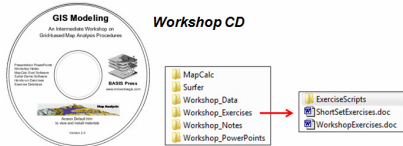


Hands on Exercises for

Grid-based Map Analysis and GIS Modeling Workshop

- Exercise #1 – **Map Analysis Framework** (MapCalc)
- Exercise #2 – **Example of a Simple Erosion Potential Model** (MapCalc)
- Exercise #3 – **Reclassify and Overlay Techniques** (MapCalc)
- Exercise #4 – **Measuring Distance and Connectivity** (MapCalc)
- Exercise #5 – **Characterizing Spatial Neighborhoods** (MapCalc)
- Exercise #6 – **Surface Modeling** (MapCalc and Surfer)
- Exercise #7 – **Spatial Data Mining** (MapCalc)
- Exercise #8 – **Gaining GIS Modeling Experience** (MapCalc)
- Optional Exercise – **Data Exchange Procedures** (MapCalc)

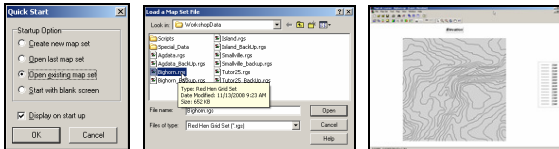


The following “**short set**” of exercises used in the workshop are designed to demonstrate basic *Map Analysis* techniques and *GIS Modeling* considerations. For a more thorough experience, complete the “**full set**” of Workshop Exercises as homework using the software contained on the Workshop CD.

(Short Exercise #1) Map Analysis Framework (Raster; grid-based data structure and analysis)

Install *MapCalc* from the *Workshop CD* using `\MapCalc\mapcalc_learner.exe`.

Access *MapCalc* by Start → Programs → MapCalc Learner → **MapCalc Learner** and select “**Open existing map set**” then browse to the ...**WorkshopData**\ folder you copied from the workshop CD and select **Bighorn.rgs** as the database.



Display Tools



Layer Contour button → mouse-over to identify Elevation values within contour polygons



Layer Mesh button



Toggle 3D View button



Rotate button



Reset View to Defaults button



Zoom-in button → click and drag area on the map to be enlarged



Use Cells button

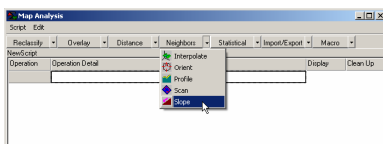


Select button → mouse-over to identify Elevation values within grid cells

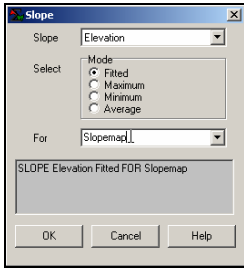
Example Map Analysis (Slope operation identifying terrain steepness)



Map Analysis button, select **Neighbors** → **Slope**

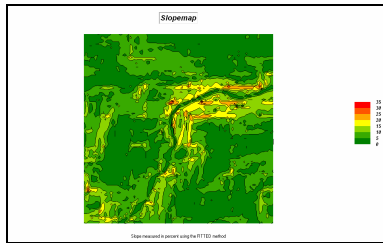


...accessing the **Slope** command



Enter **SLOPE Elevation Fitted FOR Slopemap** command, then **OK** button

Min [>=]	Max [<]	Count	acres	% Gridded Area	Color	Lock
30	35	4	0.89	0.041	Red	On
25	30	20	4.45	0.2	Orange	Off
20	25	162	36	1.7	Yellow	Off
15	20	499	111	5.1	Light Green	On
10	15	1447	322	15	Green	Off
5	10	3692	821	38	Dark Green	Off
0	5	3977	884	41	Very Dark Green	On



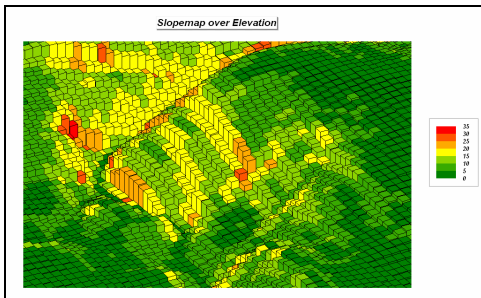
Double-click on *Slopemap*

legend and swap Red (to high values) and Green (to low values) color assignments



View, Rename and Delete Layers button → **Elevation** → **View**

And then from the **Main Menu** at the top, select **Map** → **Overlay** → **Slopemap**



