Tyler Fritz

GEOG 483: Lesson 9 and Lesson 10

<u>Environmental Management and Conservation</u>

<u>Lesson Goals</u>

The primary goal of these final two lessons are to first design a workflow that outlines the necessary steps to complete a spatial analysis problem and then to subsequently carry out that workflow to produce an output map deliverable.

Writing and designing a project workflow which will require the recall of various important GIS skills learned in past lessons including but not limited to: overlay analysis, working and switching between raster and vector datasets, raster data reclassification, buffering vector features, creating hillshade and slope rasters from elevation data, performing map algebra, and working with attribute tables.

<u>Project Summary</u>

The workflow and subsequent analysis seek to assist in a proposed project in Centre County, PA to proactively approach wildlife species conservation by setting up a biological reserve system within the region. This system would protect lands within the region that contain a specific set of attributes that make them ideal habitats for at-risk species populations. The spatial analysis done in this project will help experts identify the areas within the region that meet the following criteria:

- Greater than 70 total bird and mammal species
- Less than 10% of study areas occupied by buffered roads, highways, and interstates
- High habitat potential
- Publicly owned land
- Forested land
- Slopes less than 10%

Deliverables include output maps that highlight the areas within the county that meet these criteria.

<u>Discussion</u>

The analysis was split into two main parts: the first phase consisted of working with all the vector layer data until a single layer was completed with only the areas that met criteria determined by vector data while the second phase consisted of turning the completed vector layer into a raster and then using reclassification and map algebra with the remaining raster data to produce a final raster output which shows all areas that met criteria.

I will outline the steps in the vector portion of the analysis. Information on species was first added to the study areas vector using a join – followed by creating a new field for total species. The roads layer was also buffered according to rd_type by creating a buffer field and assigning the predetermined values using a series of select by attribute queries. The study areas layer was then whittled down using the Erase overlay analysis tool as well as some selecting by attributes queries. For example, the erase tool was used to remove all buffered roads from the study area layer (Figure 1).
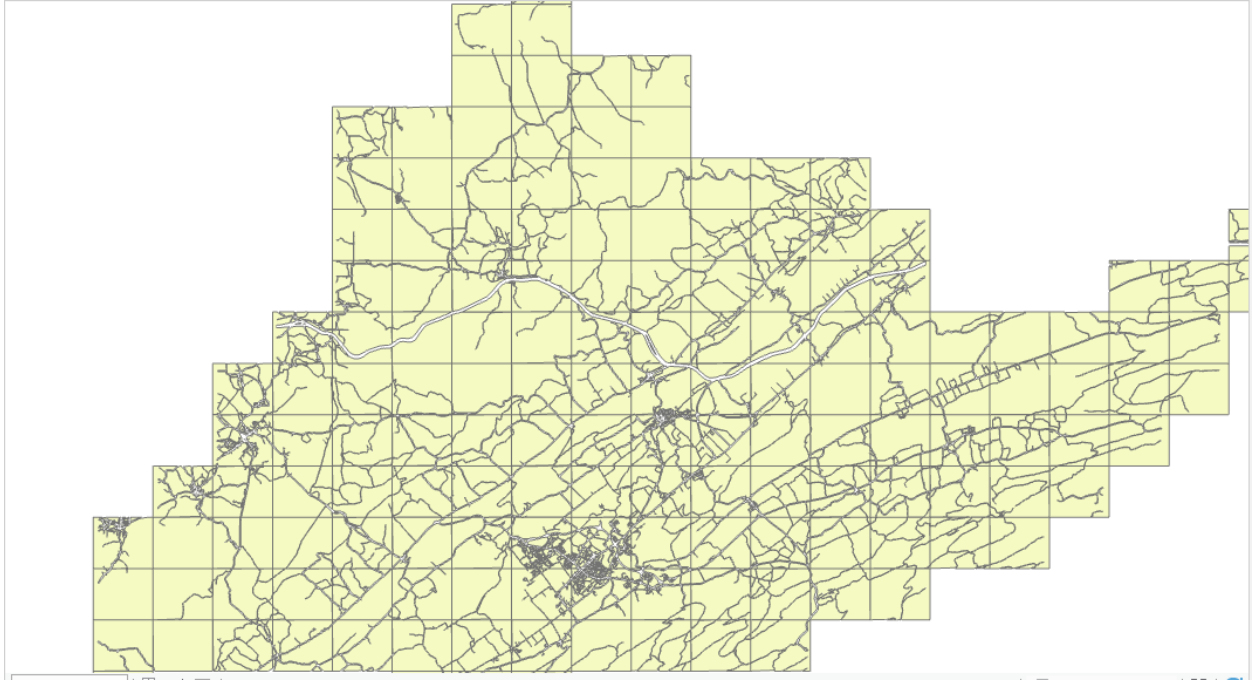
Figure 1: Roads erased from studyareas

