Tutorial-7 &8

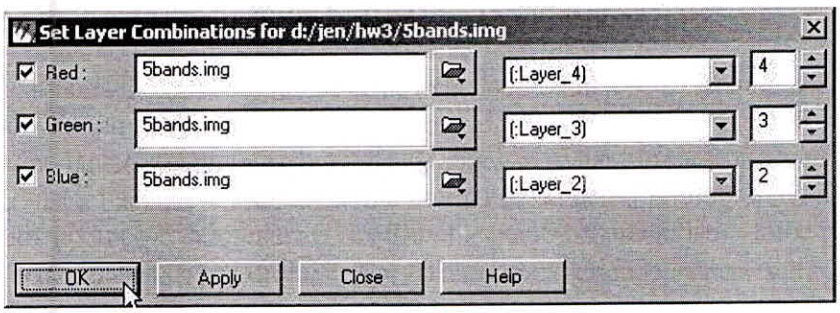
Supervised classification in ERDAS Imagine 8.4

Image interpretation is the most important skill to be learned before producing accurate land use maps from remotely sensed data. Supervised classification allows the user to define the training data (or signature) that tells the software what types of pixels to select for certain land use. Facts about the area, knowledge about aerial photography, and experience in image interpretation permit pixels with specific characteristics to be selected for a better classification of the image. Through experience, supervised classification becomes easier and more accurate.

19. Open the raster image with the different bands stacked in layers as created in tutorial 3.

20. On the Viewer menu, choose Raster and select Band Combinations from the list.

21. When the Band Combinations dialog box appears, change the layers so that the Red Layer is Near Infrared (Layer 4), the Green Layer is Red (Layer 3), and the Blue Layer is Green (Layer 2).



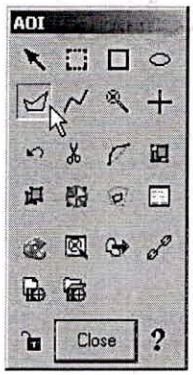
22. Hit Ok. The image that appears, shown on following page, is a common band combination used to evaluate land use and vegetation. In this image, green (band 2), red (band 3), and near infra-red (4) band are represented by blue, green, and red, respectively. This band combination and color selection make identification of bare surfaces easily distinguishable from healthy vegetation.

5. On the main ERDAS menu, select the Classifier button.

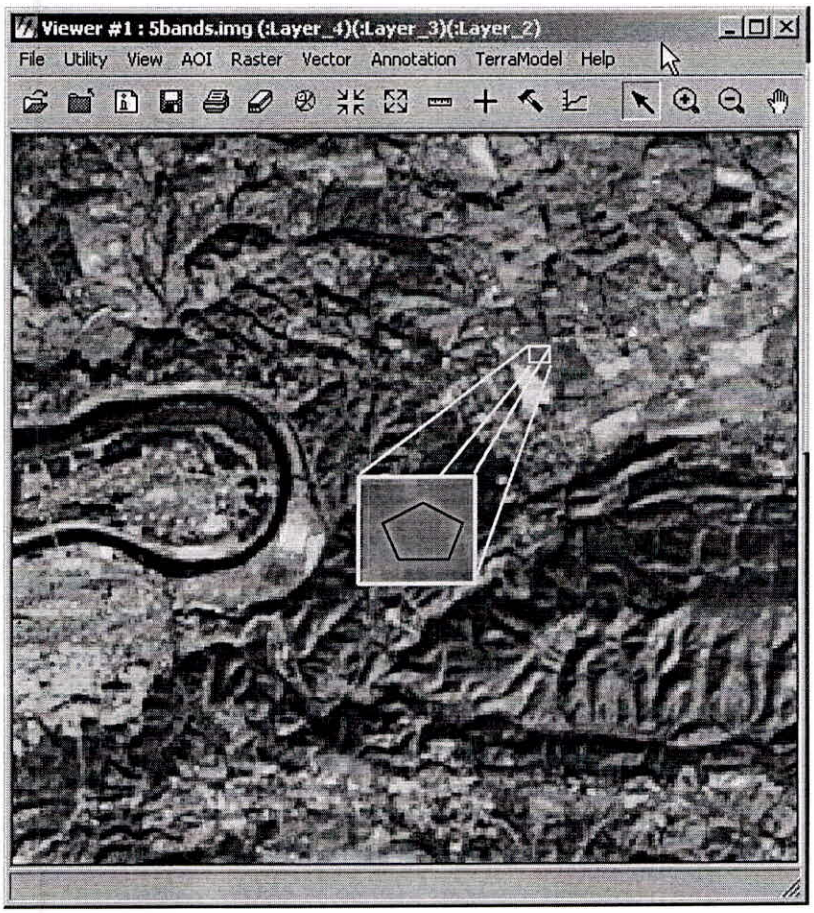
6. In the Classification menu, select Signature Editor. The signature dialog box will appear with a new file opened to begin defining training data. The signature editor allows the user to select areas of interest (AOI) to be used as training samples to categorize the photograph.

