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Lab4.2
GEOG 482 W18

Weighted Suitability Analysis

In this analysis, we expanded the Boolean suitability model to more accurately account for geographic features when determining site suitability for Wolverine nests in the Eagle Cap Wilderness Area near McCully Trail.

The following datasets were used and were obtained from Dr. Nick Kohler of the University of Oregon or derived from said source:

Trail location
"McCully_Trail"
R:\Geog482_3\Class_Data\Labs\Lab3\Data\McBasin.gdb

Elevation raster
"McCully_Trail"
R:\Geog482_3\Class_Data\Labs\Lab3\Data\McBasin.gdb

Clipped vegetation
Subset of vegetation layer in Lab4.1

Vegetation attribute table
"gapcodes.csv"
R:\Geog482_3\Class_Data\Labs\Lab4\data

Study area
"mcbasin_studyarea.shp"
R:\Geog482_3\Class_Data\Labs\Lab4\data

Slope raster
Derived from elevation raster in Lab3

Aspect raster
Derived from elevation raster in Lab3

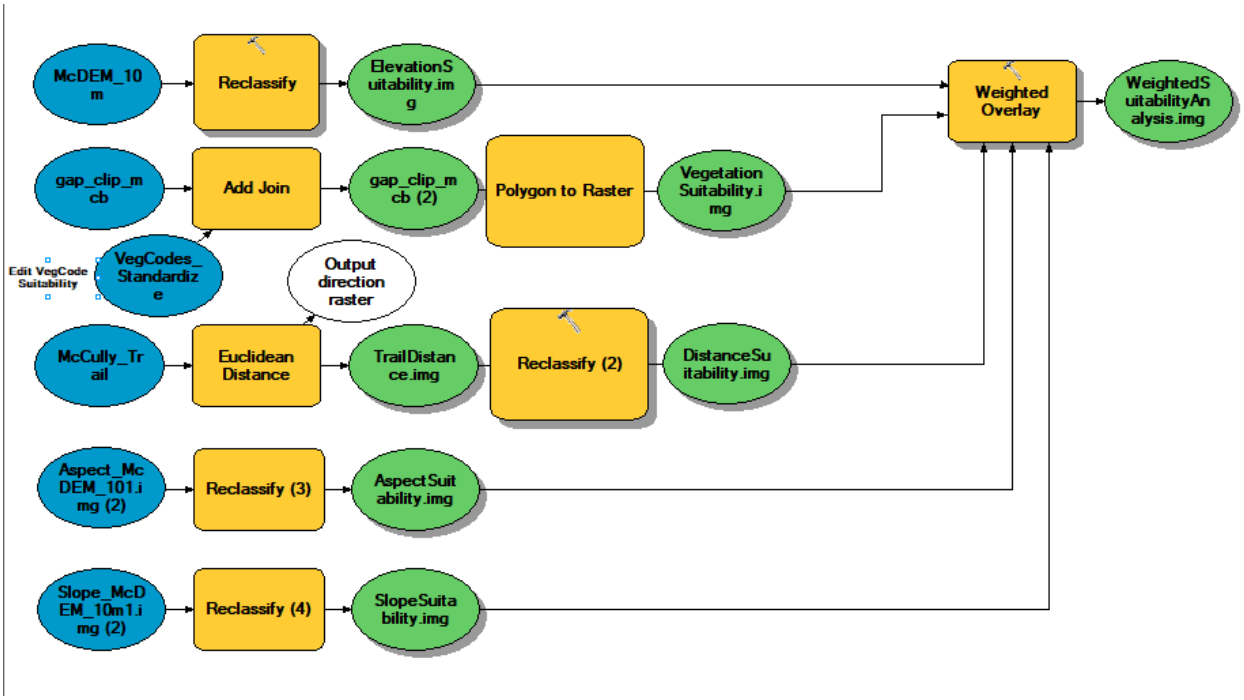


Figure 1 Weighted Overlay Suitability Model classifies suitability as values ranging from 1 to 10, then compiles them based on defined weights to provide an ordinal scale of site suitability.