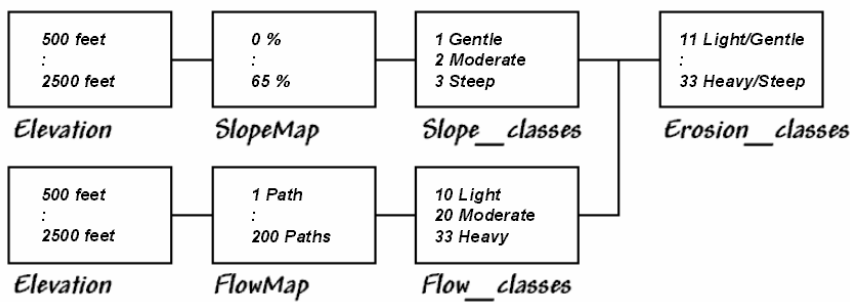
Use Cells button



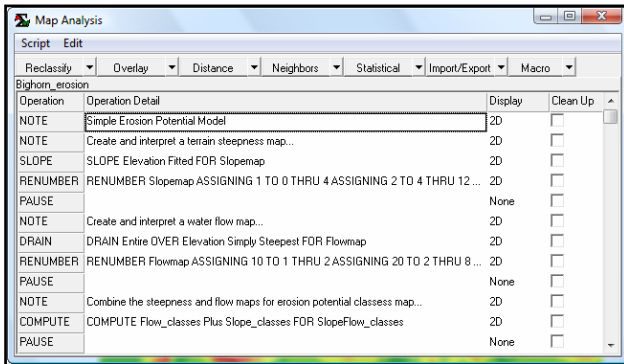
Zoom-in button → click and drag area on the map

(Short Exercise #2) Example of a Simple Physical Model (Erosion Potential Model that Derives, Calibrates and Combines map layers)

Become familiar with the following simple model flowchart and script for estimating soil erosion potential—



Logical processing sequence (Flowchart)...

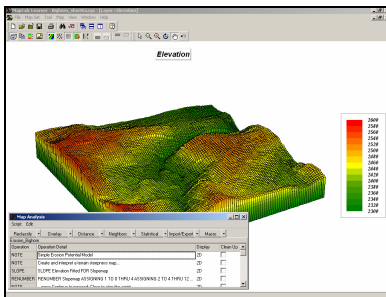


Command sequence (**Script**)



Press the **Map Analysis** button to pop-up the *Map Analysis* dialog box.

Select **Script**→ **Open** and then browse to and select **Bighorn_Erosion.scr** file in the ...\\WorkshopData\\Script\\ folder.



Resize and position the script window to the lower-left portion of the display.

Execute the command script a line at a time by double-clicking on the line and interpreting the dialog box information. Submit a command line by pressing **OK**. The first portion of the erosion model...

NOTE	Create and interpret a terrain steepness map...
SLOPE	SLOPE Elevation Fitted FOR Slopemap
RENUMBER	RENUMBER Slopemap ASSIGNING 1 TO 0 THRU 4 ASSIGNING 2 TO 4 THRU 12...

...creates a map of terrain steepness (**Slopemap**) then “calibrates” the steepness into three classes (1= Gentle, 2= Moderate, 3= Steep). The next portion of the model...

NOTE	Create and interpret a water flow map...
DRAIN	DRAIN Entire OVER Elevation Simply Steepest FOR Flowmap
RENUMBER	RENUMBER Flowmap ASSIGNING 10 TO 1 THRU 2 ASSIGNING 20 TO 2 THRU 8...

...creates a map of water confluence (**Flowmap**) then “calibrates” water flow into three classes (10= Light, 20= Moderate, 30= Heavy). The final portion of the model...

NOTE	Combine the steepness and flow maps for erosion potential classes map...
COMPUTE	COMPUTE Flow_classes Plus Slope_classes FOR SlopeFlow_classes

...combines the steepness and flow maps into a single erosion potential map (**Erosion_classes**) to identify each map location by a two-digit code where the first number (tens digit) indicates the flow class and the second number (ones digit) indicates the steepness class. For example, 11= Light/Gentle (low erosion potential) and 33= Heavy/Steep (high erosion potential).

NOTE	Calibrate Erosion Classes for Erosion Potential ...1= high EP (reach farther) through 9= L...
RENUMBER	RENUMBER SlopeFlow_classes ASSIGNING 1 TO 33 ASSIGNING 2 TO 32 ASSIG...
NOTE	Calculate the effective distance from streams for every location in the project area
SPREAD	SPREAD Water NULLVALUE PMAP_NULL TO 300 THRU Erosion_potential Simply F...
NOTE	...end of script
RENUMBER	RENUMBER Water ASSIGNING -1 TO 1 FOR NewMap
COVER	COVER Erosion_eProx_Buffers WITH NewMap IGNORE 0 FOR EPot_display

The remaining commands create a variable-width buffer around streams (Full exercise #2).

(Short Exercise #3) Example of a Suitability Model (Habitat Suitability Model that Derives, Calibrates and Combines map layers)

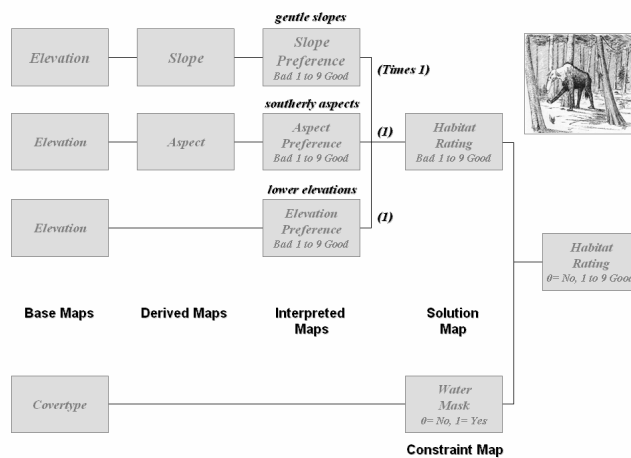
The combination of geographic factors often determine habitat quality. In this example, using the Bighorn.rgs database Hugags in this locale have shown a preference for...