7. In the Viewer menu, select AOI and then choose Tools.

8. In the AOI Tools dialog box, select the polygon tool to create an AOI.

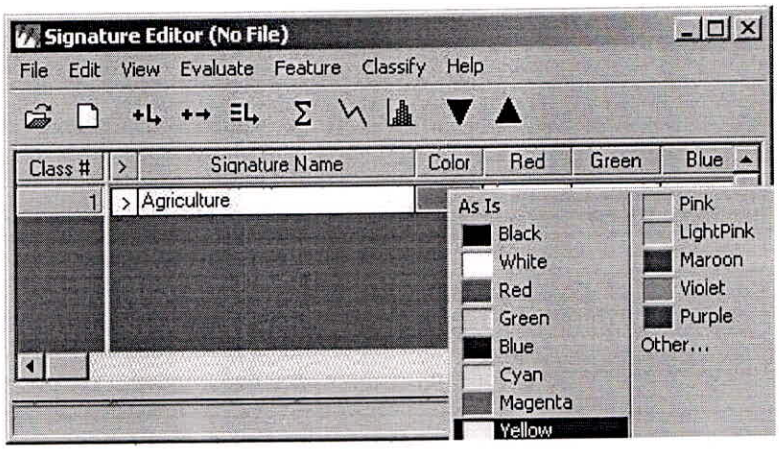


9. Zoom into an area to be classified, and draw a polygon around a specific region to be used for training data.

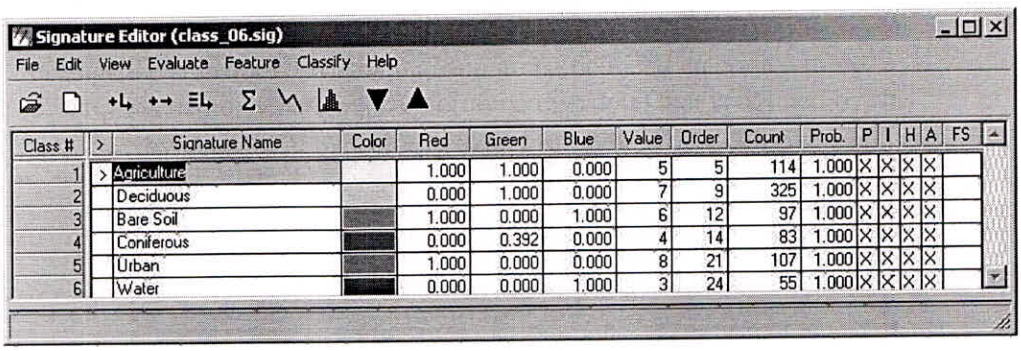


10. With the AOI still selected, hit the Select New Signature(s) from AOI button.

11. Change the signature name by clicking in the field and entering a more descriptive name. Change the color to be displayed that is defined by this signature by clicking in the color field and selecting a new color.

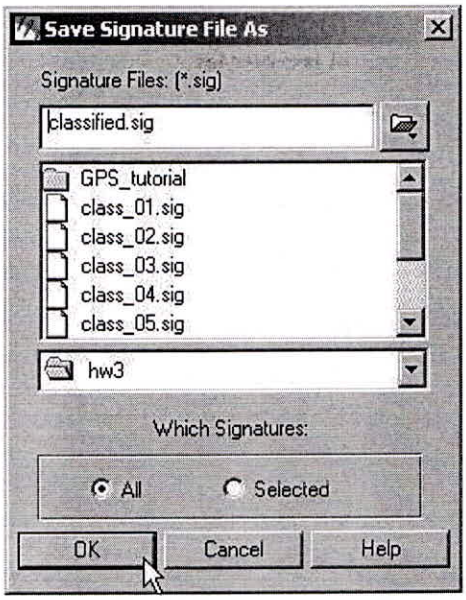


12. Continue to select more signatures until all desired land uses or areas are selected.



Class #	Signature Name	Color	Red	Green	Blue	Value	Order	Count	Prob.	P	I	H	A	FS
1	Agriculture		1.000	1.000	0.000	5	5	114	1.000	X	X	X	X	
2	Deciduous		0.000	1.000	0.000	7	9	325	1.000	X	X	X	X	
3	Bare Soil		1.000	0.000	1.000	6	12	97	1.000	X	X	X	X	
4	Coniferous		0.000	0.392	0.000	4	14	83	1.000	X	X	X	X	
5	Urban		1.000	0.000	0.000	8	21	107	1.000	X	X	X	X	
6	Water		0.000	0.000	1.000	3	24	55	1.000	X	X	X	X	