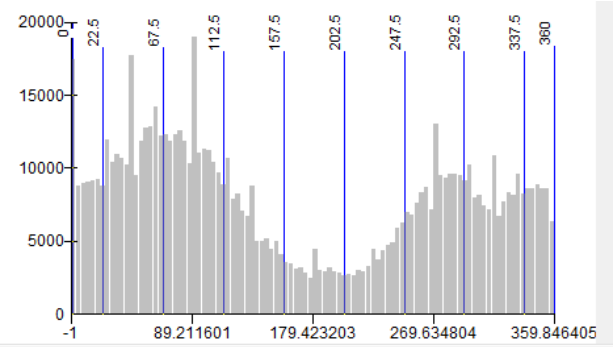
This analysis took the parameters we used in the previous Boolean model such as being at least 1.5 miles from the trail, above 8000 ft in elevation and within appropriate vegetation, in addition to the DEM derived attributes of aspect and slope to better account for the nesting needs of the species. Instead of giving an "all or nothing" approach, we were able to classify the data into categories of increasing suitability, using the Boolean values as a zero point in the classification.

Values of 0-10 were assigned to categories based on the expected suitability for the given dataset. These criteria were developed by Dr. Kohler using the following sources:

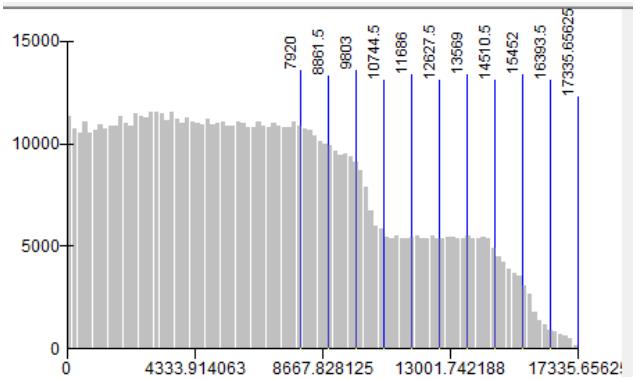
Zoological Society of London
http://onlinelibrary.wiley.com/doi/10.1111/j.1469-7998.2012.00907.x/full

The Wolverine Foundation
http://wolverinefoundation.org/denning

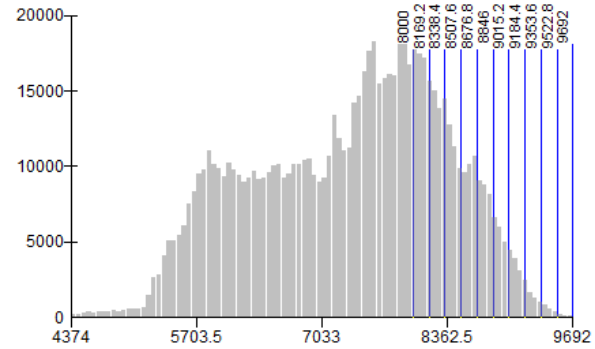
The method I used to determine values for each dataset depended on the descriptors given by Dr. Kohler. Criteria deemed "not suitable" was given a value of 0, "OK" a value of 3, "good" was assigned 6, while "best" was classified as 10. If suitability increased with a range (for example distance), the suitable zone values increased at equal interval and unsuitable ranges were given 0.



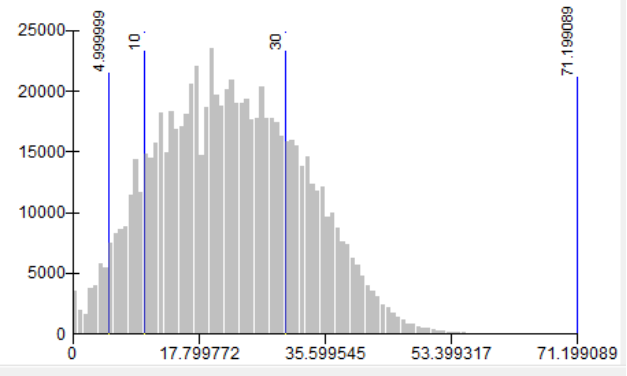
2 Aspect classification distribution by degree facing. North (337.5, 22.5) and Northeast (22.5, 67.5) were assigned classification of 10, South and Southwest (157.5, 247.5) were both assigned 0. Aspects adjacent to each extreme were given classification of 6 and 3 respectively.



