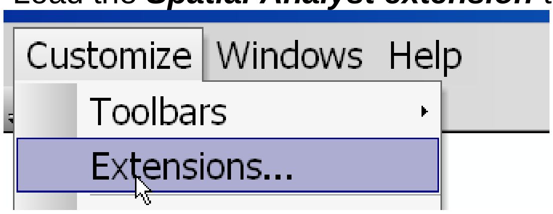
Lab#9: Raster Analysis

If you want to output to a folder, use a .tif extension with your output raster name.

If you output to a geodatabase, do not use a .tif extension with your raster name.

This lab is a lab#2 (point analysis lab) and lab#6 (polygon analysis lab) in the raster world. You will convert your points and polygons to raster layers with 10-meter raster cells.

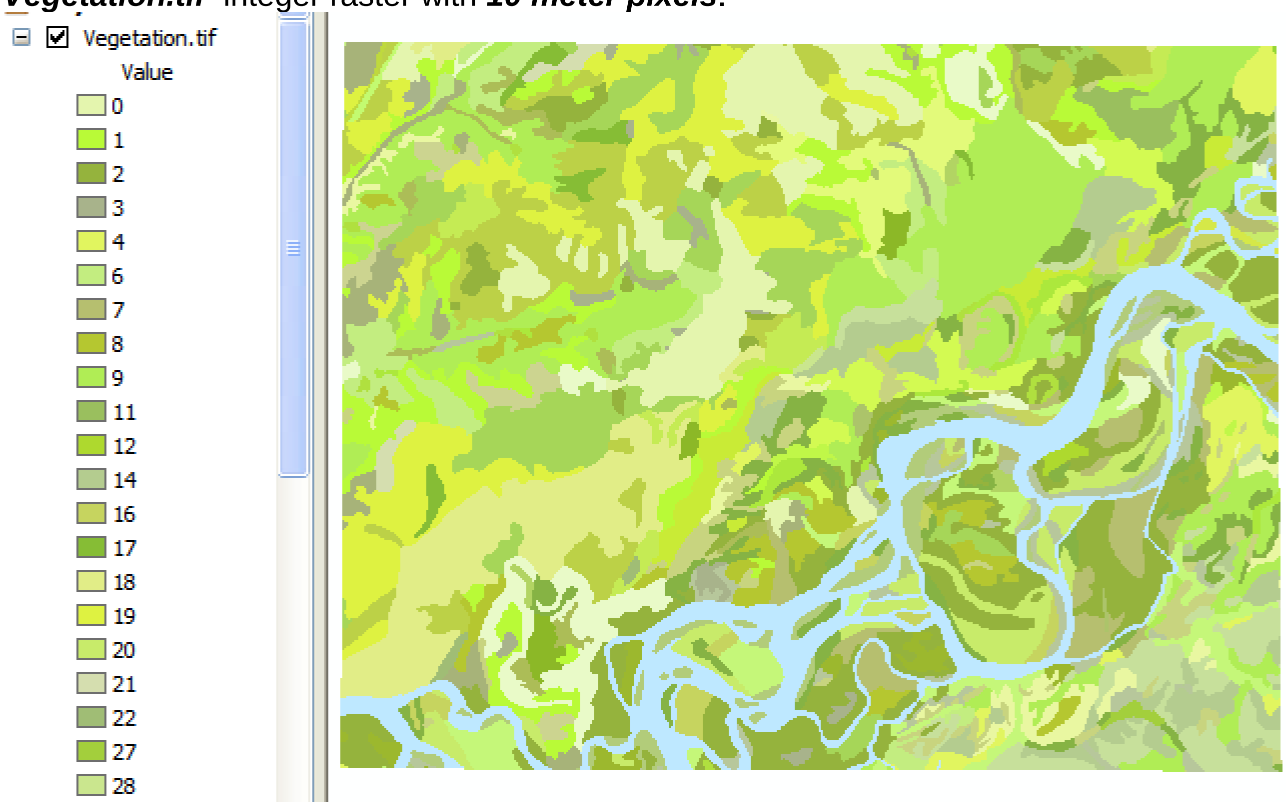
Load the ***Spatial Analyst extension*** to use tools designed for analysis of rasters.