- Gentle Slopes (<10%)
- Southerly Aspects (E-W)
- Lower Elevations (<2450 feet)

...are evaluated using computer-based map analysis techniques for Binary, Ranking and Rating suitability models.

Using the flowchart and script listing below, become familiar with the model logic ingrained in each processing step that leads to the final Hugag habitat suitability map.

Conveying Suitability Model Logic



```

Map Analysis
Script Edit
Reclassify Overlay Distance Neighbors Statistical Import/Export Macro
Bighorn_Habitat
Operation Operation Detail Display Clean Up
NOTE Simple Habitat Models... 2D
NOTE Create maps of Slope and Aspect... 2D
SLOPE SLOPE Elevation Fitted FOR SlopeMap 2D
ORIENT ORIENT Elevation Octants FOR AspectMap 2D
NOTE ...press Continue to proceed; Close to stop the script 2D
PAUSE None
NOTE Binary Model- gentle, southern and low... 2D
RENUMBER RENUMBER SlopeMap ASSIGNING 1 TO 0 THRU 10 ASSIGNING 0 TO 10 THRU 100 FOR S_Pref 2D
RENUMBER RENUMBER AspectMap ASSIGNING 0 TO 1 THRU 9 ASSIGNING 1 TO 3 THRU 7 FOR A_Pref 2D
RENUMBER RENUMBER Elevation ASSIGNING 1 TO 0 THRU 2450 ASSIGNING 0 TO 2450 THRU 5000 FOR E_Pref 2D
COMPUTE COMPUTE S_Pref Times A_Pref Times E_Pref FOR B_Habitat 2D
PAUSE None
NOTE Ranking Model- number of acceptable conditions with 0= none through 3= all three conditions good 2D
COMPUTE COMPUTE S_Pref Plus A_Pref Plus E_Pref FOR R_Habitat 2D
PAUSE None
NOTE Rating Model- "calibrate" preferences on a scale of 1= poor through 9= excellent 2D
RENUMBER RENUMBER SlopeMap ASSIGNING 9 TO 0 THRU 3 ASSIGNING 7 TO 3 THRU 4 ASSIGNING 5 TO 4 THRU... 2D
RENUMBER RENUMBER AspectMap ASSIGNING 1 TO 1 THRU 9 ASSIGNING 5 TO 3 ASSIGNING 6 TO 7 ASSIGNING... 2D
RENUMBER RENUMBER Elevation ASSIGNING 9 TO 0 THRU 2350 ASSIGNING 7 TO 2350 THRU 2375 ASSIGNING 5 T... 2D
PAUSE None
NOTE ...calculate total and average "score" 2D
COMPUTE COMPUTE S_Pref2 Plus A_Pref2 Plus E_Pref2 FOR Total_Suitable 2D
COMPUTE COMPUTE Total_Suitable Dividedby 3 FOR Avg_Suitable 2D
PAUSE None
NOTE ...mask for water 2D
RENUMBER RENUMBER Water ASSIGNING 0 TO 1 ASSIGNING 1 TO 0 FOR Water_mask 2D
CALCULATE CALCULATE Avg_Suitable * Water_mask FOR Avg_Suitable 2D
NOTE ...end of script 2D

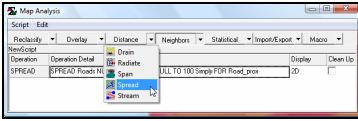
```

Under the guidance of the instructor, access and complete the suitability model for Hugag habitat by selecting **Map Analysis**→ **Script**→ **Open**→ **Bighorn_Habitat.scr** in the **...WorkshopDataScript** folder and completing the processing a line at a time.

(Short Exercise #4a) Spatial Analysis (Simple and Effective Distance)

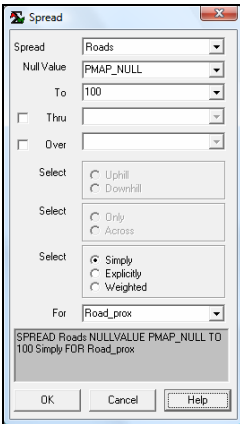


Within the **Bighorn.rgs** database select the **Map Analysis** button, and then select **Distance** → **Spread**



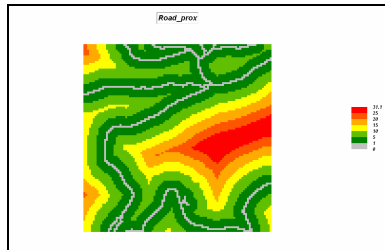
...accessing the **Spread** command

Simple Distance



SPREAD Roads NULLVALUE PMAP_NULL TO 200 Simply FOR Road_prox

Min [>=]	Max [<]	Count	acres	% Gridded Area	Color	Lock
25	31.1	432	96.074	4.41	Red	Dn
20	25	526	116.98	5.37	Diff	
15	20	940	209.051	9.59	Diff	
10	15	1318	293.116	13.45	Dn	
5	10	2551	567.328	26.03	Diff	
1	5	3411	758.598	34.8	Dn	
0	1	621	138.107	6.34	Dn	



Double-click on the map legend and set the display to **“User Defined Ranges”** (Calculation Mode), **“7”** (Number of Ranges), **Color** settings as shown (Grey, Green to Red with Yellow inflection), enter the **Min[>=]** values as shown and press **OK** to create the custom display.