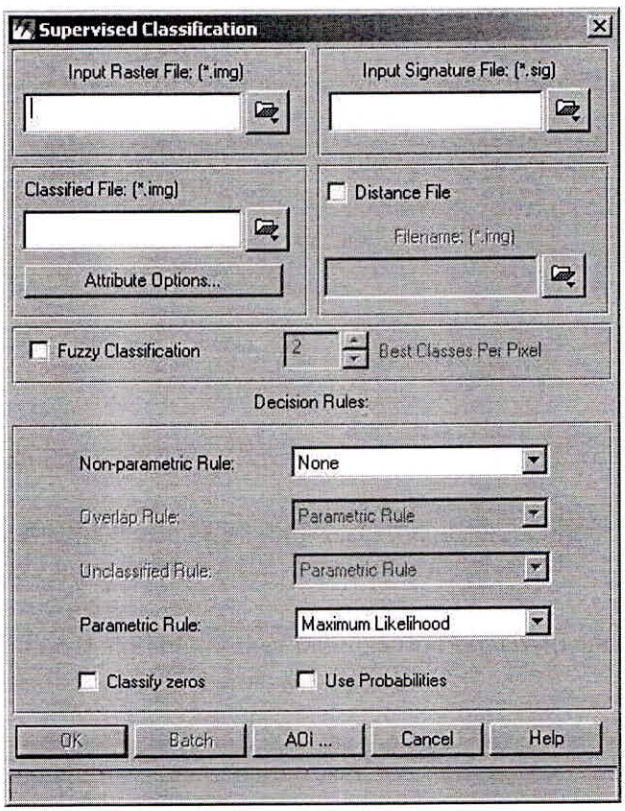
13. In the Signature Editor dialog box, select File then Save As. Browse to the desired folder. Name the file and click Ok. The resulting image classifications will distinguish deciduous from coniferous trees using different shades of green. Urbanized bare areas will be represented by red, water by blue, and agriculture by yellow. With careful pixel selection, bare soil can be distinguished from urbanized bare areas. In this example, based on knowledge of the area, bare soil is considered to be bare soil fields (as opposed to urbanized impervious areas such as asphalt).



32. Close the Signature Editor dialog box by selecting File then Close.

Now that the Signature File has been created to select the different classifications, a supervised classification can be performed.

33. In the Classification dialog box, select the Supervised Classification button. The Supervised Classification dialog box will appear.

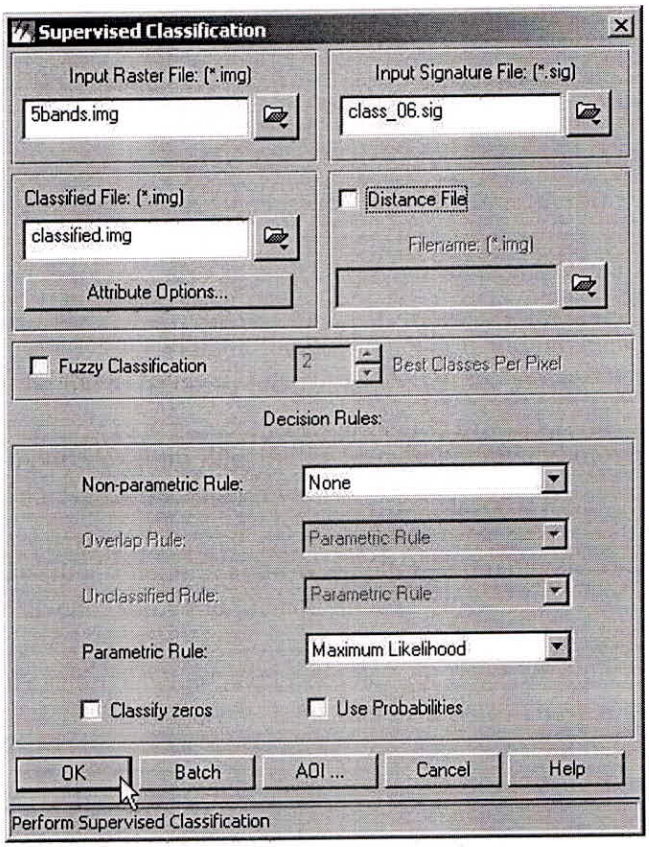


16. To select the Input Raster File, hit the browse button and navigate to the desired folder. Select the file to be classified that is open in the viewer.

17. To select the Input Signature File, hit the browse button and move to the preferred folder. Select the Signature File previously created.

18. To create a Classified File, hit the browse button and navigate to the folder where files are being saved. Name the file and hit Ok.

19. Verify the other settings below and click OK.



20. When the Status dialog box is complete, click Ok.

21. Open the newly classified file to observe the classifications and verify the signature file. Most of the land use is deciduous trees (light green), followed by agriculture (yellow), bare soil (pink), and urban (red). Water is shown in blue.

22. If the signature file needs to be edited, open the Signature Editor by clicking on it in the Classification dialog box.

23. In the Signature Editor dialog box, select File then Open. Navigate to the desired file and open the previously created signature file.

