Kevin Price

Candidate Reserve Sites - Centre County

Lesson Criteria:

In this lesson our client, the Centre County (PA) planning office, has requested help with a site selection analysis that will identify potential reserve areas in the county. The criteria for the analysis have been defined by land use planning and conservation biology experts and include areas with:

- Greater than 70 bird and mammalian species combined
- Less than 10% of each study area occupied by buffered roads, highways, and interstates
- High habitat potential
- Publicly owned land
- Forested areas
- Slope less than 10%

All necessary data for the analysis has been provided to us.

Summary of Project Goals:

The main goal of this project is to create a map and report for the Centre County (PA) planning office that identifies all potential reserve areas based on the defined criteria with the data provided to us. Intermediary goals for this project include creating a workflow for the analysis and capturing major steps throughout the process to included in the report. Alongside the map and key analysis steps, a summary of how the analysis was conducted and a discussion of its results will also be included.

Key Analysis Steps

Kevin Price

Unique Species and Road Coverage

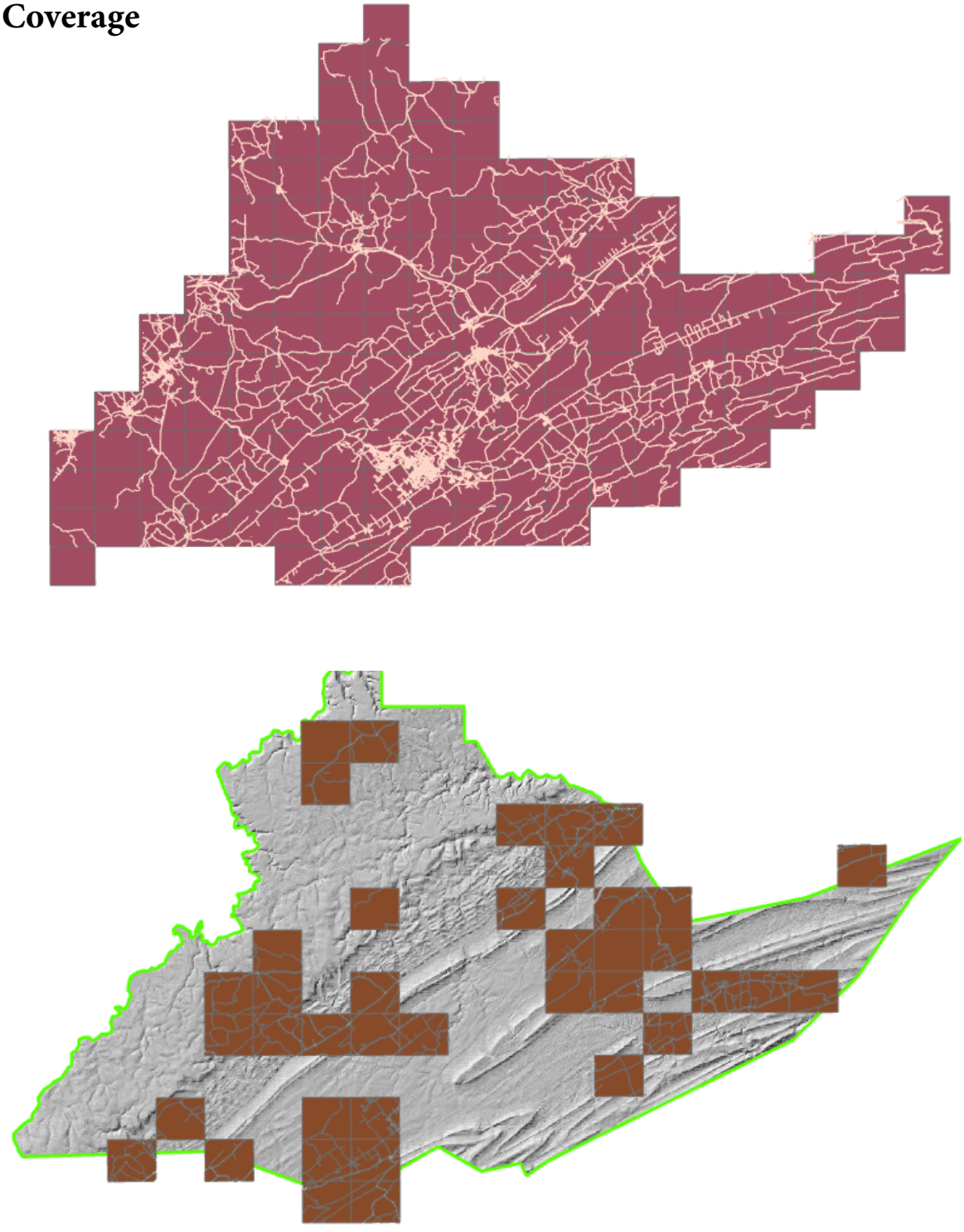


Figure 9/10-1

Upper image shows all study areas (157) used to determine the number of unique mammal and bird species as well as a roads layer for Center County. Lower image shows the study areas left (40) after performing selections for study areas with more than 70 species and less than 10% road coverage. Road layer was removed from study areas layer and then rasterized (using a cell size of 50) to perform map algebra for final candidate reserve sites.

Kevin Price

Land Ownership

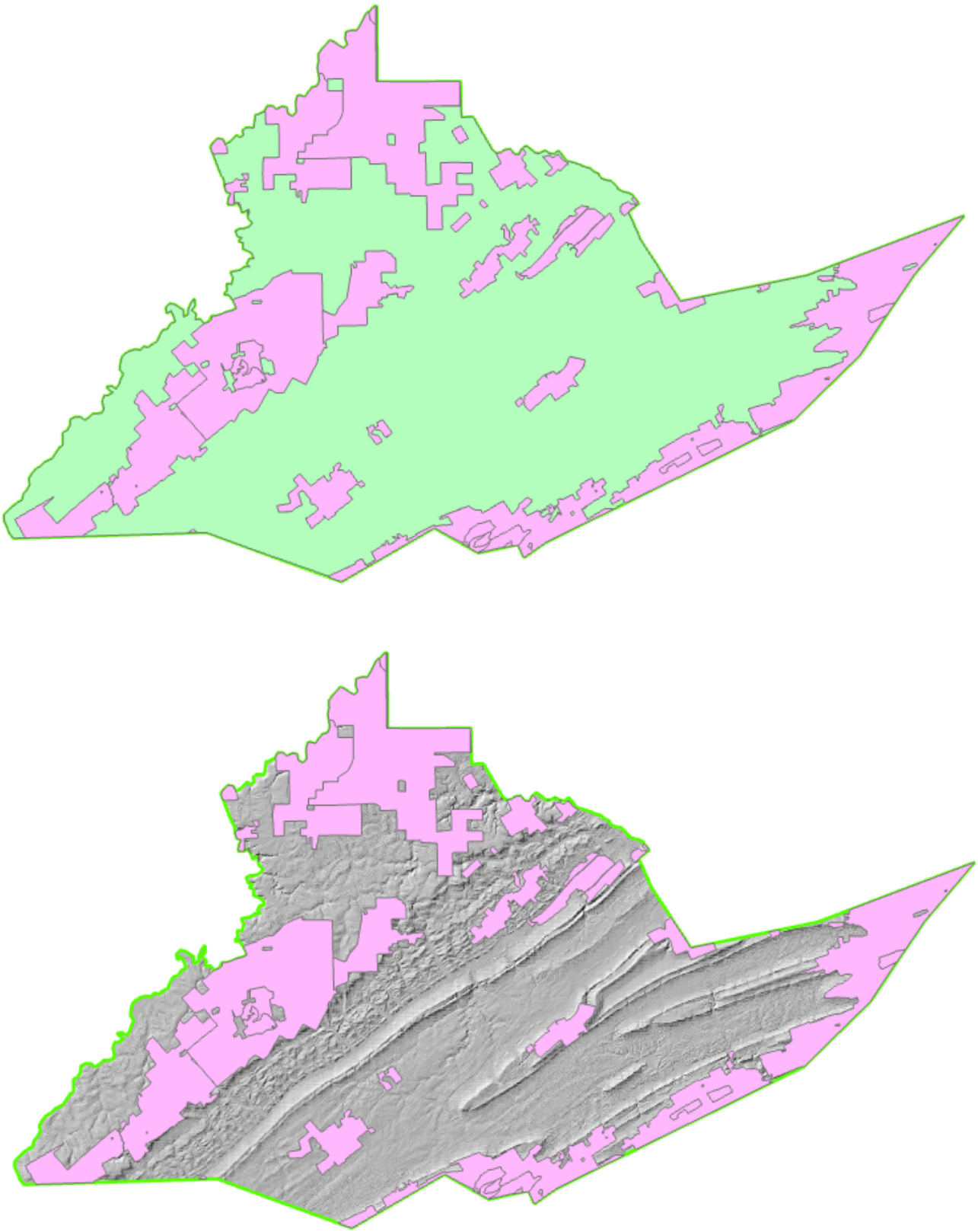


Figure 9/10-2

Upper image shows polygon layer depicting public (pink) and private (green) lands. Bottom image shows public lands after selecting from original layer and exporting to a new polygon layer. Bottom image was then rasterized and classified appropriately for map algebra.

