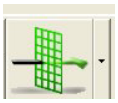
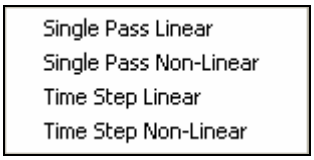
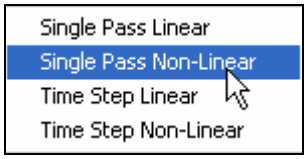
Exercise 5
Building a Single Pass Non-Linear Model of Cattle Distribution in the California Foothills

Step 1: Launching the Multi-Criteria Analyses

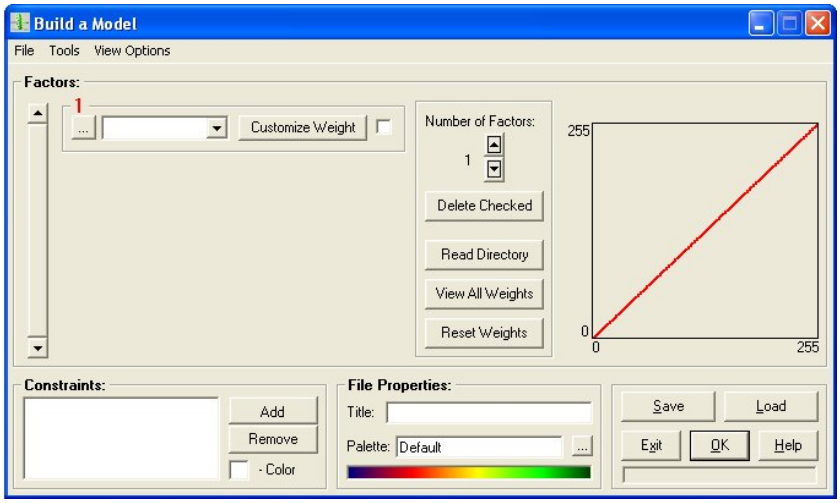
From the lower tool bar, click onto the Multi-Criteria Analyses icon. 
This will initiate a dropdown menu with four choices of model types: Single Pass Linear, Single Pass Non-Linear, Time Step Linear, and Time Step Non-Linear. You can choose one of these four types of models.



For this exercise, click on the second choice, “Single Pass Non-Linear.”



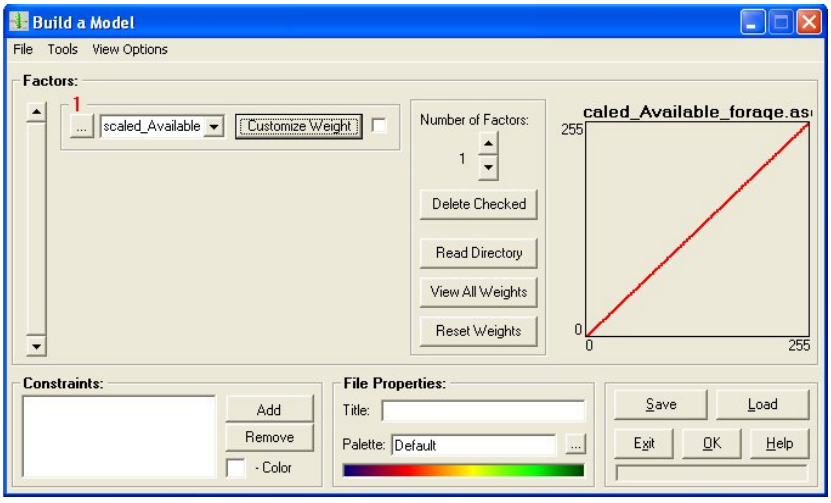
This will open a new window titled “Build a Model.”



