Case Study Activity – Bats and Wind Energy Development Risk

Objective:

Identify areas in Pennsylvania which have a high probability of wind energy development that could potentially impact federally listed bat species if developed.

Data Layers:

1. Potential of Wind Energy Development across the Appalachian LCC – 90 Percent Risk or Greater
2. Pennsylvania Watersheds with a Documented Bat Occurrence
3. Pennsylvania Forest Cores at Risk to Energy Development

Potential Solution:

1. Open ArcGIS Desktop
2. Download and add Potential of Wind Energy Development across the Appalachian LCC – 90 Percent Risk or Greater from the Data Layers list above. This layer depicts areas with a 90% or greater risk of wind energy development throughout the Appalachian Landscape Conservation Cooperative (LCC).
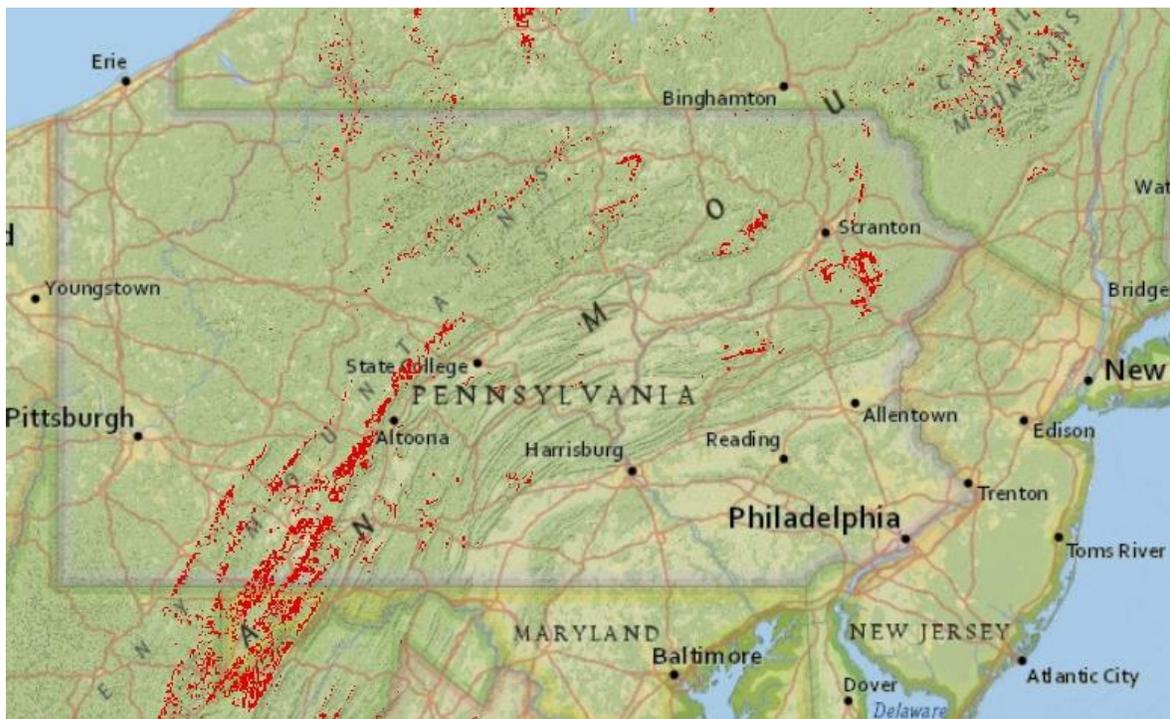