ET Habitat Analysis

Download and unzip the geodatabase ***lab1_points.zip*** from http://dverbyla.net/nrm435/data

Each pixel will have a value inherited from a point or polygon feature class. Run the ***Feature to Raster tool*** with your ***study_area*** polygon feature class using the Vegtype field to create a ***Vegetation.tif*** integer raster with ***10 meter pixels***.



Open the raster attribute table to see all the class values…(0 to 99) AND pixel counts

Next convert your ***home_poly*** polygon feature class to ***Home_Range.tif*** integer raster with ***10-meter pixels***. We want home range pixels to have a value of 1, so change the polygon ID value to 1 before running the ***Feature to Raster*** tool.

home_poly

	Shape *	ID
▸	Polygon	1

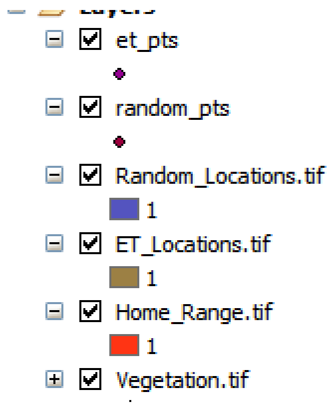
Next convert your et_pts and random_pts to rasters with a 10-meter pixel value of 1 representing a point location. So add a short integer field, CODE and use that field for converting each point to a pixel with a value of 1.

et_pts

ET_PTS_ID	CODE
1	1
2	1
3	1
4	1

random_pts

RANDOM_PTS	CODE
1	1
2	1
3	1
4	1



You will answer the following four questions using your raster layers…

1) Does the home range have a higher percentage of willow than the entire area?

2) Within ET's home range, are there more ET location points within willow polygons compared to points randomly located within ET's home range?

3) Is mean distance of the ET location points closer to willow polygon boundaries than the mean distance for randomly located points?

4) Are more ET than random locations within 100 meters of a willow?

1) Does the home range have a higher percentage of willow than the entire area?

To answer this question, you need to know the count of willow cells in the entire study area versus in the home range area.

First determine the number of willow pixels in the entire study area. From your raster attribute table add a field named Willow, and assign a 1 to the records corresponding to willow vegetation types (values 62,67,70,71).

And calculate Willow = 1 for the willow rows.

Vegetation.tif.vat

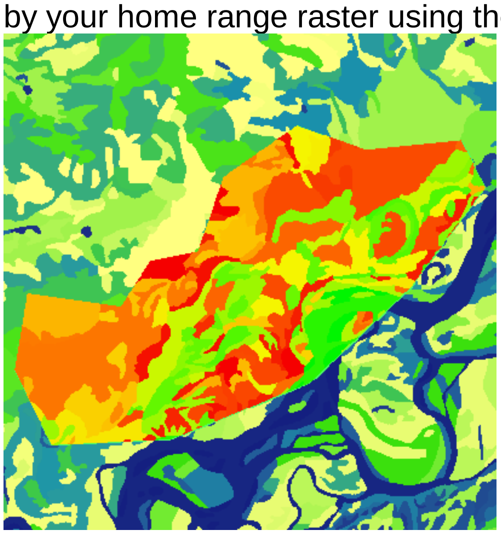
Value	Count	Willow
37	65403	0
38	9061	0
40	8970	0
41	2037	0
42	31003	0
44	5749	0
45	15732	0
46	17811	0
48	28851	0
56	13946	0
62	20052	1
65	894	0
67	42788	1
70	14654	1
71	31863	1
77	1500	0
79	26545	0

Then determine the total percent of willow pixels in the study area…about 9.2 percent.

Vegetation_Frequency

FREQUENCY	Willow	Count	Percent_
46	0	1080332	90.8%
4	1	109357	9.2%

To determine the percent willow within the home range area, multiply your vegetation raster by by your home range raster using the ***Times*** geoprocessing tool.