Habitat

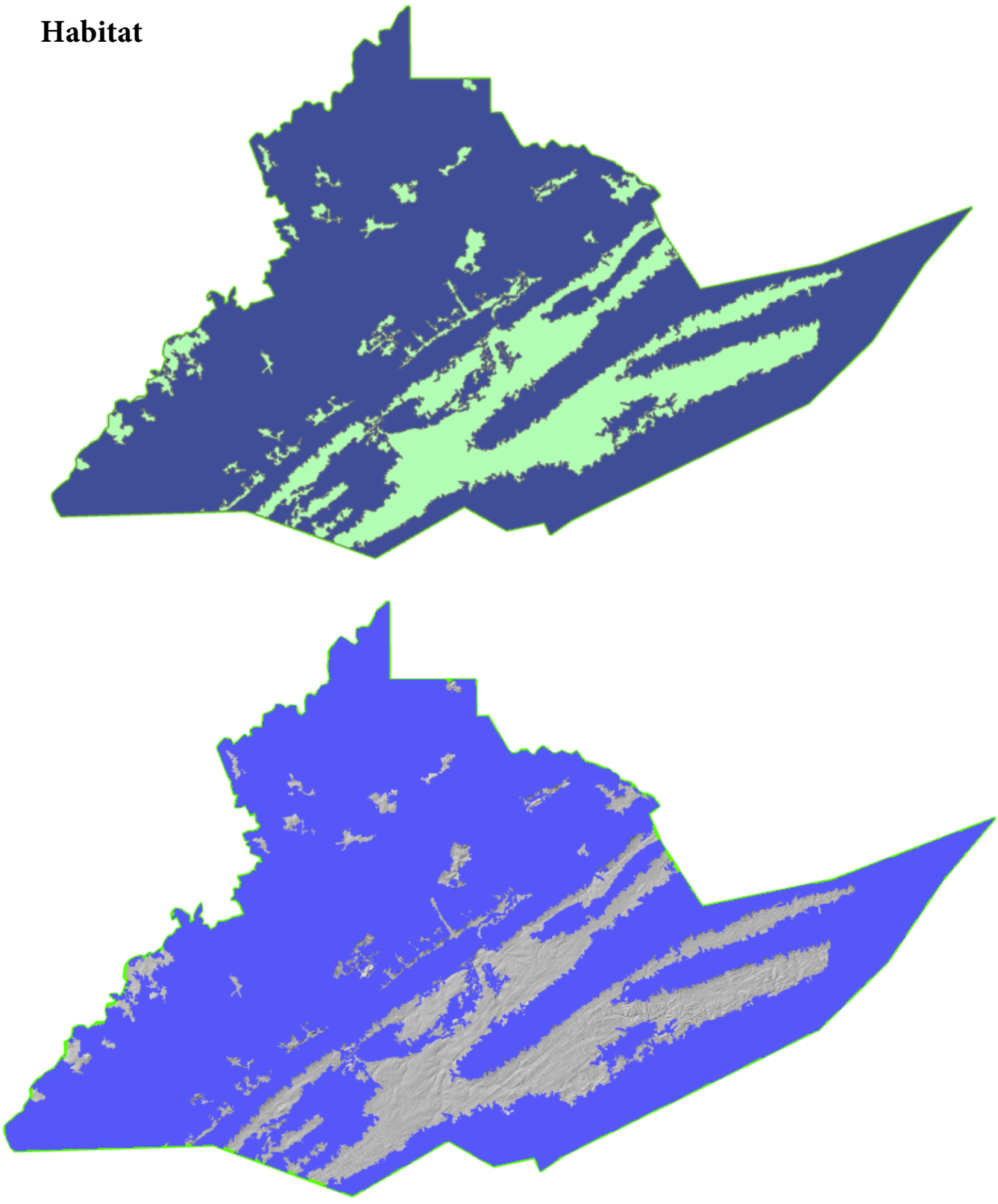


Figure 9/10-3

Upper image shows habitat polygon layer symbolized by habitat potential, green indicates low potential and blue indicated high potential. Lower image shows the data after filtering for areas with high habitat potential and converting the selection to a raster layer using a cell size of 50.