3. The data layer added in Step 2 is in raster format. In order to perform the analysis in this exercise, the data will first need to be converted to vector format. To complete this step, select the "Raster to Polygon" tool available in the Conversion toolbox in ArcGIS Desktop. The input

raster will be the data added in Step 2. In the "Field" box, ensure that VALUE is selected (this field differentiates between areas greater than or equal to 90 percent risk and areas less than 90 percent risk). The "Output polygon features" is the location to which the newly created data will be saved. You do not need to follow the same file path as shown in the example. However, it is a good idea to create a project folder to save the data layers used for this exercise and layers you will create. Also remember to uncheck Simplify polygons. When finished , click "OK"
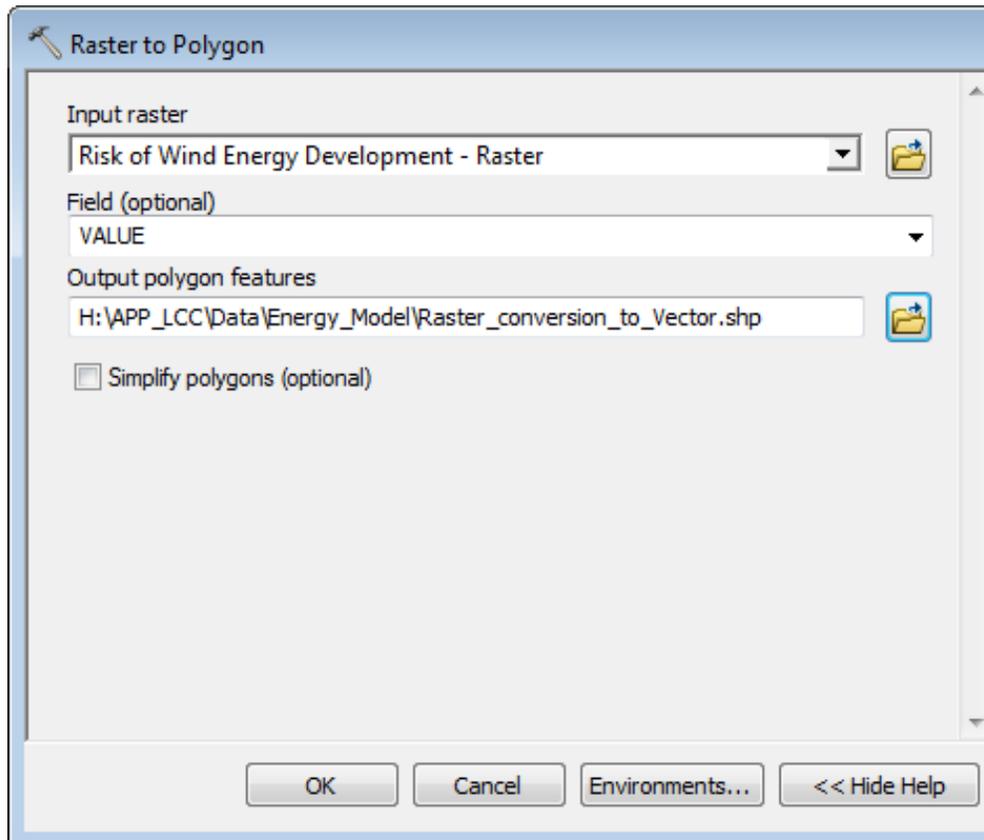