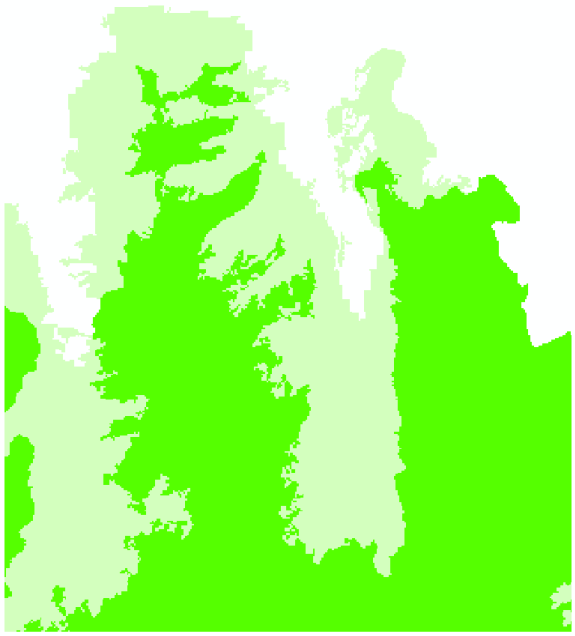
3 Distance classification distribution by feet from trail. Less then 1.5 miles (7920 ft) were given 0, then an equal interval (941.5) was applied increasing from 1 to 10 as distance increased.



4 Elevation classification distribution by feet above sea level. Elevations below 8000 ft were given 0, while an equal interval (169.2) was applied for the remaining values, classifying from 1 to 10 as elevation increased.



5 Slope classification distribution by degrees from horizontal. Here, flat land (value of -1) and slopes below 5 degrees were assigned 0. Ranges (5,10) and 30+ were given a value of 3. The highest value of 6 was given to the range (10,30). A value of 10 was not assigned being that the descriptors of habitat suitability ranged from not suitable to a maximum of "good", as opposed to "best" in other criteria.



6 Vegetation classification map. Alpine Fell and Subalpine Grasslands were given a value of 10, Subalpine Fir-Lodgepole Pine was given a value of 3, and all remianing vegetation types were assigned 0 for unsuitability.

By applying a weighted overlay using the values described below, we generate a more complex suitability map of den locations. For this analysis, I set the weights of the various inputs as follows based on what I interpreted as their overall influence on den location.

Suitability Layer	Percent Weight
Elevation	10
Vegetation	30
Distance	10
Aspect	20
Slope	30

The resulting product shows areas of increasing suitability ranging from light green (1) as least quality of suitable land to dark blue (6) being most suitable. Unsuitable area is not drawn. The areas of each category is as follows:

Suitability	Area (Acres)
1	2
2	277
3	545
4	490
5	156
6	7

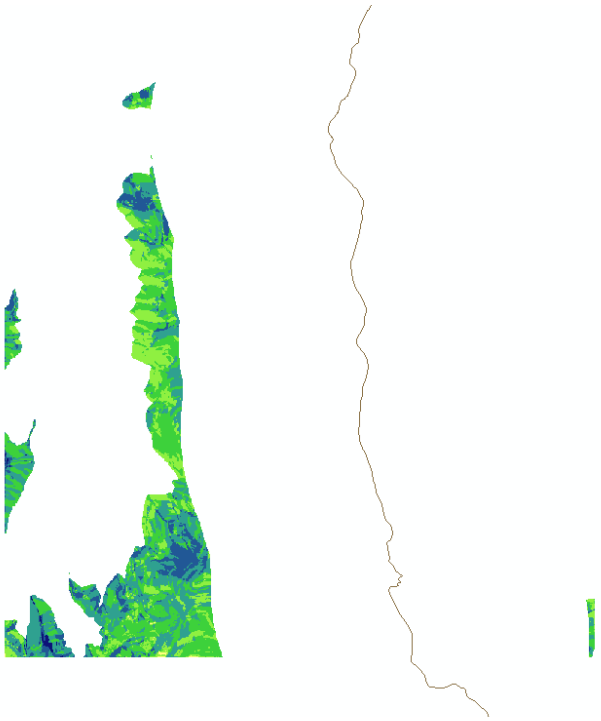


Figure 7 Weighted suitability analysis product. Light green indicates less suitable, dark blue more.