Now the study areas have had the road sections removed as well as having attribute table values with area fields which can be used to select study areas by the percent of roads. Additionally, selection of study areas by total species can be done, producing Figure 2.
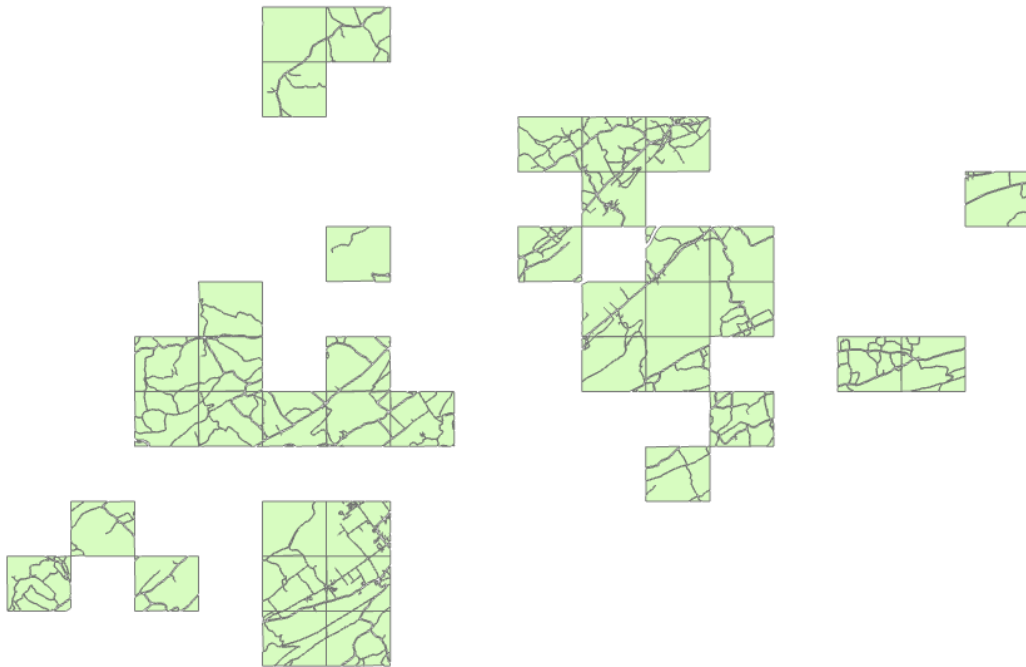