Step 2: Loading the Factors

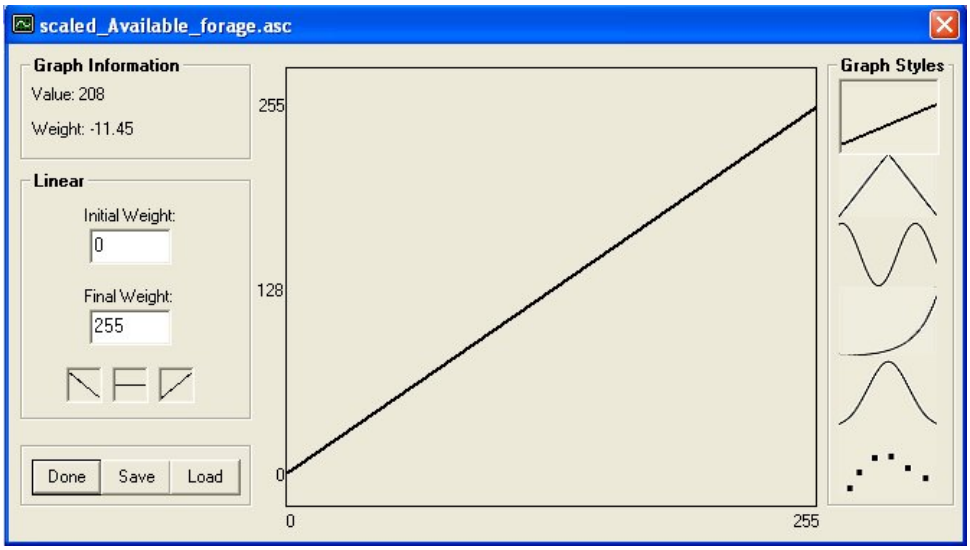
The next step is loading the factors. In the "Build a Model" window, select the number of factors you want to add on the far right-hand side. The factors can be loaded either one at a time or all at once. To do them individually, click on the "…" button next to the file name to search for the desired file. The file name can also be typed directly into the blank text space; however, for the file to be found there can be no spelling errors. If you want to add all the files in a working directory, click on the "Read Directory" button. It is important to remember that all factor formats are ASCII raster layers and should have the "*.asc" extension.

The image below shows the addition of one factor, the scaled file demonstrating available forage.

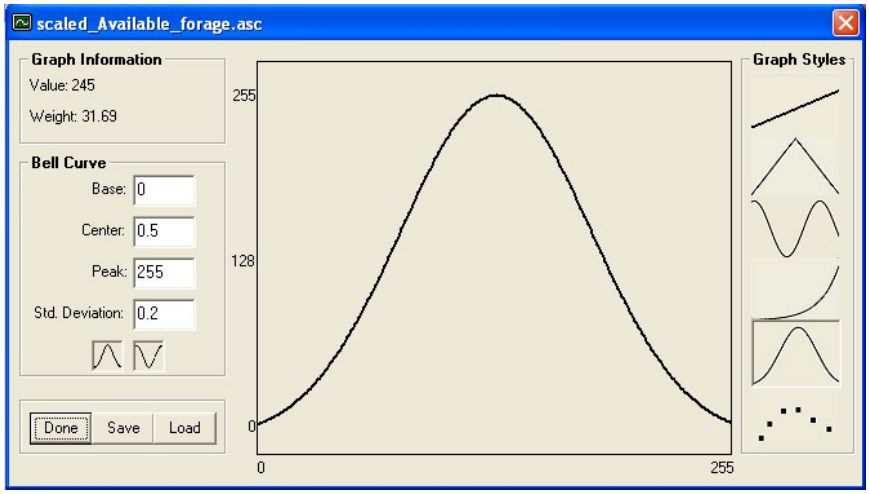


Step 3: Customizing the Weight of the Factor

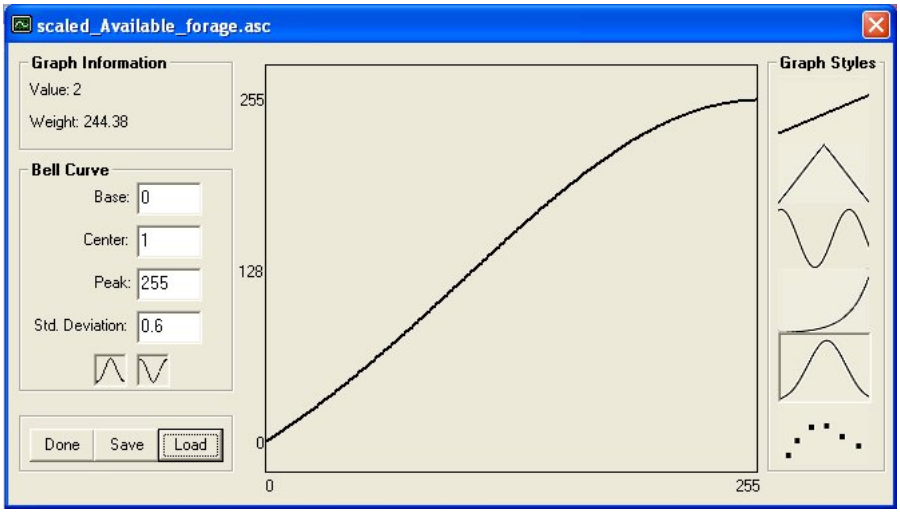
The default setting shows a linear relationship between weights. To change this, click on the "Customize Weight" tab to the right of the file title space. A new window will appear, as shown below.