24. Edit the signature file by using the add, replace, merge, and delete (in the edit menu) options.

25. Save the redefined signature file and repeat steps 15 through 21.

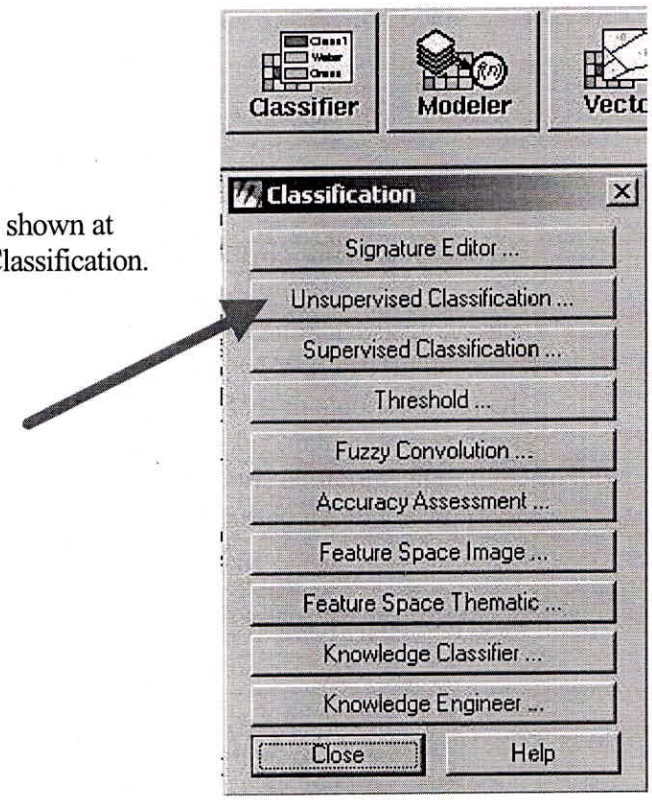
Through experience, supervised classification becomes easier and more accurate. Image interpretation is the most important skill to be learned before producing accurate land use maps.

Tutorial 2: Unsupervised classification in ERDAS Imagine 8.4

Performing an unsupervised classification, covered in this tutorial, is simpler than a supervised classification. Unfortunately, simplicity comes at a cost. In unsupervised classification, the signatures are automatically generated by an algorithm named ISODATA. The resulting classification has less discerning abilty than a supervised classification due to the lack of training data supplied to the clustering algorithm. In this tutorial, you will perform an unsupervised classification using the following steps.

26. On the main ERDAS menu, select the Classifier button, which will open the Classification menu.

27. On the Classification menu, shown at right, select Unsupervised Classification.



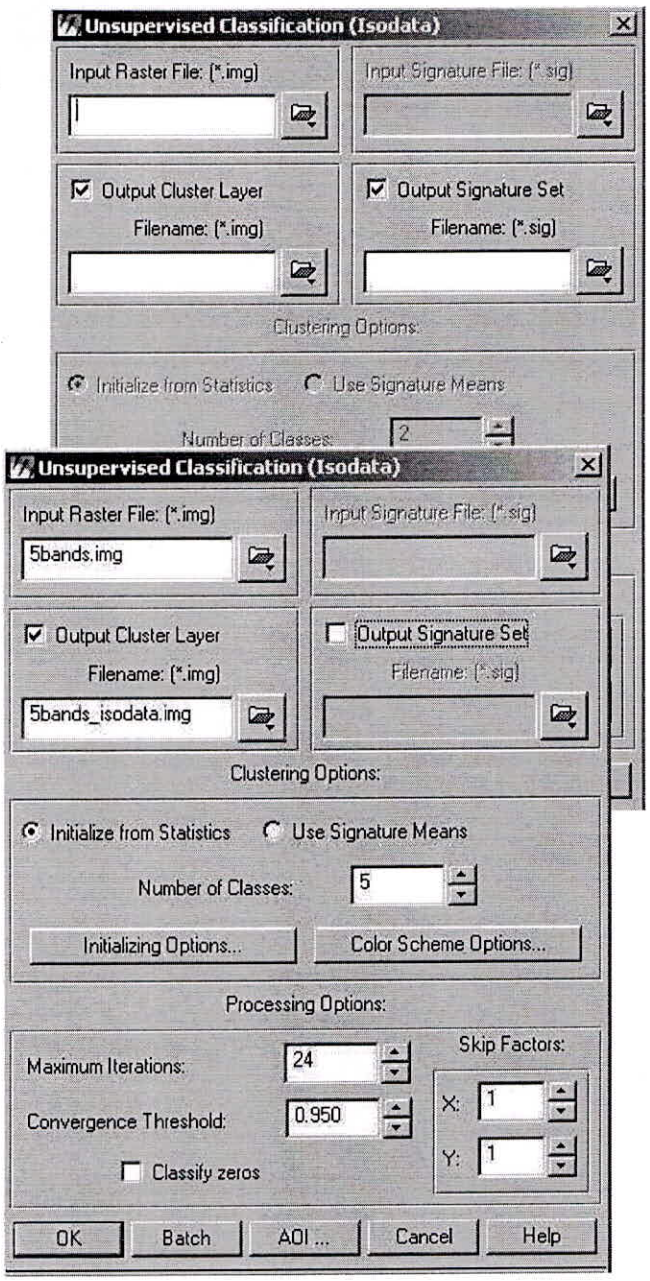
28. The Unsupervised Classification dialog box, shown on the next page, will appear.

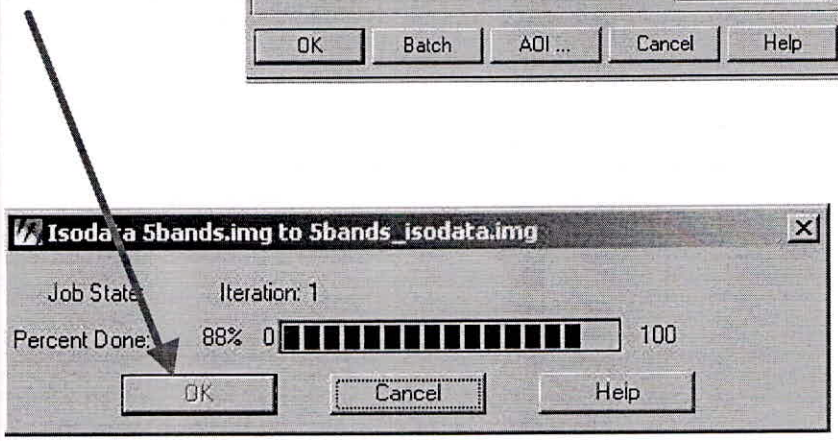
29. Under Input Raster File, place the name of the file and file location to classify. Under Output Cluster Layer, give the target destination and filename of the output file. Click the Output Signature Set to disable the Output Signature Set filename box (you will not be creating a signature set as you did with supervised classification).