Land Use Designation

Kevin Price

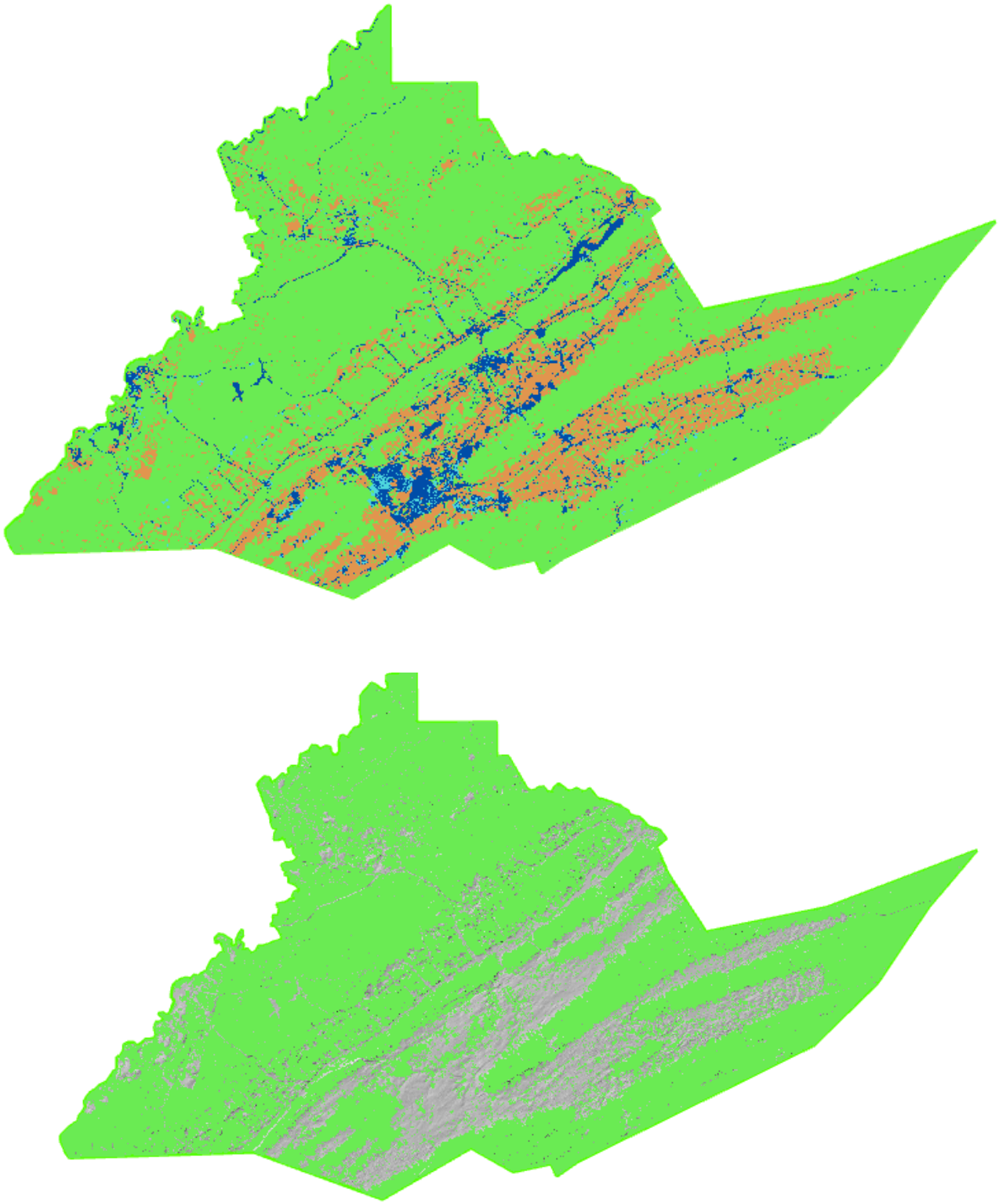


Figure 9/10-4

Upper image shows a raster layer for land use designation. This layer was provided with a cell size 50, the coarsest dataset provided, and thus was used as the size for all other raster layers. Bottom image shows the land use raster layer after a reclassification to assign forests (green) a value of 1 and all other designations (no color) a value of 0.