To alter the format from the straight line to a curved line chose the bell curve graph style in the lower right-hand corner of the window.

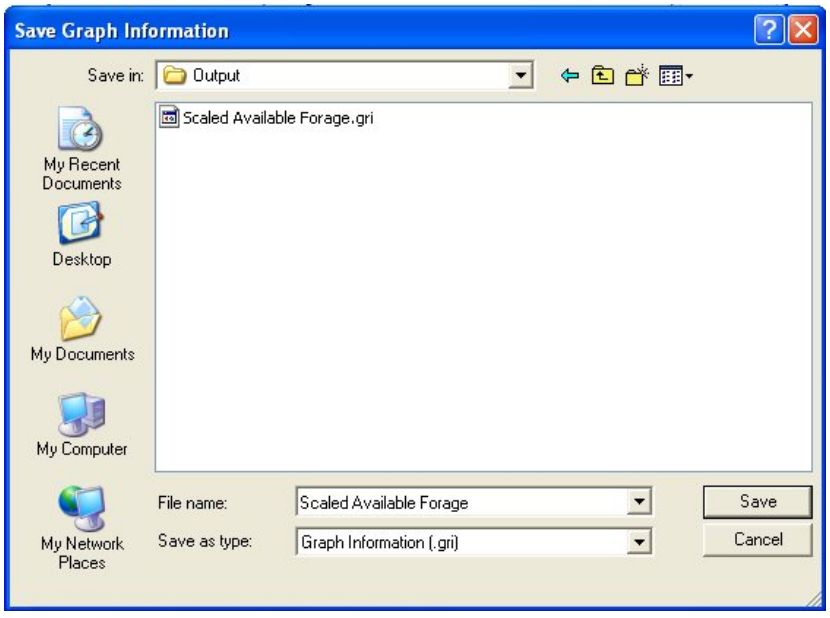


This will change the settings below "Graph Information" to pertain to the "Bell Curve." You can input your own numeric data here. For now, type in the number 0 next to the "Base" option, the number 1 for the "Center" section, 255 for "Peak", and 0.6 for "Standard Deviation".



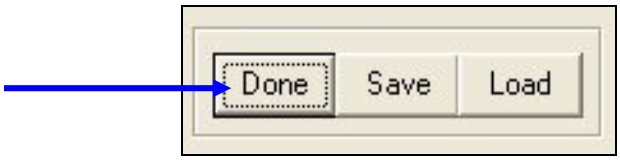
Step 4: Saving Graph Information

The graph information should now be saved. Click on the "Save" button to do this. The file name can remain the same because the file type changes to a "Graph Information" file ("*.gri").

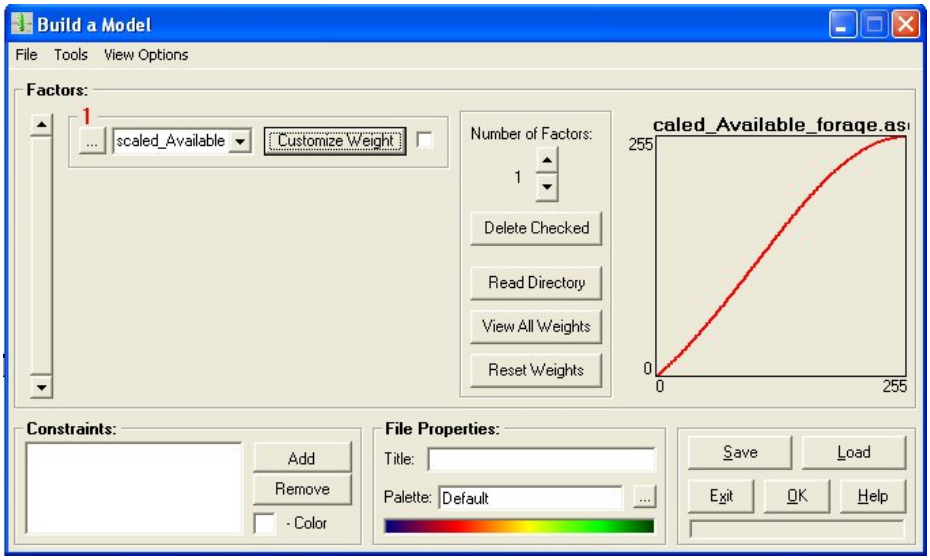


Step 5: Returning to the Main Page

Once saved, the program will show the selected graph information window again. Click on the "Done" button to return to the "Build a Model" main page.