Effective Distance

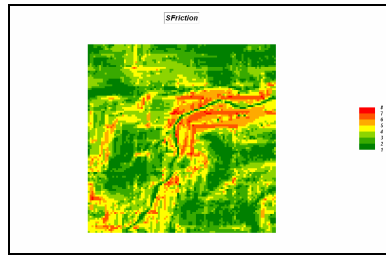
SLOPE Elevation Fitted FOR SlopeMap ...already created

RENUMBER SlopeMap

- ASSIGNING 1 TO 0 THRU 3
- ASSIGNING 2 TO 3 THRU 5
- ASSIGNING 3 TO 5 THRU 8
- ASSIGNING 4 TO 8 THRU 12
- ASSIGNING 5 TO 12 THRU 16
- ASSIGNING 6 TO 16 THRU 24
- ASSIGNING 7 TO 24 THRU 30
- ASSIGNING 8 TO 30 THRU 100

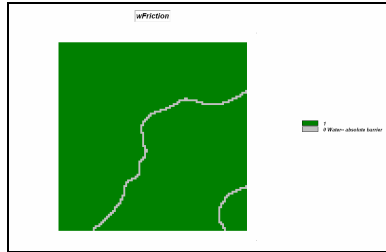
FOR **sFriction** ...identifies increasing relative barrier to hiking movement as terrain steepness increases

Min (>=)	Max (<)	Count	acres	% Gridded Area	Color	Lock
7	8	27	6	0.28	On	On
6	7	434	96.5	4.4	Off	Off
5	6	787	175	8	Off	Off
4	5	1641	365	17	On	On
3	4	2461	547	25	Off	Off
2	3	2356	524	24	Off	Off
1	2	2095	466	21	On	On



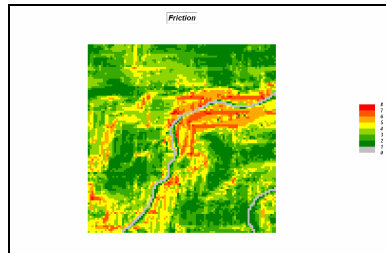
RENUMBER Water
 ASSIGNING 1 TO 0
 ASSIGNING 0 TO 1
 FOR wFriction ...identifies water as absolute barrier to hiking movement

Category	Count	acres	% Gridded Area	Color
1	9594	2,134	98	Green
0 Water-- absolute barrier	207	46	2.1	Grey



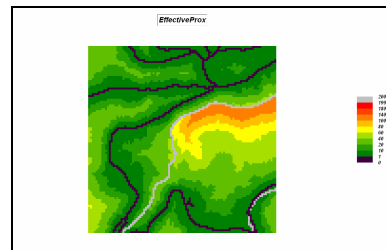
COMPUTE sFriction Times wFriction FOR Friction ...combines relative and absolute barriers

Min (>=)	Max (<)	Count	acres	% Gridded Area	Color	Lock
7	8	27	6	0.28	On	On
6	7	430	95.6	4.4	Off	Off
5	6	770	171	7.9	Off	Off
4	5	1601	356	16	On	On
3	4	2415	537	25	Off	Off
2	3	2319	516	24	Off	Off
1	2	2032	452	21	On	On
0	1	207	46	2.1	On	On



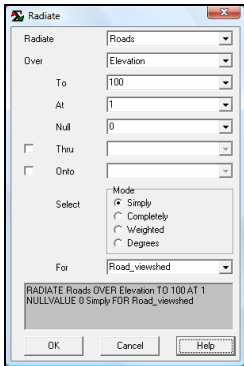
SPREAD Roads NULLVALUE PMAP_NULL TO 200 THRU Friction Simply FOR Road_hikingprox ...identifies relative proximity to the nearest road for all locations in the analysis frame.

Min (>=)	Max (<)	Count	acres	% Gridded Area	Color	Lock
199	200	195	43.4	2	On	On
180	199	0	0	0	On	On
140	180	0	0	0	Off	Off
100	140	257	57.2	2.6	Off	Off
80	100	248	55.2	2.5	Off	Off
60	80	381	84.7	3.9	On	On
40	60	850	191	8.8	Off	Off
20	40	2049	456	21	Off	Off
10	20	1975	439	20	Off	Off
1	10	3215	715	33	On	On
0	1	621	138	6.3	On	On



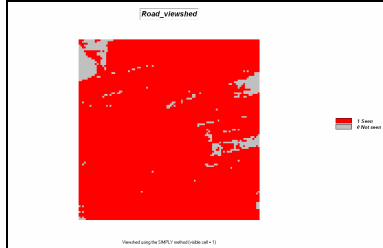
(Short Exercise #4b) Spatial Analysis (Viewshed, Visual Exposure and Weighted Visual Exposure)

Viewshed



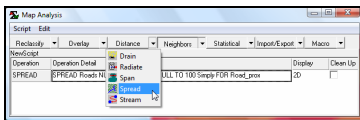
RADIATE Roads OVER Elevation TO 100 AT 1 NULLVALUE 0 Simply FOR Road_viewshed
 ...identifies all locations that are visually connected to at least one road cell as a binary map (1=seen, 0=not seen)

Category	Count	acres	% Gridded Area	Color
1.0 Seen	9226	2,051.812	94.13	Red
0.0 Not seen	575	127.877	5.87	Grey