Figure 2: Study areas meeting road and species criteria

Now further analysis can be done by making dissolves of the ownership and habitat layers and creating new layers from them that only contain the areas that DO NOT meet criteria and using those as Erase layers on the study areas layer, producing a final vector layer of all the areas that meet criteria (Figure 3).
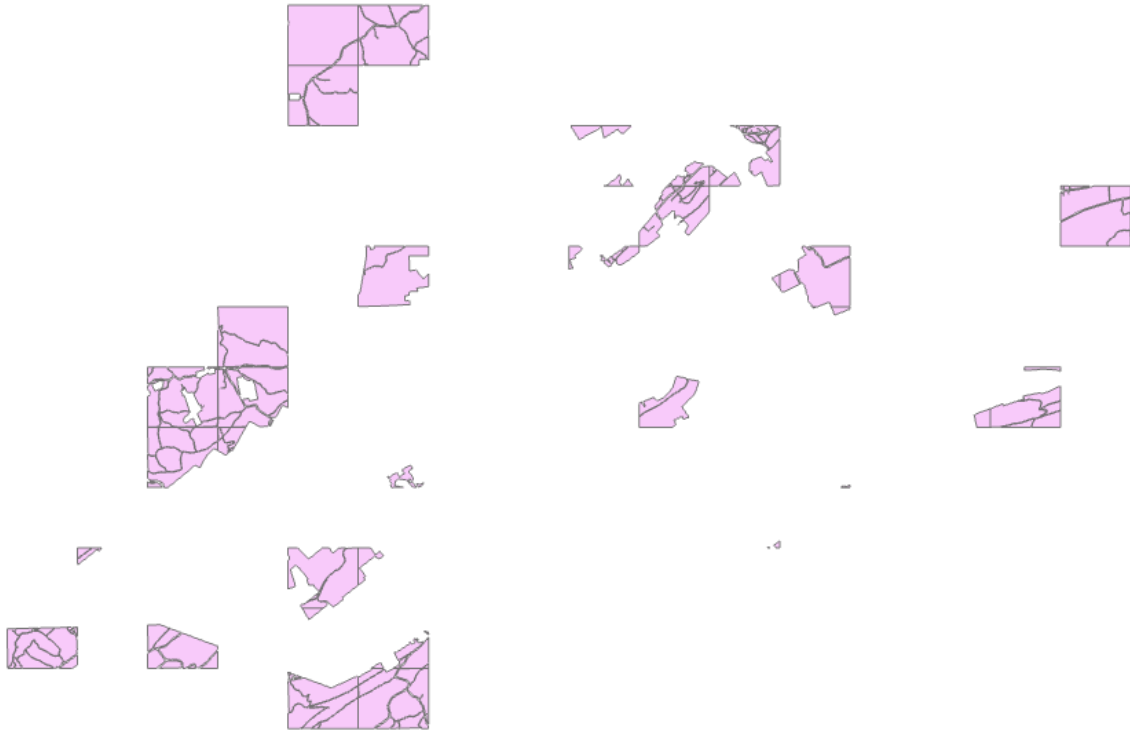

Figure 3: Final vector layer showing areas meeting criteria.

Now begins the portion of the analysis which involves raster reclassification and map algebra. The Figure 3 vector is converted to a raster with 50x50 cells (based on largest cell resolution of data input rasters) and each cell reclassified to 1 with NoData classified as 0. The elevation data was used to produce a slope% raster and reclassified having cells with less than 10% equal to 1 and others equal to 0. Similarly, the landuse raster was reclassified. Map algebra was used to produce a final raster showing areas meeting criteria (Figure 4).