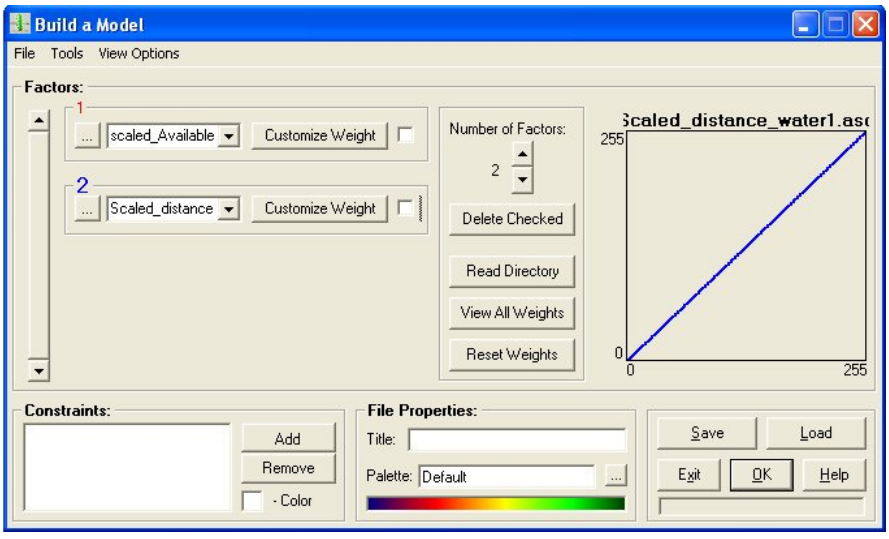


At this point, your window should show the factor layer with a curved line graph on the right-hand side.



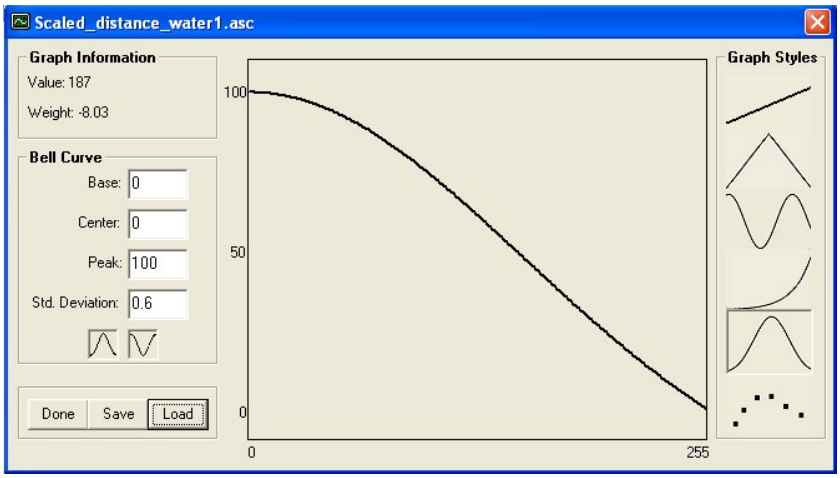
Step 6: Loading the Second Factor (Distance to Water)

Once the first factor has been added and modified, a second factor can be included. To do this, increase the number of factors (clicking on the up arrow) to 2. Load the file portraying the distance from water following the procedures previously described in Step 2.



Step 7: Customizing the Weight of the Second Factor

To customize the weight for the second factor, click on the “Customize Weight” button and follow the same procedures for altering the linear graph to a bell curve and adding applicable numeric data. For this exercise, type in the following numbers: Base = 0, Center = 0, Peak = 100, and Standard Deviation = 0.6.