Visual Exposure

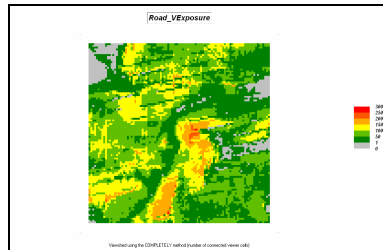
Map Analysis button, select **Distance** → **Radiate**



...accessing the **Radiate** command

RADIATE Roads OVER Elevation TO 100 AT 1 NULLVALUE 0 Completely FOR Road_VEExposure ...identifies the number of road cells visually connected to each map location (increasing values indicate areas that are increasingly more exposed)

Min [>=]	Max [<]	Count	acres	% Gridded Area	Color	Lock
250	300	2	0.445	0.02	Red	On
200	250	26	5.78	0.27	Dark Red	Off
150	200	450	100	4.6	Orange	Off
100	150	1832	407	19	Yellow	On
50	100	3590	798	37	Light Green	Off
1	50	3326	740	34	Green	On
0	1	575	128	5.9	Grey	On



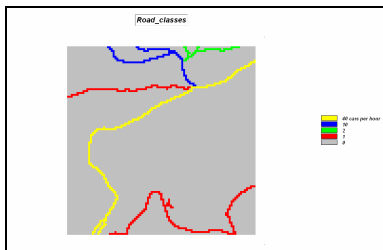
Weighted Visual Exposure

RENUMBER Road_type

- ASSIGNING 1 TO 4
- ASSIGNING 2 TO 3
- ASSIGNING 10 TO 2
- ASSIGNING 40 TO 1

FOR Road_classes ...calibrates the roads based on relative number of cars

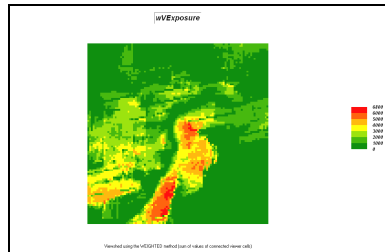
Category	Count	acres	% Gridded Area	Color
40 cars per hour	220	48.9	2.2	Yellow
10	102	22.7	1	Blue
2	50	11.1	0.51	Green
1	249	55.4	2.5	Red
0	9180	2,042	94	Grey



RADIATE Road_classes OVER Elevation TO 200 AT 1 NULLVALUE 0 Weighted FOR wVExposure ...identifies the weighted visual exposure for each map location (uses the road type as the weight)

Shading Manager [wVExposure]

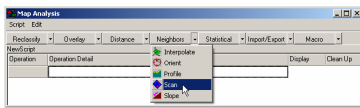
Min [>=]	Max [<]	Count	acres	% Gridded Area	Color	Lock
6000	6800	47	10.5	0.48	Red	On
5000	6000	194	43.1	2	Orange	Off
4000	5000	451	100	4.6	Yellow	Off
3000	4000	733	163	7.5	Light Green	On
2000	3000	1120	249	11	Green	Off
1000	2000	1708	380	17	Dark Green	Off
0	1000	5548	1,234	57	Black	On



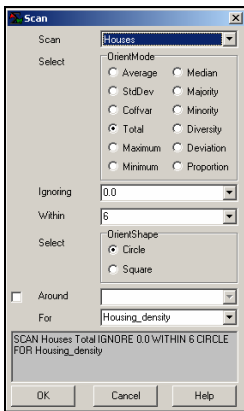
(Short Exercise #5) Spatial Analysis (Neighborhood operators)



Within the **Bighorn.rgs** database select the **Map Analysis** button, and then select **Neighbors**→ **Scan**



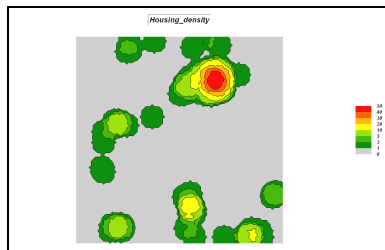
...accessing the **Scan** command



SCAN Houses Total IGNORE 0.0 WITHIN 6 CIRCLE FOR Housing_density ...identifies the total number of houses within a 6-cell reach of every map location

Shading Manager [Housing_density]

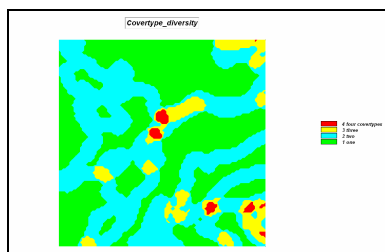
Min [>=]	Max [<]	Count	acres	% Gridded Area	Color	Lock
40	50	36	8.45	0.39	Red	On
30	40	43	9.56	0.44	Orange	Off
20	30	77	17.1	0.79	Yellow	Off
10	20	225	50	2.3	Light Green	On
5	10	460	102	4.7	Green	Off
3	5	508	113	5.2	Dark Green	Off
1	3	1475	328	15	Black	On
0	1	6959	1,548	71	Black	On



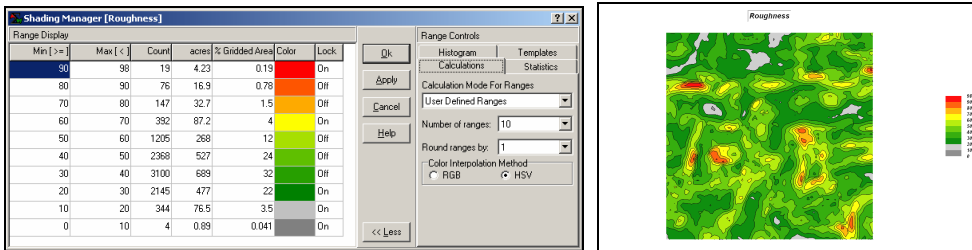
SCAN Covertypes Diversity IGNORE 0.0 WITHIN 4 CIRCLE FOR Covertypes_diversity ...identifies the number of different cover type classes within a 4-cell reach of every map location