30. Next set the clustering options as follows; Maximum Iterations = 24 and Convergence Threshold = 0.950, as shown below.

31. Put 5 for number of classes. Click OK to begin the classification process.

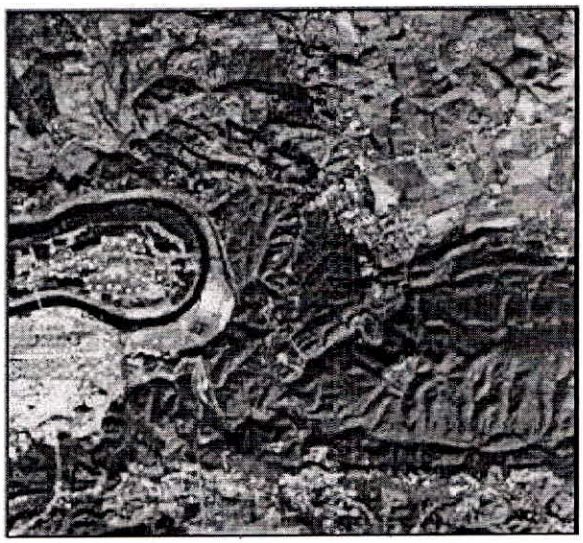
32. The job status dialog box, shown below, will alert you as to progress. Hit OK when the process is 100% complete.



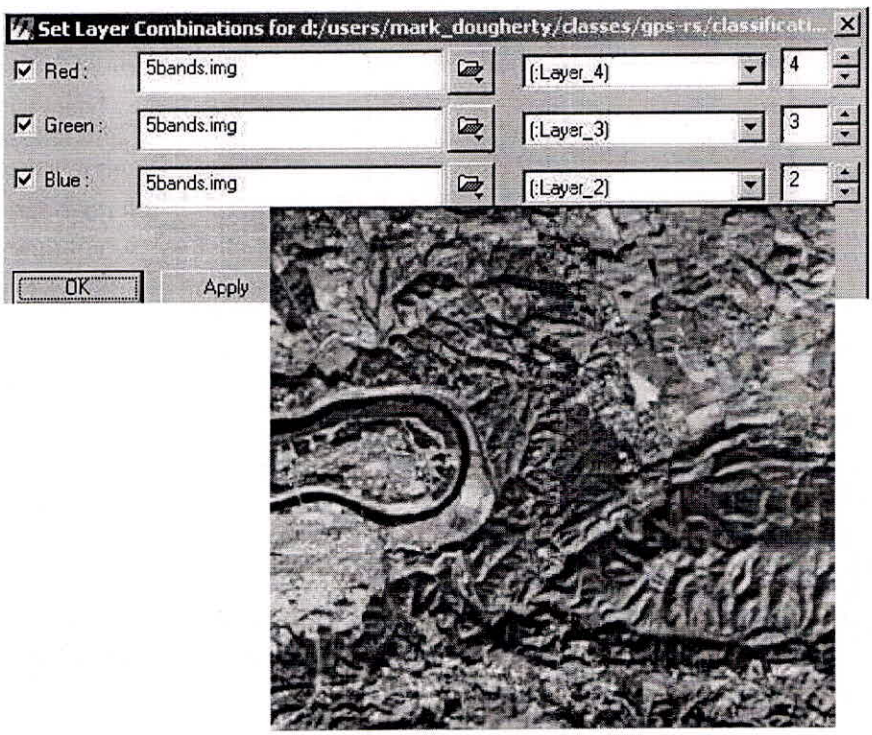


33. After the classification process is complete (yes, that is all there is to unsupervised classification processing), you will want to evaluate and test the accuracy of the classification. You may also want to reclassify your image using a different number of classes with a different number of iterations. Let's see what the classified image looks like.