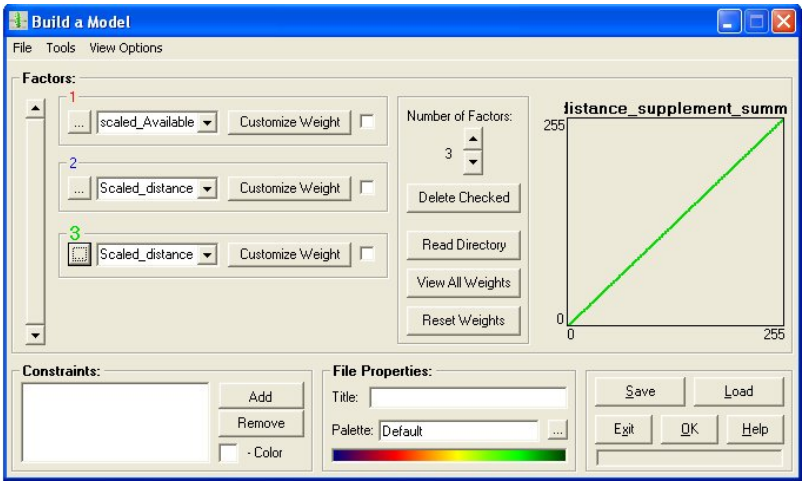


Step 8: Saving the Graph and Returning to the Main Window

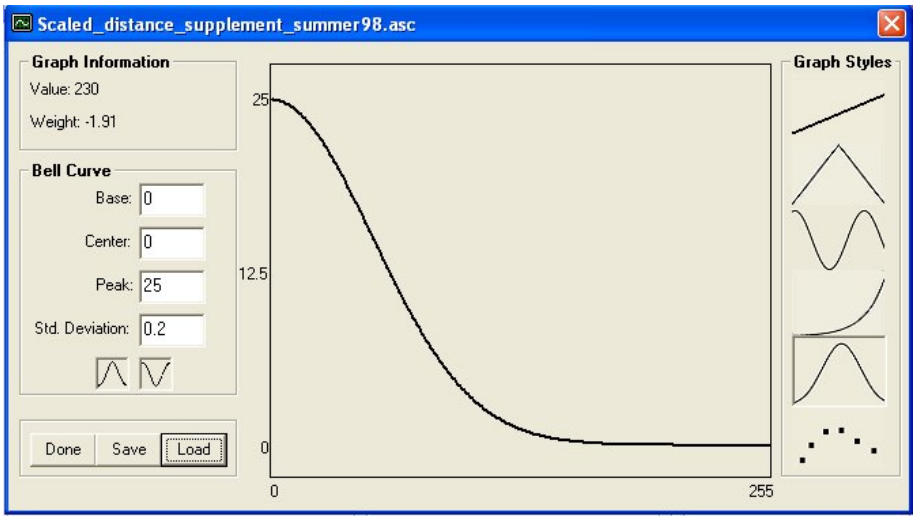
Repeat steps 4 and 5 to save the graph information and return to the main menu.

Step 9: Adding and Customizing the Third Factor

The third and final factor to add is the distance from supplement. Follow the previous procedures for adding the factor file and customizing the weight.



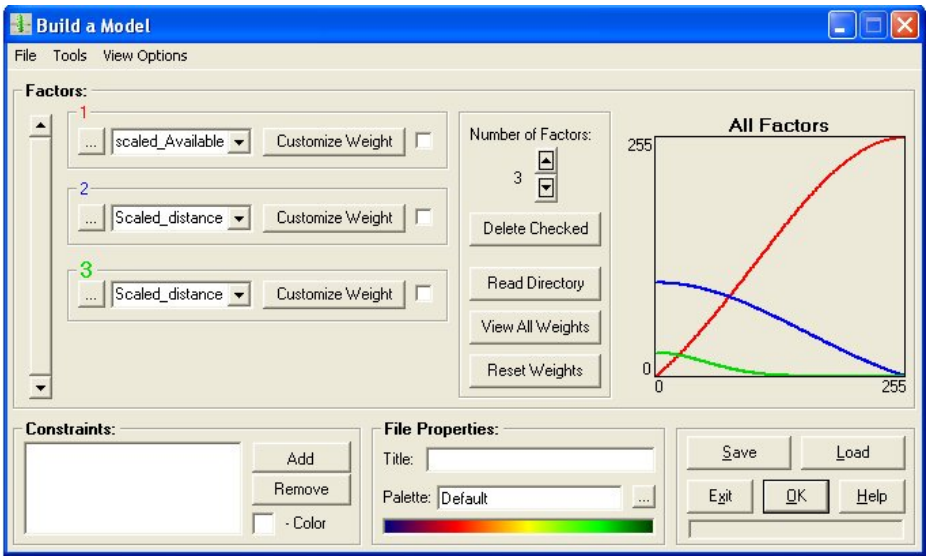
On this layer, the base and center values should be 0, the peak value should be 25, and the standard deviation should read 0.2, as shown below.