Shading Manager [Covertypes_diversity]

Category	Count	acres	% Gridded Area	Color
4 four covertypes	164	36.5	1.7	Red
3 three	935	208	9.5	Orange
2 two	4562	1,015	47	Yellow
1 one	4140	921	42	Green



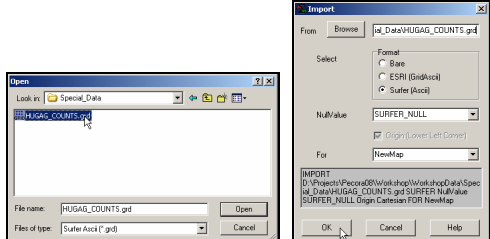
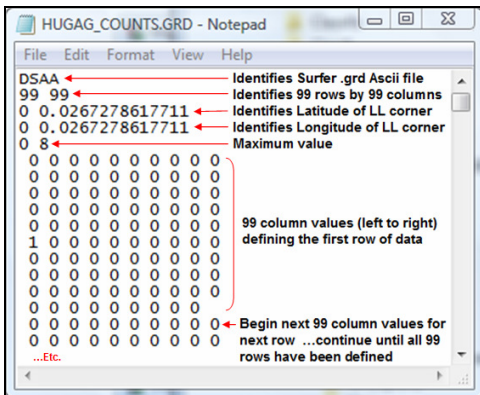
SCAN SlopeMap CoffVar IGNORE 0.0 WITHIN 2 CIRCLE FOR Roughness ...identifies the coefficient $([StDev / Mean] * 100)$ of variation as the relative amount of variation within a 4-cell reach of every map location



As time and interest permits for optional homework, complete the *MapCalc Tutorials* on the Workshop CD in the ...\\Surfer\\Surfer_Tutorial\\ folder.

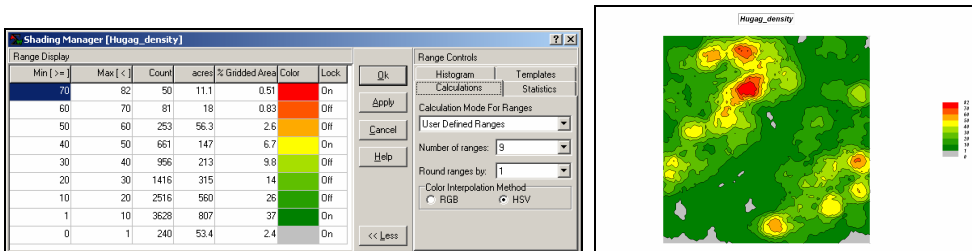
(Short Exercise #6) Surface Modeling (Generating continuous geographic distributions from discrete point sampled data—Density Analysis and Spatial Interpolation)

Density Analysis



If the *Hugag_counts* map isn't in the *Bighorn.rgs* database, import it by selecting **Map Analysis**→ **Import/Export**→ **Import**→ choose "**Surfer (Ascii)**" format, browse to the *Hugag_counts.grd* file in the ...\\WorkshopData\\Special_Data folder you copied from the workshop CD, enter *Hugag_counts* as the new map name and click **OK**.

SCAN Hugag_counts TOTAL WITHIN 6 FOR Hugag_density ...identifies the total number of Hugag occurrences within a 6-cell reach to generate a density surface of animal activity



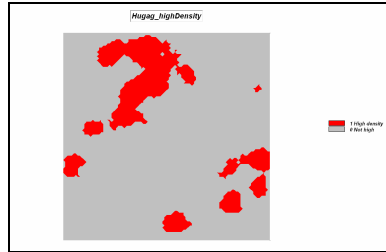
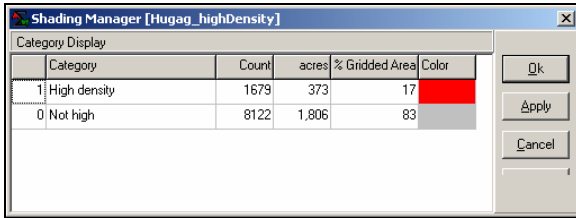
Right-click on the map and select the *Shading Manager*. Click on the *Statistics* tab and note that the average customer density is **17.5** with a standard deviation of **15.0** (rounded). Therefore the breakpoint for unusually high Hugag densities is $17.5 + 15.0 = 32.5$ (Mean + 1 Stdev).