Slope

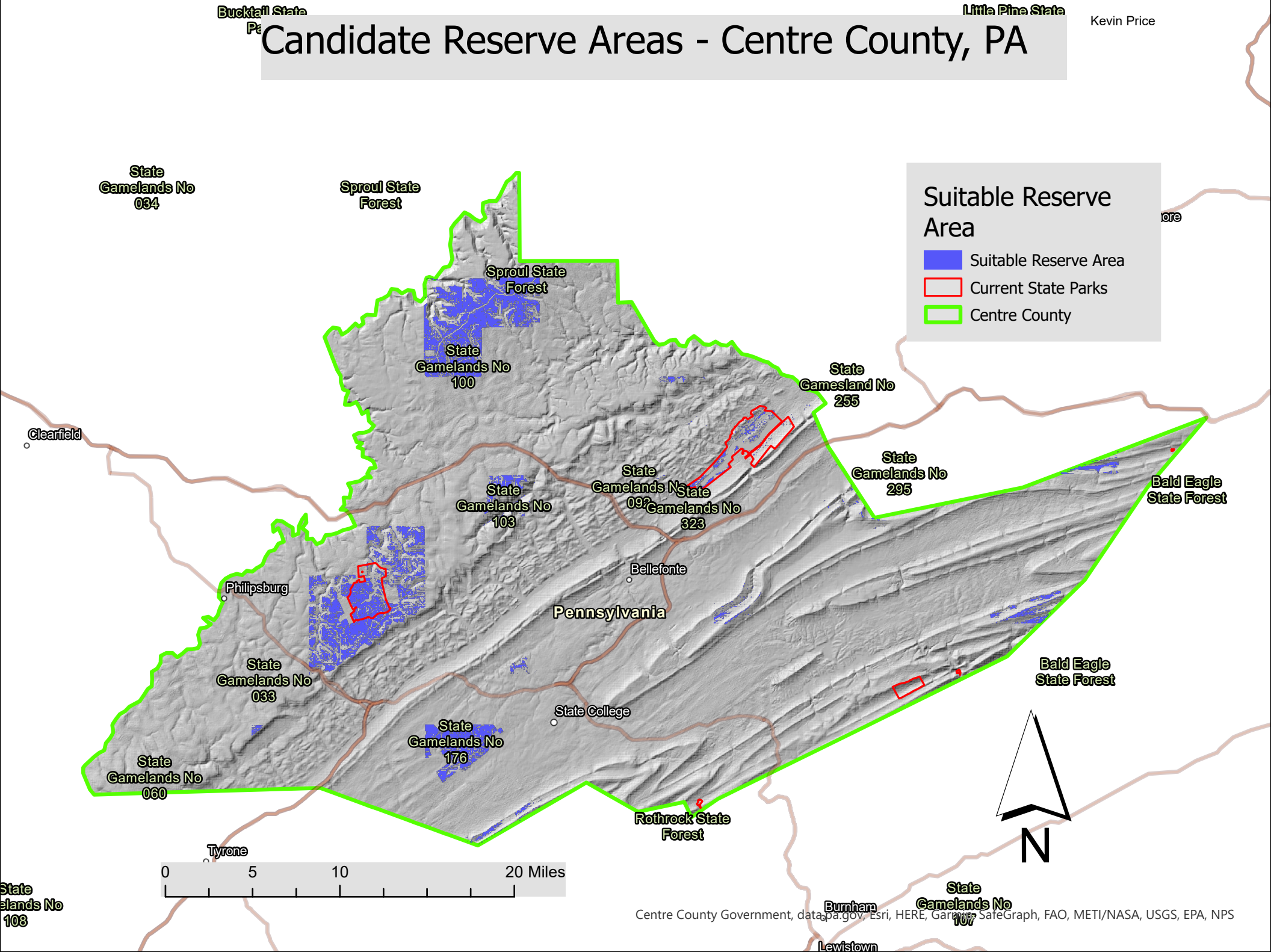
Kevin Price

Figure 9/10-5

Upper image shows a percent slope raster layer created from elevation data of Centre County provided to us for the analysis. Lower image shows a reclassified raster layer where all area with % slope less than 10 were assigned a value of 1 while all other areas were assigned a value of 0. Bottom image was utilized with raster calculator alongside all other finalized raster layers to determine areas in Centre County that met all criteria for our analysis.