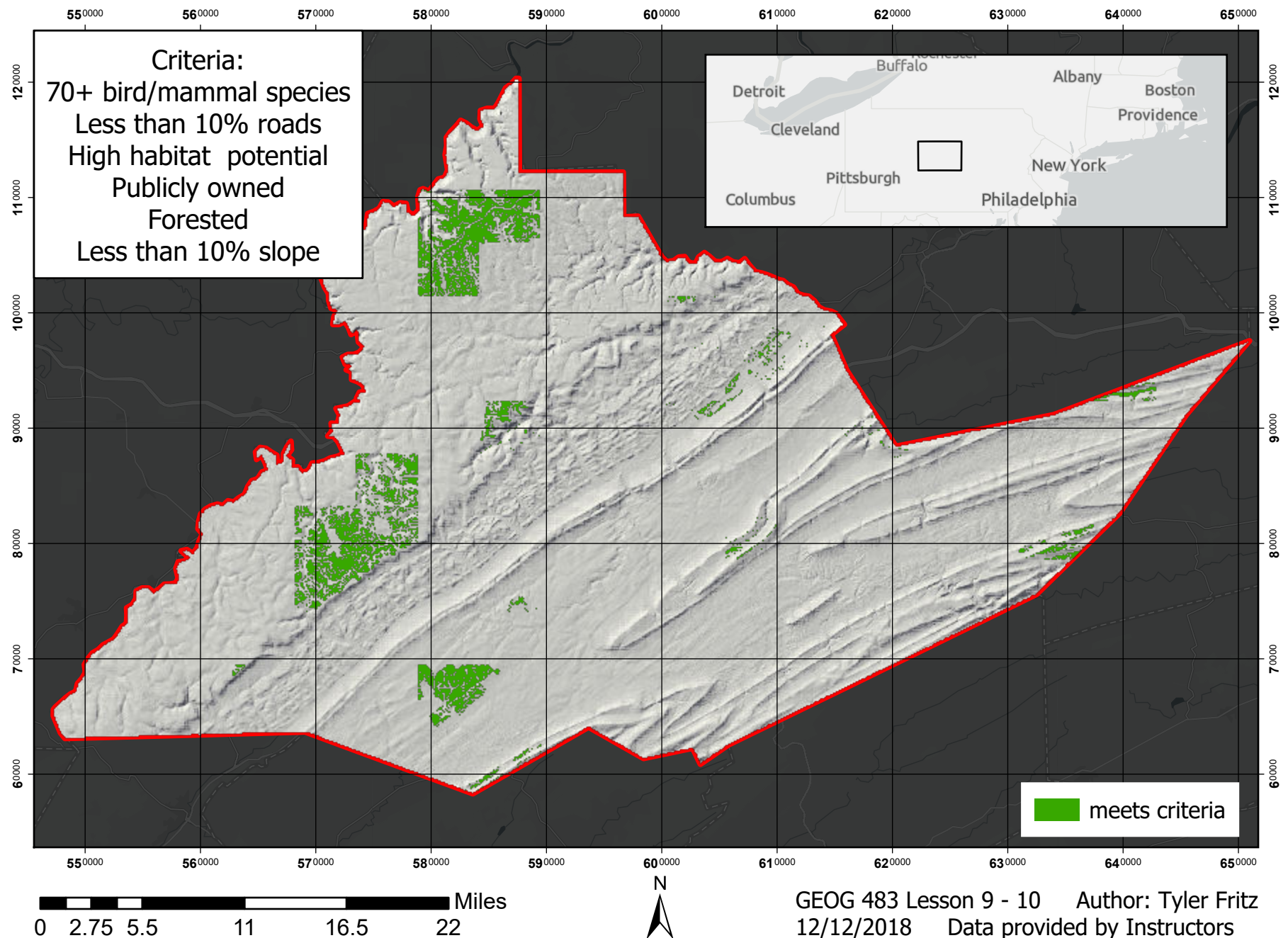| OBJECTID	Value	Count
1	0	1037639
2	1	47724

Click to add new row.

Figure 4: Final raster showing areas meeting criteria with attribute table statistics showing 47724 cells meeting all criteria

This final raster was used to produce two final maps showing this data overlying a hillshade layer as well as overlaying the original elevation data.

Detemination of Potential Wildlife Conservation Areas in Centre County, PA

Description: Green highlighted areas meet all criteria listed below

Criteria:
70+ bird/mammal species
Less than 10% roads
High habitat potential
Publicly owned
Forested
Less than 10% slope

Detroit   Buffalo   Rochester   Albany   Boston
Providence
Cleveland
Pittsburgh   New York
Columbus   Philadelphia

meets criteria

Miles
0   2.75   5.5   11   16.5   22

N

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12/12/2018   Data provided by Instructors

Detemination of Potential Wildlife Conservation Areas in Centre County, PA

Description: Green highlighted areas meet all criteria listed below

Criteria:
70+ bird/mammal species
Less than 10% roads
High habitat potential
Publicly owned
Forested
Less than 10% slope

elevation (m)
809.999

170.962

meets criteria

Miles
0   2.75 5.5   11   16.5   22

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