Then save the graph and click on done to return to the main window.

Step 10: View All Weights

Click on the "View All Weights" icon in the center of the window to display graphs of all three factors.

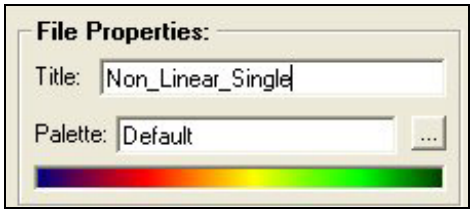


Step 11: Adding the Constraint Layer

Since this example has one constraint, a constraint layer needs to be added. This is done by clicking on the “Add” icon in the “Constraints” box. Choose the file “mask.asc” and add it.

Step 12: Naming the Model

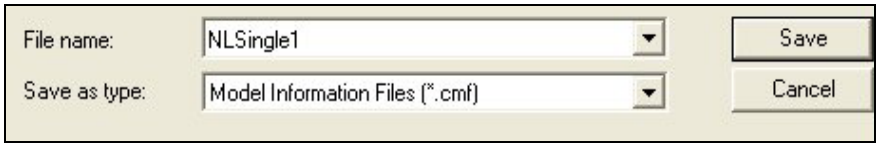
Then give the model a title so that it can be identified in the future.



Step 13: Saving the Model

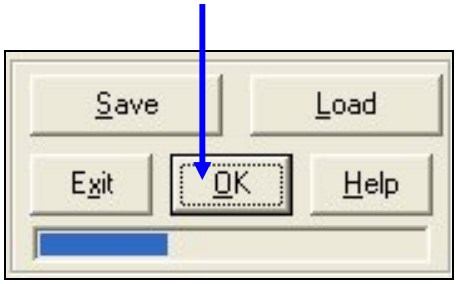
Click on the “Save” icon.

A new window “Save Model Information” will appear. Under “File Name” write NLSingle1. The extension file name for this type of file is a Model Information File (“*.cmf”).



Step 14: Running the Model

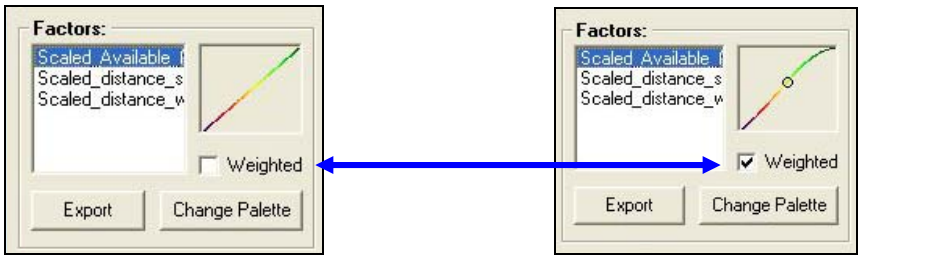
Once the model has been saved, you can run it. Click on the "OK" button and watch the progress bar indicating the length of time before completion. This process should not take more than few seconds.

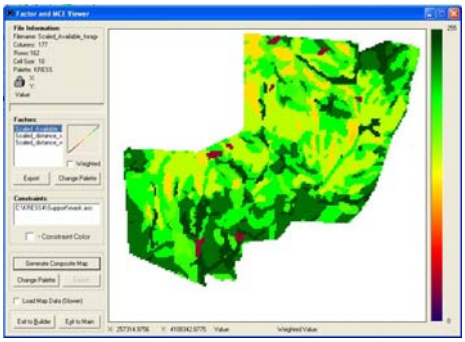


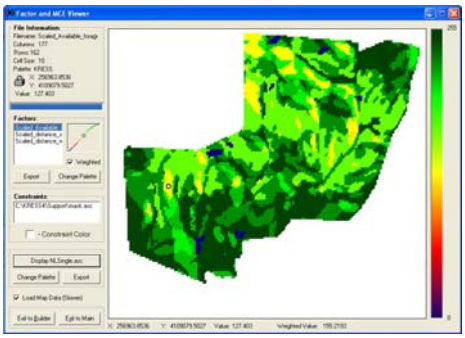
Step 15: Displaying Factors

Upon completion, a new window, "Factor and MCE Viewer," will display each layer. As seen in the previous tutorial exercise, the first factor (in this case the forage layer) is displayed automatically. The top left-hand corner displays file information, including the file name, the factor weight, the number of columns and rows, the number of pixels, and XY reading showing the position of the cursor on the map.