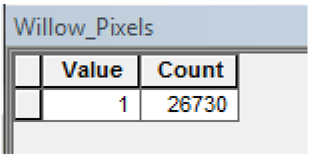
Repeat the process to determine percent willow inside the home range…

FREQUENCY	Willow	Count	Percent
36	0	210204	88.7%
4	1	26730	11.3%

So there was about 11.3 percent willow in the Home Range area, and 9.2 percent in the total study area… the same results we had in the points lab#1…

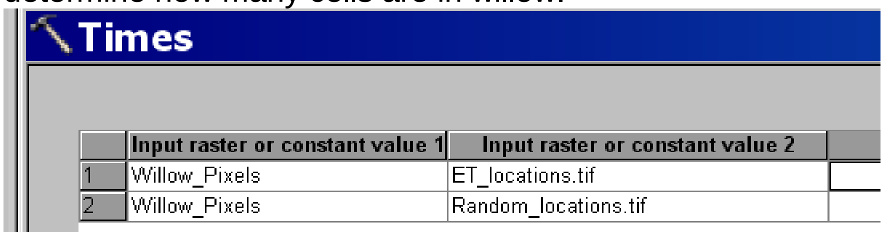
2) Within ET's home range , are there more ET location points within willow polygons compared to points randomly located within ET's home range?

First use the ***Con*** tool to create a layer of willow and NoData pixels.

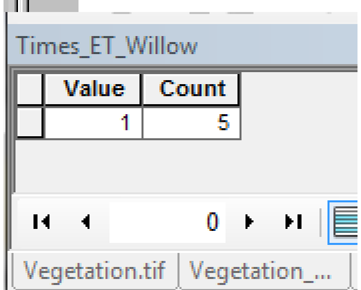

Willow_Pixels

Value	Count
1	26730

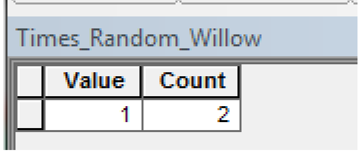
Then use the ***Times*** tool to batch multiply this raster by the ET and random cell rasters to determine how many cells are in willow.


Times

	Input raster or constant value 1	Input raster or constant value 2
1	Willow_Pixels	ET_locations.tif
2	Willow_Pixels	Random_locations.tif


Times_ET_Willow

Value	Count
1	5

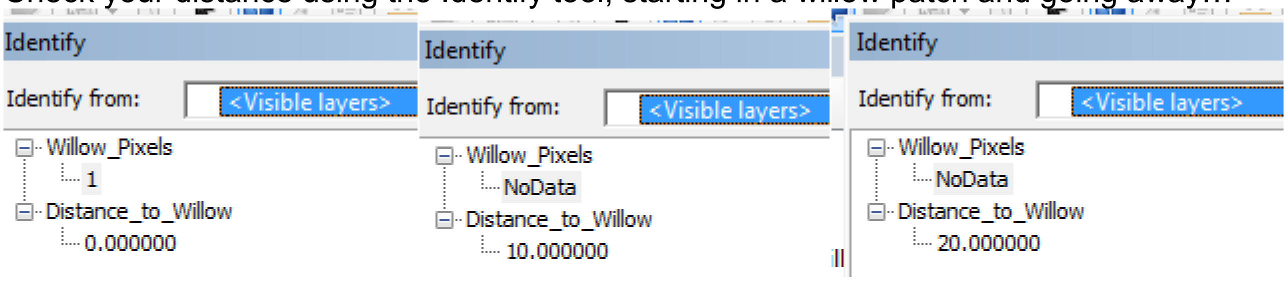

Times_Random_Willow

Value	Count
1	2

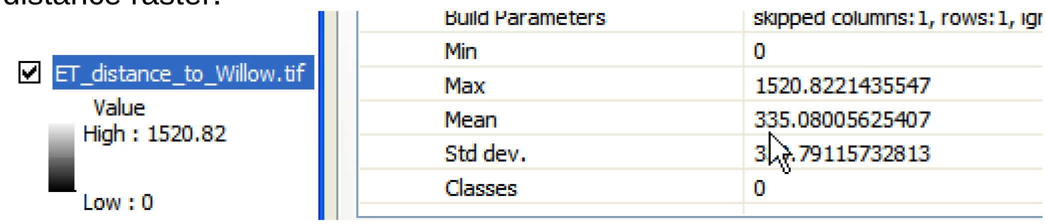
So there were 2 random points in willow, and 5 ET points in willow.