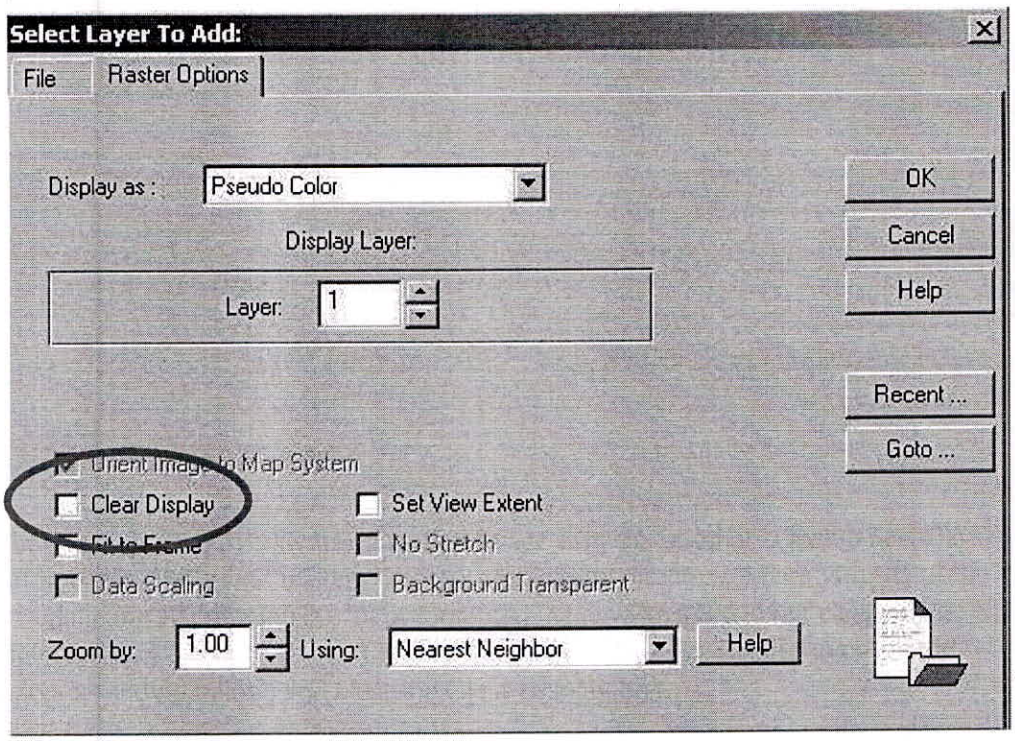
34. A good way to evaluate the results of the unsupervised classification is to overlay the original image data with your *_isodata.img file. To do this, from the Viewer menu bar open the original image with File ✍ Open ✍ Raster Layer. The image at right should appear in your viewer.



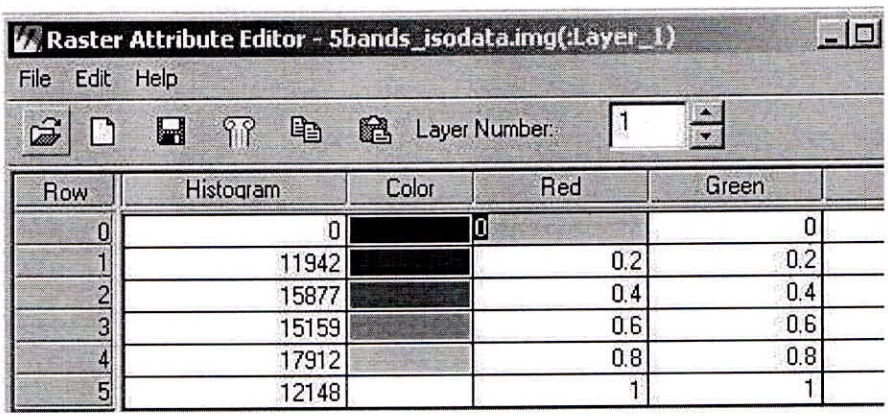
35. Change the colors displayed to match those used in tutorial 4 by selecting from the Viewer menu bar Raster ✍ Band Combinations. Change the Layers to Colors 4,3, and 2. The following familiar image should appear.



36. The next step is to overlay the classified image over the original. Open a new file dialog box as described in step 9, above. Select the directory where you saved the *_isodata.img file previously. In order to add the new image without clearing the original image, click the Raster Options tab at the top of the Select Layer to Add dialog, as shown below, and clear the Clear Display box.