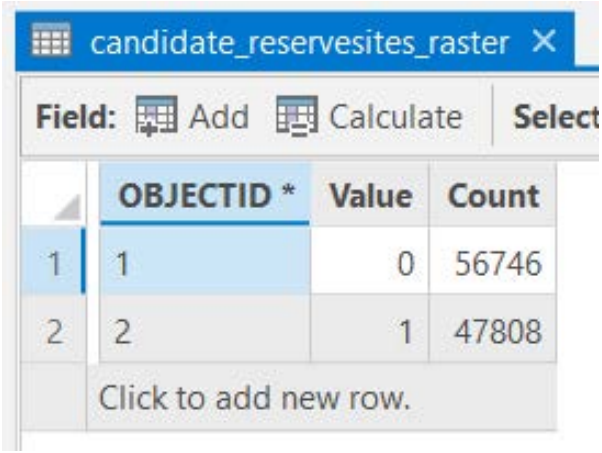
Candidate Reserve Areas - Centre County, PA

Kevin Price



Map 9/10-1

This map shows the final candidate reserve areas of our analysis in blue. A layer including current state park boundaries as well as a hybrid imagery label layer were included to identify current areas that may already be protected. This was not a part of our analysis but could be important information to consider for the planning office if they are looking to establish new reserve areas.



	OBJECTID *	Value	Count
1	1	0	56746
2	2	1	47808
	Click to add new row.		

Table 9/10-1

This table displays the number cells in the final raster that met our criteria (47808) and the number of cells that did not (56746). Each cell represents a 50 by 50 meter square equating to 119,520,000 square meters or approximately 29,534 acres of land that meets all of the criteria for this analysis.

Methods Summary

An array of methods for spatial analysis including joins, buffers, selecting by attribute, field calculation, exporting to feature layers, polygon to raster, and raster reclassification were used in this analysis to determine the final results as well as the slope and raster calculator tools. Joins were used to append species information to the study areas layer and the erase tool was utilized eliminate road area form the study areas. Field calculation was utilized to determine the percent road coverage in each study area based on its original area and its area after a buffered road layer was erased. Attribute selection was applied to our study areas, habitat, and ownership data to identify features which met the analysis' criteria and these selections were exported to new feature layers then converted to raster. The slope tool was utilized to create a % slope raster layer and this raster layer as well as the provided land use raster were reclassified to assign appropriate values to desirable and undesirable attributes. Finally, the raster calculator was utilized to multiply all of the raster layers together to identify land within Centre County that met our criteria based off the data that was provided.

Conclusions and Discussion

This analysis returned approximately 29,534 acres of land within Centre County (PA) that met all the criteria defined by land use planning and conservation biologist experts. The results can with out a doubt help serve the purpose of supporting the Centre County (PA) planning offices initiative for a biological reserve system within the region. However, there are some additional consideration that are recommended to improve the analysis.

The largest issue with this analysis is derived from the provided land use raster. It is our coarsest set of data and requires that all other data be set to a cell size of 50 which impacts the precision of our data. However, the issue compounds even further when we observe that the land use raster layer and habitat vector layer are nearly identical in their area which meets the analysis' criteria, observable in *Figures 9/10-3 and 9/10-4.* This indicates that the omission of the land use raster layer from our analysis entirely would most likely conclude in very similar results while it's inclusion limits the precision of the analysis. The recommendation to improve the analysis would be to provide a land use raster layer at a resolution size of 30 cells, the next limiting factor in our analysis, or smaller.

Another consideration that could improve the analysis is the inclusion of more data on current protected areas data within the county. State Park boundaries and Gamelands labeling were included to help illustrate where they currently exist; however, they were not factored into the analysis in any way and their existence is most certainly important for the planning office's purposes. Quick observations can be made illustrating how current State Park boundaries may want to be expanded such as in the case of Black Moshannon State Park of the western part of the county. Although, Bald Eagle State Park in the northeast raises a different question as very little of its boundary area was identified by our analysis as suitable reserve area. This could signify that Bald Eagle, as it exists, may not be an ideal area for conservation or that the analysis was performed in such a way and/or is missing important criteria that has limited its ability to identify suitable area.

References

- State Park Boundaries. Pennsylvania Spatial Data Access. (n.d.). Retrieved May 4, 2022, from https://www.pasda.psu.edu/uci/DataSummary.aspx?dataset=114
- King, E., Walrath, D., & Zeiders, M. (1999-2022). Problem-Solving with GIS, Lesson X. The Pennsylvania State University World Campus Certificate/MGIS Programs in GIS. Retrieved Month Day, Year