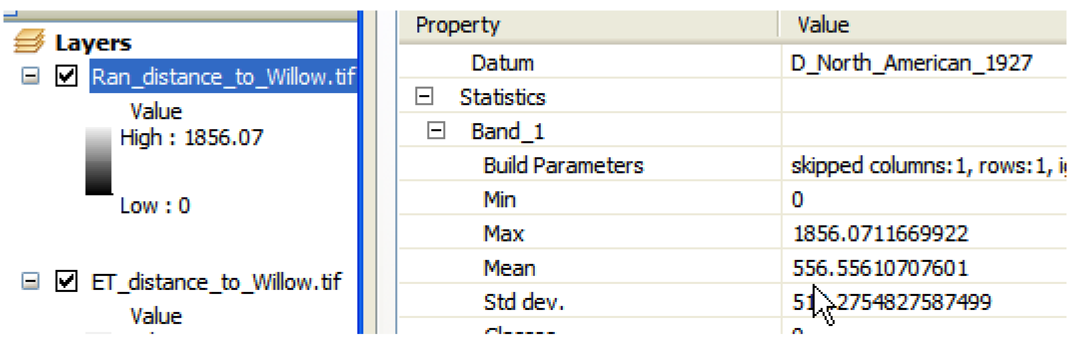
3) Is mean distance of the ET location points closer to willow polygon boundaries than the mean distance for randomly located points?

Create a raster of distance to nearest willow cell…using the ***Euclidean Distance*** tool
Check your distance using the Identify tool, starting in a willow patch and going away…



To determine the distance to the closest willow pixel for each random and ET location, simply multiply the random locations raster by the distance raster, and multiply the ET raster by the distance raster.



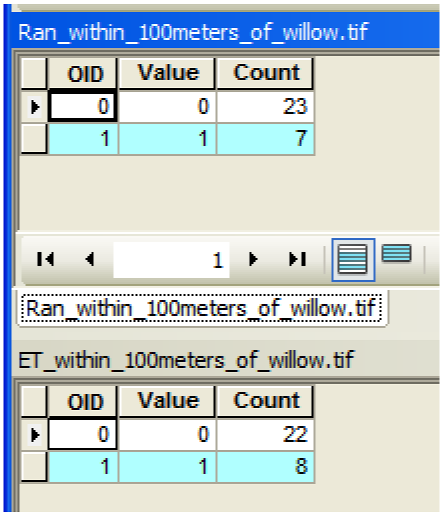


So the mean distance to the closest willow pixel was 335 meters for ET locations and 556 meters for Random locations…

4) Are more ET than random locations within 100 meters of a willow?
Create a raster representing cells within 100 meters of willow…use the ***Raster Calculator*** geoprocessing tool to ask this question.

("Willow_Distance.tif" <= 100) & "ET_Locations.tif"

("Willow_Distance.tif" <= 100) & "Random_Locations.tif"



Ran_within_100meters_of_willow.tif

OID	Value	Count
0	0	23
1	1	7

Ran_within_100meters_of_willow.tif

ET_within_100meters_of_willow.tif

OID	Value	Count
0	0	22
1	1	8

8 ET Point Ids within 100 meters of willow, 7 Random Point Ids within 100 meters of willow:

Create a new data frame…we will do a raster analysis analogous to the polygon lab…