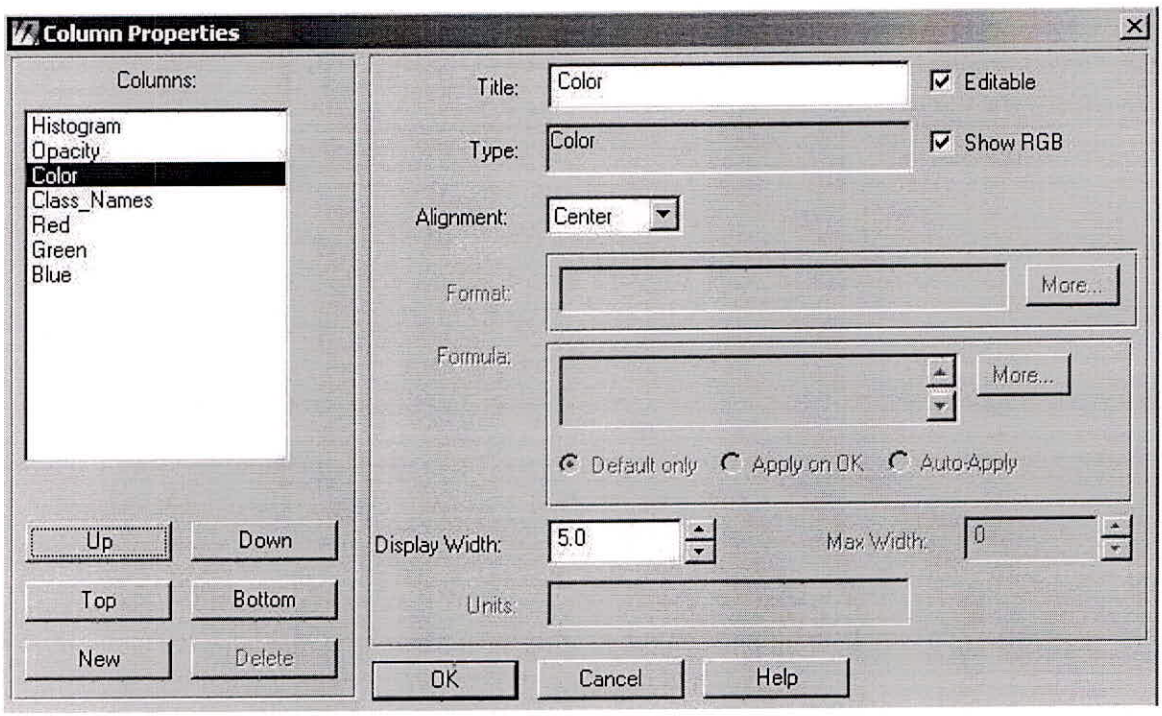


37. After loading the *_isodata.img image, select Raster ✍ Attributes then Edit ✍ Column Properties. You will rearrange the columns of the following editor box as follows;

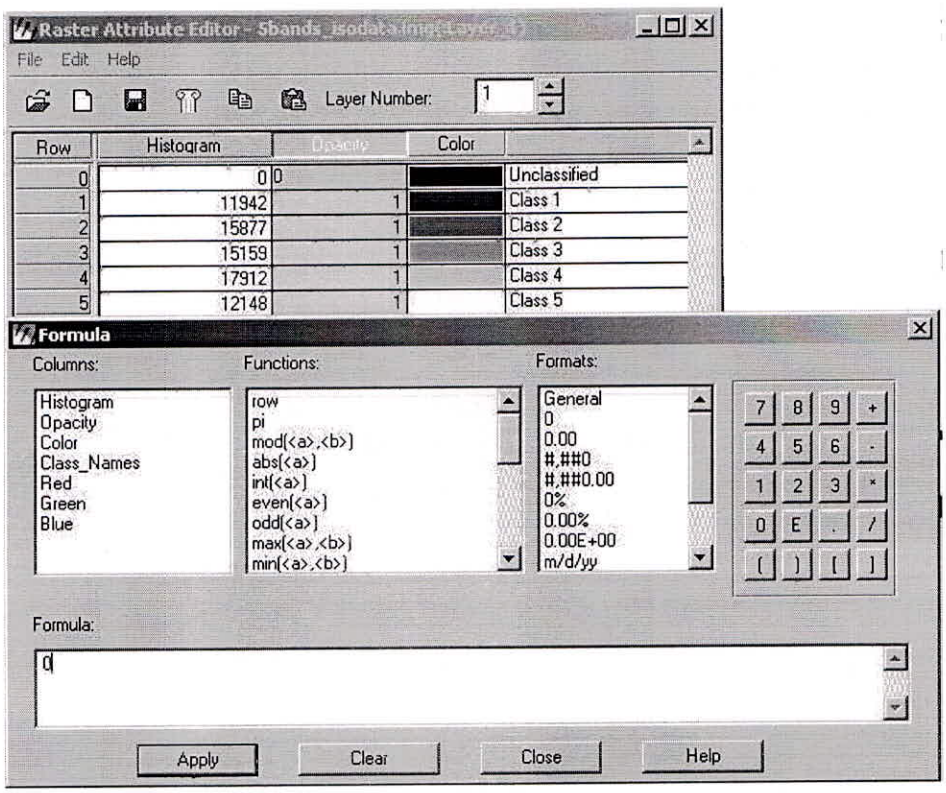


Row	Histogram	Color	Red	Green
0	0		0	0
1	11942		0.2	0.2
2	15877		0.4	0.4
3	15159		0.6	0.6
4	17912		0.8	0.8
5	12148		1	1

38. Select the column headings one at a time as shown and hit the Up key to rearrange the headings, as shown. When complete, hit OK.



39. The Raster Attribute Editor box, below will appear with columns as below.



40. Next, select the Opacity column to highlight all the values in blue (shown above). Select Edit ✍ Formula and place a zero in the Formula box function above as a value for all cells in the column. This makes the newly classified image effectively transparent, until you are ready to add colors, one at a time.

41. Change the color and opacity in Class 1 to red and 1, respectivel, and note the change in the raster image displayed.