RENUMBER Hugag_density

ASSIGNING 0 TO 0 THRU 32.5

ASSIGNING 1 TO 32.5 THRU 1000

FOR **Hugag_highDensity** ...isolates the locations of high Hugag density (assigned a value of 1 embedded in zeros)



Spatial Interpolation

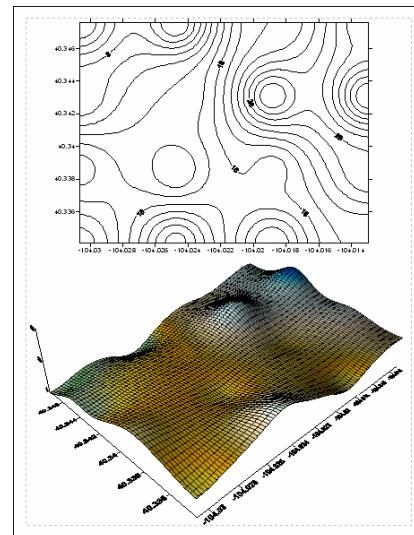
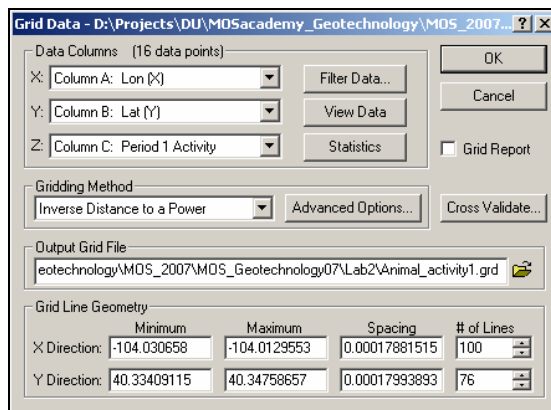
Install *Surfer* from the *Workshop CD* using \Surfer\s8demo.exe.
 Access *Surfer* by Start→ Programs→ Golden Software Surfer 8→ **Surfer 8**.

Bring the data into Surfer by...

Selecting **Grid→ Data→** and browsing to ...**Program files\Golden Software\Surfer8\Samples** folder and specifying the **DEMOGRID.DAT** data file. Accept all of the defaults and press **OK** to generate the interpolated surface.

Selecting **Map→ Contour Map→ New contour map** and accepting the default DEMOGRID.GRID file specification to generate a *Contour* map of the interpolated data.

Selecting **Map→ Wireframe→ New contour map** and accepting the default DEMOGRID.GRID file specification to generate a *Wireframe* map of the interpolated data.



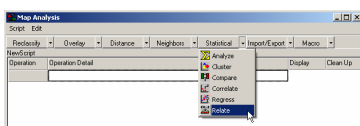
As time and interest permits for optional homework, complete the *Surfer Tutorials* in the ...**Geotechnology_software\Surfer\Surfer_Tutorial** folder on the Workshop CD.

(Short Exercise #7) Spatial Data Mining (Similarity and Clustering)

If *MapCalc* is still open, change to the Precision Farming database by File→ Open→ **AgData.rgs**. If *MapCalc* isn't open, access it by Start→ Programs→ MapCalc Learner → **MapCalc Learner** and select **Agdata.rgs** as the database.

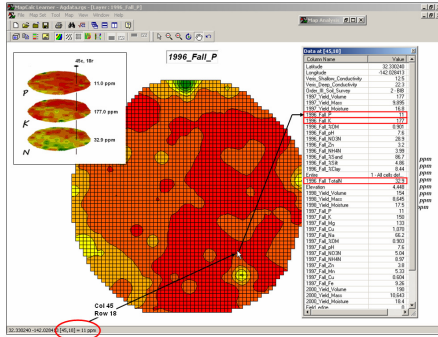


Map Analysis button, select **Statistical→ Relate**

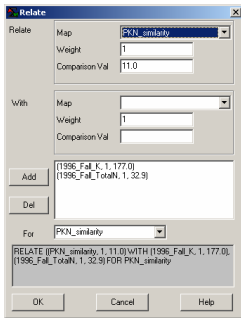


...accessing the **Relate** command

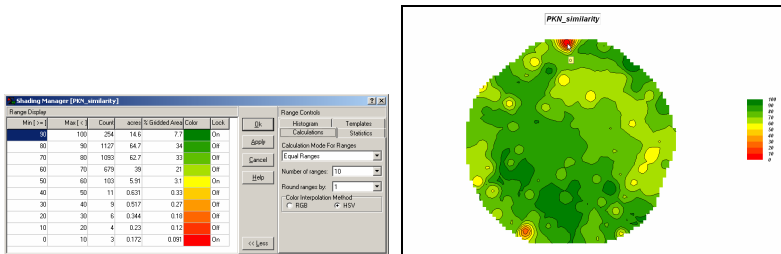
Similarity



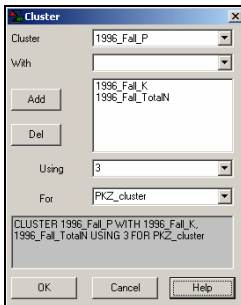
Display the **1996_Fall_P** surface and double-click at location **45c, 18r** to pop-up the “drill-down” summary of the values at that location for all maps. Note that **P= 11.0**, **K=177.0** and **N= 32.9**.