The default will display each factor based on a linear relationship. Since weighted factors were created using the bell curve graphing option, refer to those by checking the box marked "Weighted". This step and the subsequent differences in maps are pictured below.

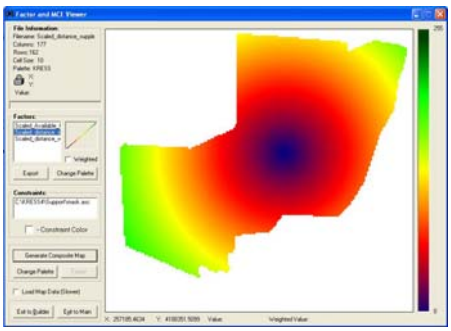


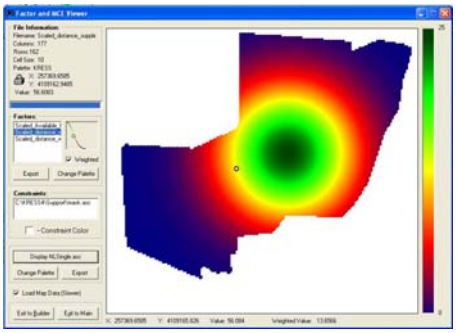




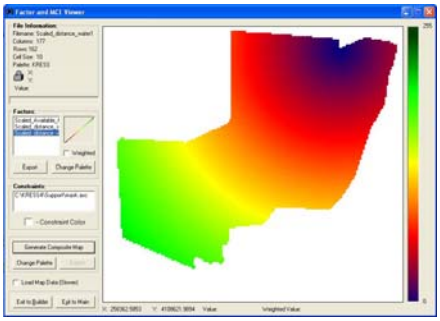
As seen in previous maps, the higher values (in this case, the darker greens) indicate increased amounts of forage.

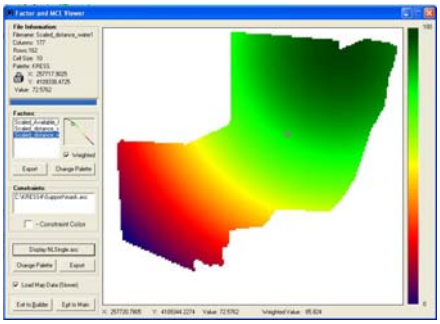
To display the second factor, highlight the “distance from supplement” file name. Again, check the “Weighted” box to alter the map according to the previously set bell curve graph standard.





These steps can be repeated to display the third factor showing distance from water. Notice the changes in the map values as the weighted amounts are accounted for.