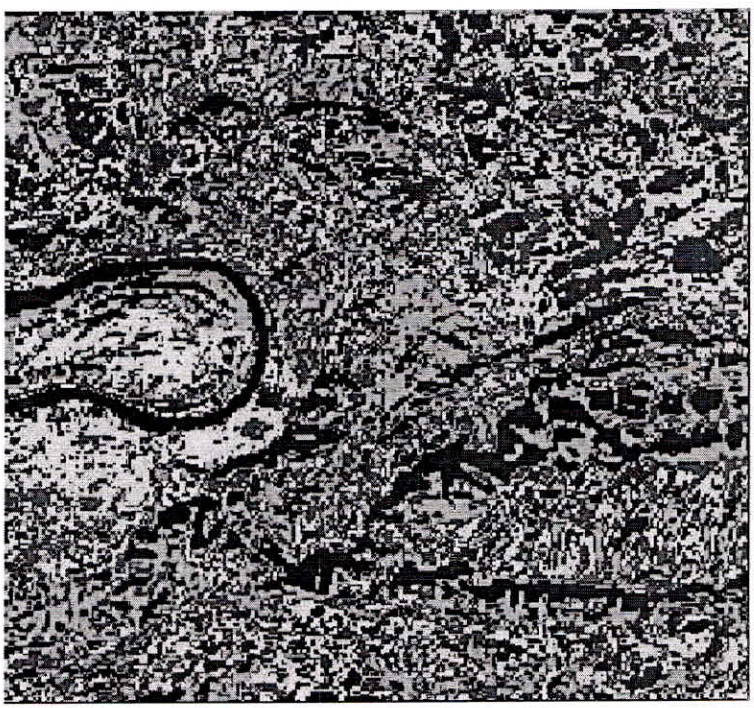
Raster Attribute Editor - 5bands_isodata.img(:Layer_1)

File Edit Help

Layer Number: 1

Row	Histogram	Opacity	Color	
0	0	0		Unclassified
1	11942	1		Class 1
2	15877	0		Class 2
3	15159	0		Class 3
4	17912	0		Class 4
5	12148	0		Class 5

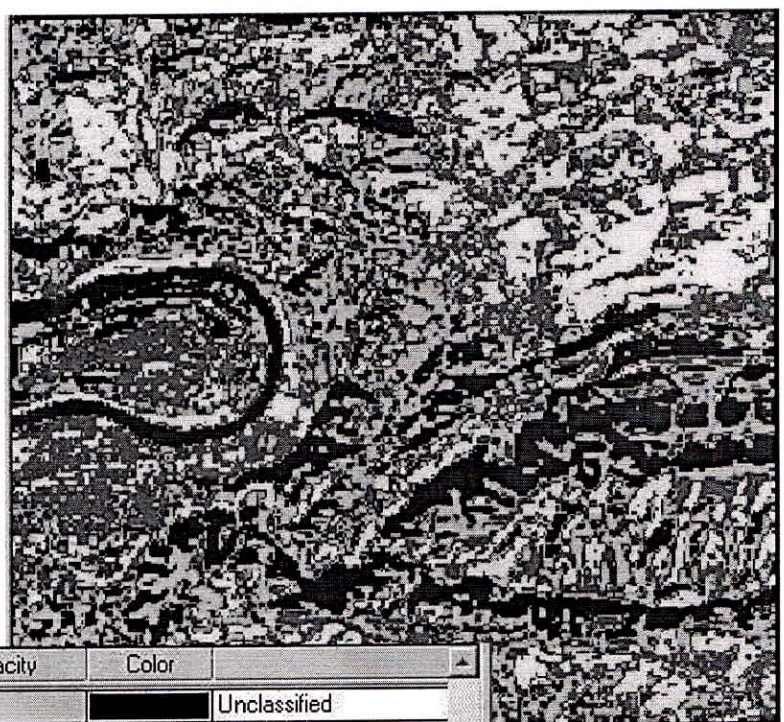
42. Continue editing the five classes one at a time, adding colors of your choice to represent what you think to be specific features. The appearance of the final drawing will depend on the color combination and number of classifications you choose. For example, the first color chosen above, red, does not seem appropriate for water, which is obviously displayed in the image. This color and heading can easily be edited to blue by clicking on the cell. The resulting drawing and legend may look like the following, at right. Note that the Classes have not been given names, yet. With unsupervised classification, it is often necessary to do



14ground truthing *after* the classification is complete. As stated previously, several attempts at the unsupervised classification may be desirable to achieve a land classification that is understandable.

Row	Histogram	Opacity	Color	
0	0			Unclassified
1	11942	1		Class 1
2	15877	1		Class 2
3	15159	1		Class 3
4	17912	1		Class 4
5	12148	1		Class 5

43. A somewhat more intuitive image display is presented below. The color scheme is the same, but the image has been re-classified using only four classes. Although the map below may be easier to interpret than the one above, it likely will have somewhat less discriminatory detail. Be aware that there are bound to be trade-offs in the selection of classes that will depend upon the use being made of the data and the land use being categorized.



Row	Histogram	Opacity	Color	
0	0			Unclassified
1	15982	1		Class 1
2	19270	1		Class 2
3	21494	1		Class 3
4	16292	1		Class 4

44. A useful aid to evaluating unsupervised classifications is through the use of the Utility menu on the viewer menu, specifically the Blend, Swipe, and Flicker commands. Each of these commands will bring a control box that will either blend, or swipe, or flicker the upper-most image alternately with the lower image within the View. Recall from step 11 that you overlaid the classified image on top of the original, which you can now view in periodic "swipes" or "flickers" or "blends" to help evaluate the types of land cover beneath your classified image.

45. The following are the three control boxes that are activated by the Blend, Swipe, and Flicker commands. We leave it to you to experiment with these handy tools as you gain more experience in your classification skills. Enjoy!