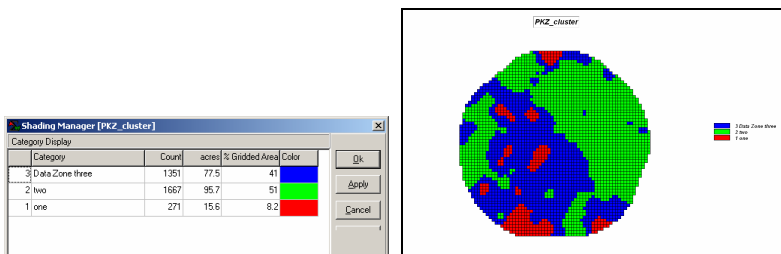
RELATE ((1996_Fall_P, 1, 11.0) WITH ((1996_Fall_K, 1, 177.0), (1996_Fall_TotalN, 1, 32.9) FOR PKN_similarity ...identifies the relative amount of similarity of each map location to a comparison set of map values



Clustering



CLUSTER 1996_Fall_P WITH 1996_Fall_K, 1996_Fall_TotalN USING 3 FOR PKZ_cluster ...identifies distinctly similar data zones where the data values within a zone are as similar as possible and as different as possible among the data zones



Script of Short Exercise Solutions (ShortExercise.scr)

Map Analysis			
Script Edit			
Reclassify ▾ Overlay ▾ Distance ▾ Neighbors ▾ Statistical ▾ Import/Export ▾ Macro ▾			
ShortExercises			
Operation	Operation Detail	Display	Clean Up
NOTE	Short Exercises #1 through #6 ...****USE Bighorn.rgs database****	2D	<input type="checkbox"/>
NOTE	Short Exercise #1...	2D	<input type="checkbox"/>
SLOPE	SLOPE Elevation Fitted FOR Slopemap	2D	<input type="checkbox"/>
NOTE	Short Exercise #2 ...uses Bighorn_erosion.scr script	2D	<input type="checkbox"/>
NOTE	Short Exercise #3 ...uses Bighorn_Habitat.scr script	2D	<input type="checkbox"/>
NOTE	Short Exercise #4...	2D	<input type="checkbox"/>
SPREAD	SPREAD Roads NULLVALUE PMAP_NULL TO 200 Simply FOR Road_prox	2D	<input type="checkbox"/>
RENUMBER	RENUMBER Slopemap ASSIGNING 1 TO 0 THRU 3 ASSIGNING 2 TO 3 THRU 5 ASSIGNING 3 TO 5 THRU 8 ASSIGNING 4 TO ...	2D	<input type="checkbox"/>
RENUMBER	RENUMBER Water ASSIGNING 1 TO 0 ASSIGNING 0 TO 1 FOR wFriction	2D	<input type="checkbox"/>
COMPUTE	COMPUTE sFriction Times wFriction FOR Friction	2D	<input type="checkbox"/>
SPREAD	SPREAD Roads NULLVALUE PMAP_NULL TO 200 THRU Friction Simply FOR Road_hikingprox	2D	<input type="checkbox"/>
RADIATE	RADIATE Roads OVER Elevation TO 100 AT 1 NULLVALUE 0 Simply FOR Road_viewshed	2D	<input type="checkbox"/>
RADIATE	RADIATE Roads OVER Elevation TO 100 AT 1 NULLVALUE 0 Completely FOR Road_vExposure	2D	<input type="checkbox"/>
RENUMBER	RENUMBER Road_type ASSIGNING 1 TO 4 ASSIGNING 2 TO 3 ASSIGNING 10 TO 2 ASSIGNING 40 TO 1 FOR Road_classes	2D	<input type="checkbox"/>
RADIATE	RADIATE Road_classes OVER Elevation TO 150 AT 5 NULLVALUE 0 Weighted FOR Road_wvExposure	2D	<input type="checkbox"/>
NOTE	Short Exercise #5...	2D	<input type="checkbox"/>
SCAN	SCAN Houses Total IGNORE 0.0 WITHIN 6 CIRCLE FOR Housing_density	2D	<input type="checkbox"/>
SCAN	SCAN Covertypes Diversity IGNORE 0.0 WITHIN 4 CIRCLE FOR Covertypes_diversity	2D	<input type="checkbox"/>
SCAN	SCAN SlopeMap CovVar IGNORE 0.0 WITHIN 4 CIRCLE FOR Roughness	2D	<input type="checkbox"/>
NOTE	Short Exercise #6...	2D	<input type="checkbox"/>
RELATE	RELATE ((1996_Fall_P, 1, 11.0) WITH (1996_Fall_K, 1, 177.0), (1996_Fall_TotalN, 1, 32.9) FOR PKN_similarity	2D	<input type="checkbox"/>
CLUSTER	CLUSTER 1996_Fall_P WITH 1996_Fall_K, 1996_Fall_TotalN USING 3 FOR PKZ_cluster	2D	<input type="checkbox"/>
SCAN	SCAN Hugag_counts Total IGNORE 0.0 WITHIN 6 CIRCLE FOR Hugag_density	2D	<input type="checkbox"/>
RENUMBER	RENUMBER Hugag_density ASSIGNING 0 TO 0 THRU 32.5 ASSIGNING 1 TO 32.5 THRU 1000 FOR Hugag_highDensity	2D	<input type="checkbox"/>
NOTE	Short Exercise #7 ...****USES AgData.rgs database****	2D	<input type="checkbox"/>
RELATE	RELATE ((1996_Fall_P, 1, 11.0) WITH (1996_Fall_K, 1, 177.0), (1996_Fall_TotalN, 1, 32.9) FOR PKN_similarity	2D	<input type="checkbox"/>
CLUSTER	CLUSTER 1996_Fall_P WITH 1996_Fall_K, 1996_Fall_TotalN USING 3 FOR PKN_cluster3	2D	<input type="checkbox"/>
NOTE	End of script	2D	<input type="checkbox"/>