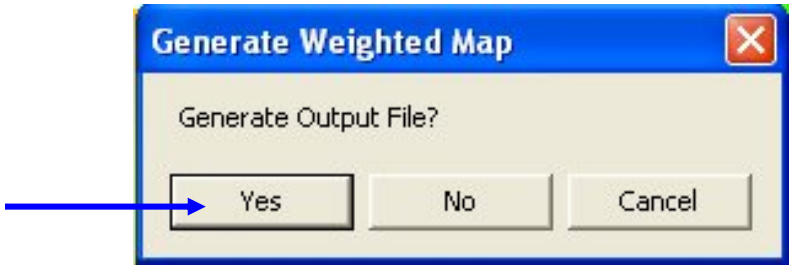




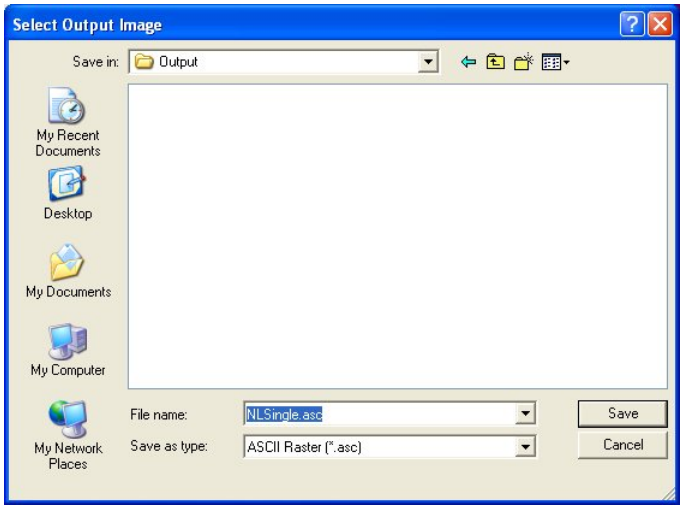
Step 16: Generating a Suitability Map

To generate a suitability map for all three features, click on the “Generate Suitability Map” icon.

The next window will ask you if you would like to generate an output file. Click on “Yes”.

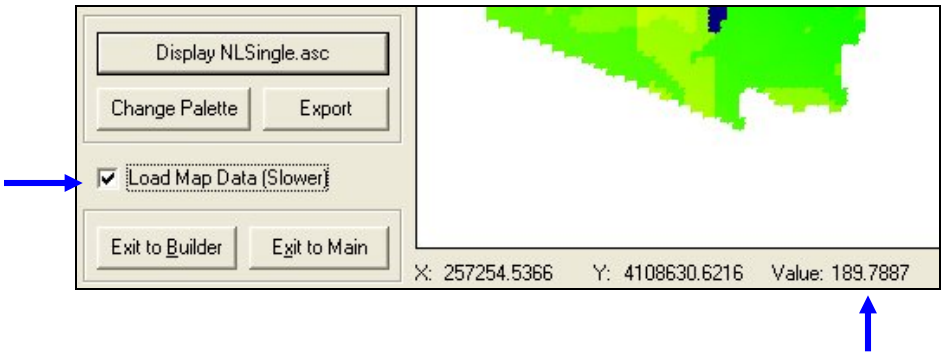


When asked for a file name, type in “NLSingle,” making sure that it saves as an ASCII Raster file (“*.asc”).



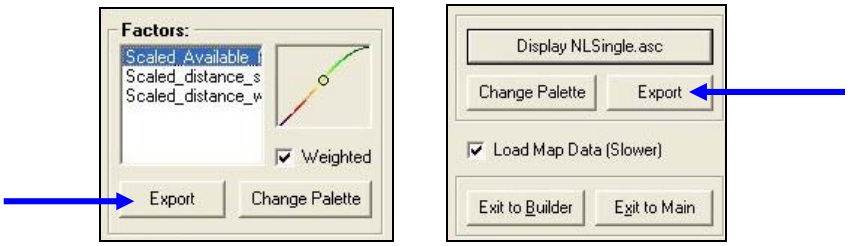
Step 17: Querying the Output

To query the output, check the box next to “Load Map Data.” Because this option makes the analysis move at a slower pace, the default leaves it un-marked. After selecting this option, move your cursor over the map, noticing that there are now X and Y positions and a “Value” attributed to the area.

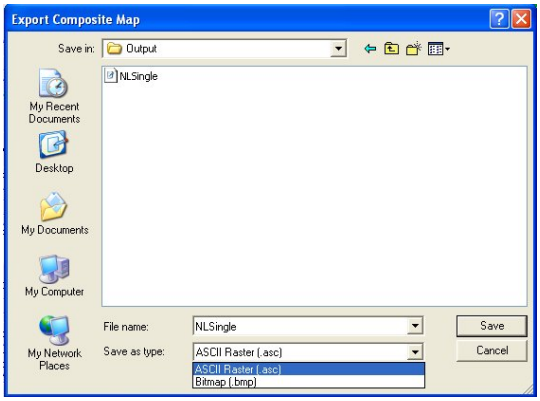


Step 18: Exporting Maps

Each of these factors can be exported as bitmap files, facilitating their incorporation into reports and power point presentations. To do this, choose one of the "Export" option, as shown below.



In the "Export Composite Map" window, you have the choice of exporting in either an ASCII ("*.asc") or a Bitmap ("*.bmp") format. Choose the latter option.



Finally, you can select either "Exit to Builder" to run another model or "Exit to Main" to return to the main page of KRESS Model.