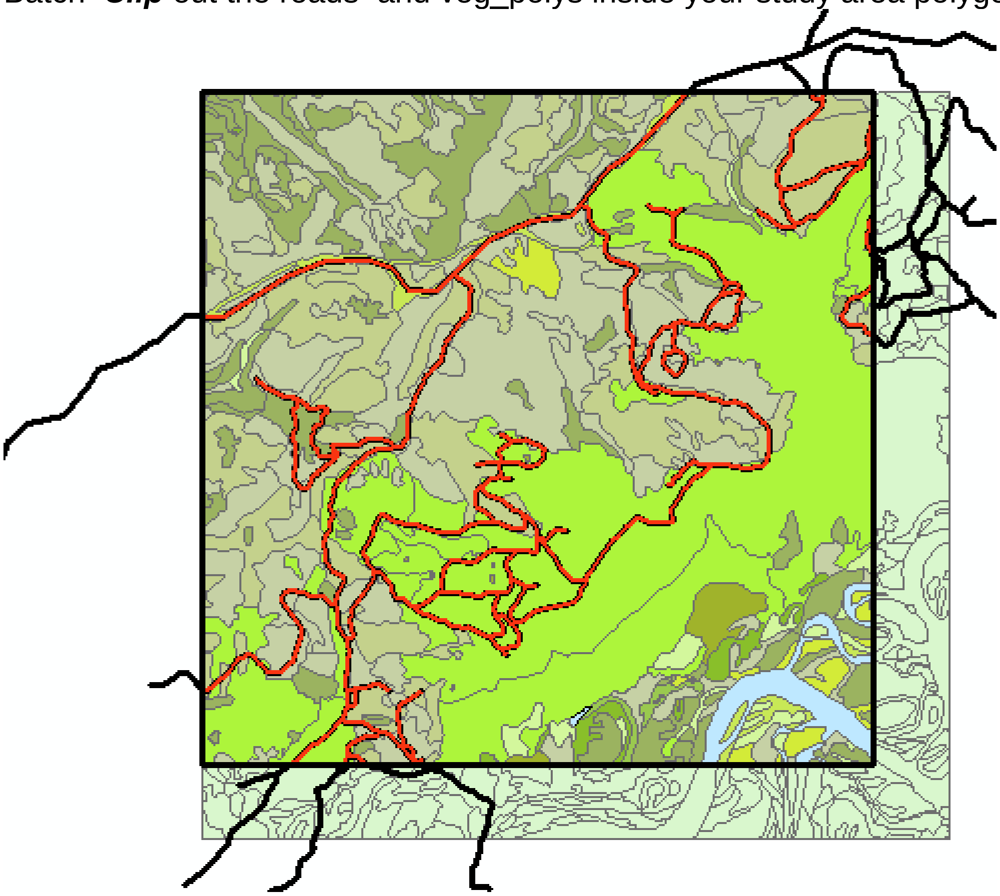
Determine the area of sawtimber of a certain stand size with a study area near roads and away from wetlands.

Near Road Constraint	Away From Wetlands Constraint	Stand Size Constraint
500m	1000m	5 hectares

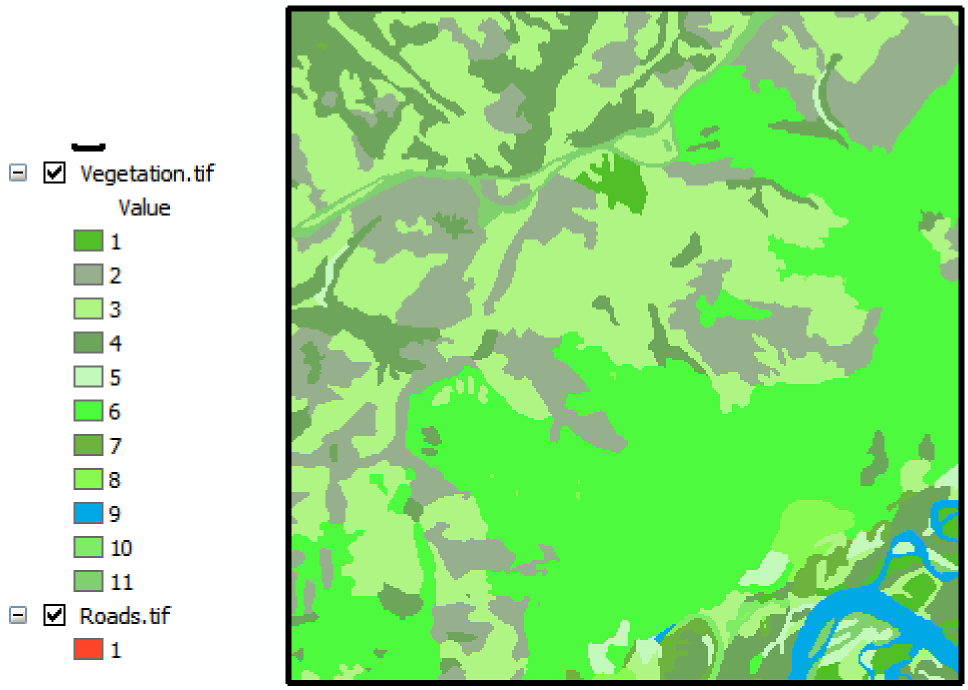
Download the same data we used in the previous lab on polygon analysis…
polygon_analysis_lab.mdb from the website:

http://dverbyla.net/nrm435/data/

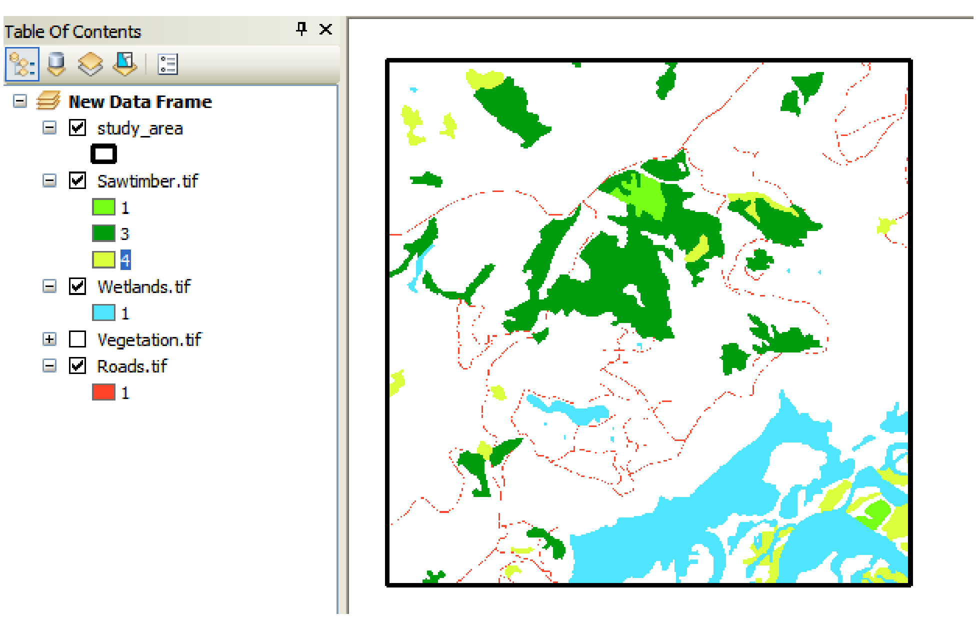
Add the roads, veg_polys, and study area layers to your data frame.
Batch ***Clip*** out the roads and veg_polys inside your study area polygon:



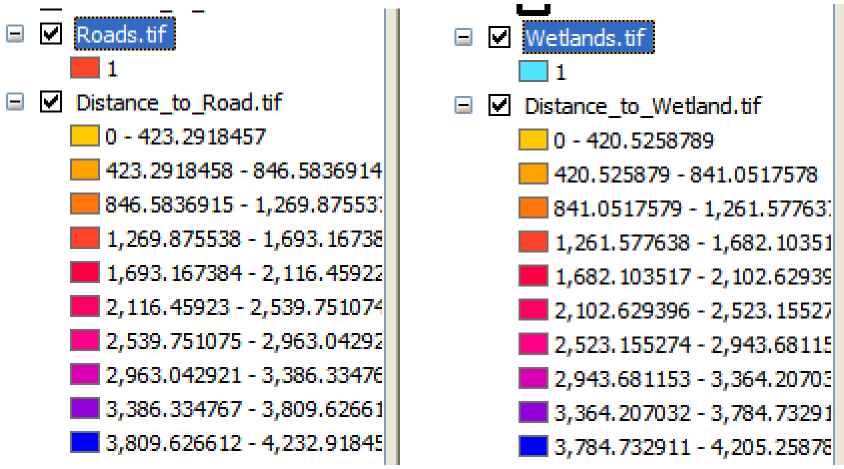
Next create tif rasters with ***10-meter pixels*** from your roads and vegetation inside the study area.



We need a raster layer to represent sawtimber and wetlands and raster layers can only have numeric values. Use the ***Make Feature Layer*** tool to create a wetlands layer and a sawtimber layer from your vegetation polygons. Then create tif rasters with 10-meter pixels representing these layers.

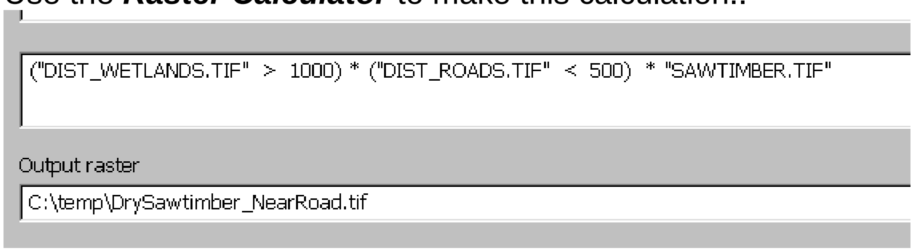


We want areas that are close enough to a road, but far enough away from wetlands. Create distance to road and distance to wetlands rasters.

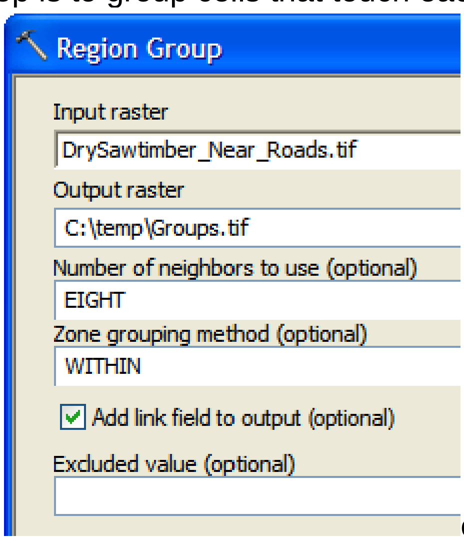


We want pixels near a road (< 500m), away from wetlands (> 1000m).

Use the ***Raster Calculator*** to make this calculation..



The next step is to group cells that touch each other using the ***RegionGroup*** tool.



exclude value 0

Groups.tif

Value	Count	LINK
1	7	3
2	61	3
3	2512	3
4	1594	3

The value represents group number, count is number of cells in the group, and link is the original vegetation value for the group. For example, group 1 had 7 connected pixels, and was originally vegclass of 3. Group 3 is big with 2,512 pixels and group 4 is big with 1594 pixels.

We have a size constraint of 5 hectares. Each cell is 10m by 10m and a hectare is 10,000 m^2, so we need a count of at least 500 cells to be greater than 5 hectares.

So select the records that have hectares > 5 and export your table as a dbf table named GT_5Ha.

GROUPS.TIF

Count	LINK	HECTARES
2512	3	25.12
1594	3	15.94
1779	1	17.79
5205	3	52.05
1611	4	16.11
816	3	8.16
926	3	9.26
548	4	5.48

0 (15 out of 28 Selected)

So there are 15 stands that are at least 5 hectares.

Create a dbf table showing the total hectares by vegetation type.

LINK	FREQUENCY	SUM_Count	Hectares
1	1	1779	17.79
3	10	28027	280.27
4	4	3447	34.47