4. The resulting vector file will include the entire Appalachian LCC. In order to perform the analysis for only the areas that have a 90 percent or greater risk of wind energy development, you will need to remove the areas which do not meet this criterion. There are several ways in which this task can be accomplished. This exercise will cover how to perform this task using a definition query. There is a vector layer available for download if you would like to see an example.
5. To create a definition query, double click on the layer name in the Table of Contents to open the Layer Properties dialog. Select the "Definition Query" tab. Click on "Query Builder" and enter the expression shown in the example below. When finished, click "OK".
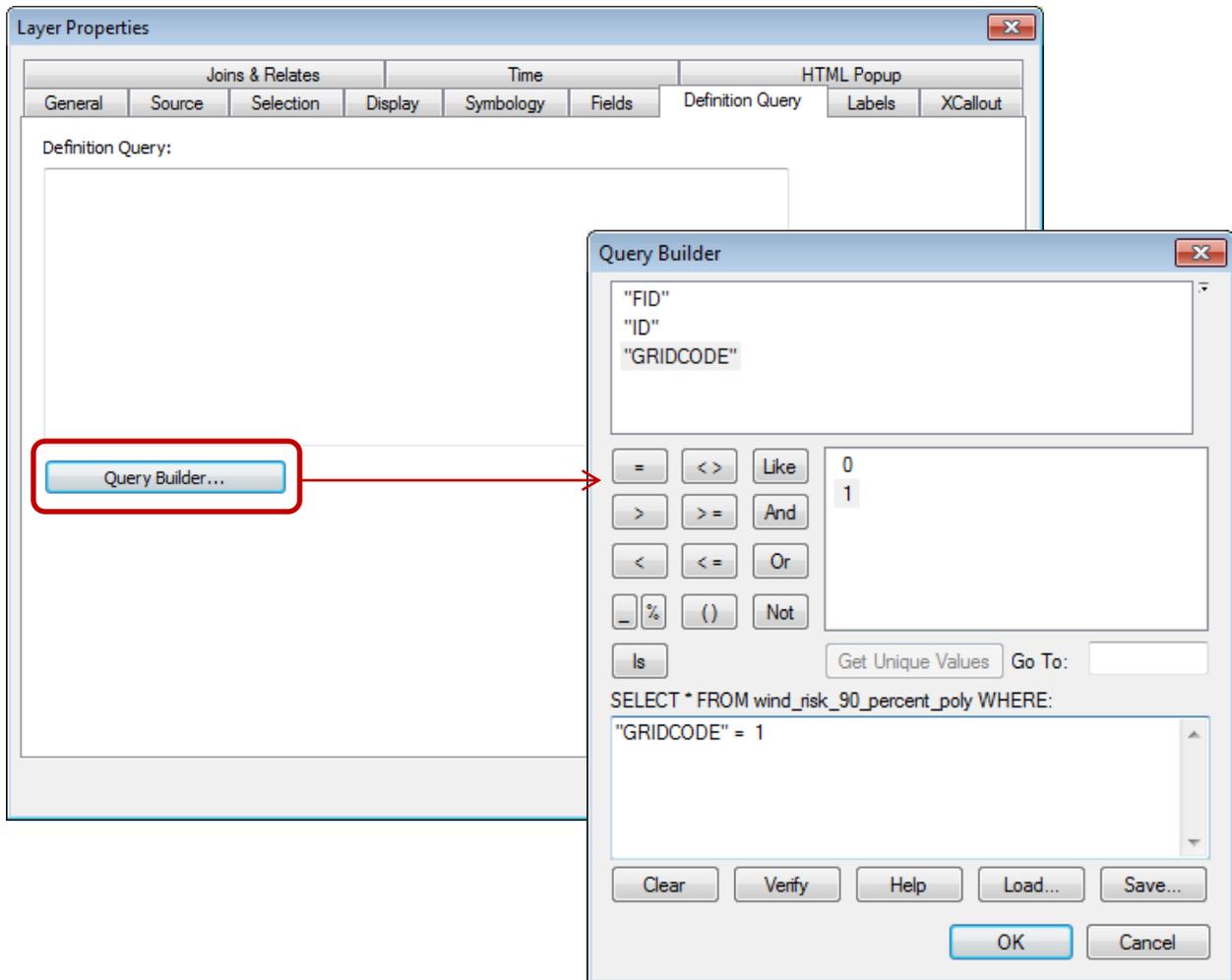
4. The next step in the analysis is to identify the areas at risk to wind energy development that are within a specified distance of a documented bat occurrence. Exact bat locations are considered sensitive and are therefore not being used in this exercise. As an alternative, a layer depicting bat occurrence generalized to the HUC-12 watershed scale was created. Download and import the Pennsylvania Watersheds with a Documented Bat Occurrence.
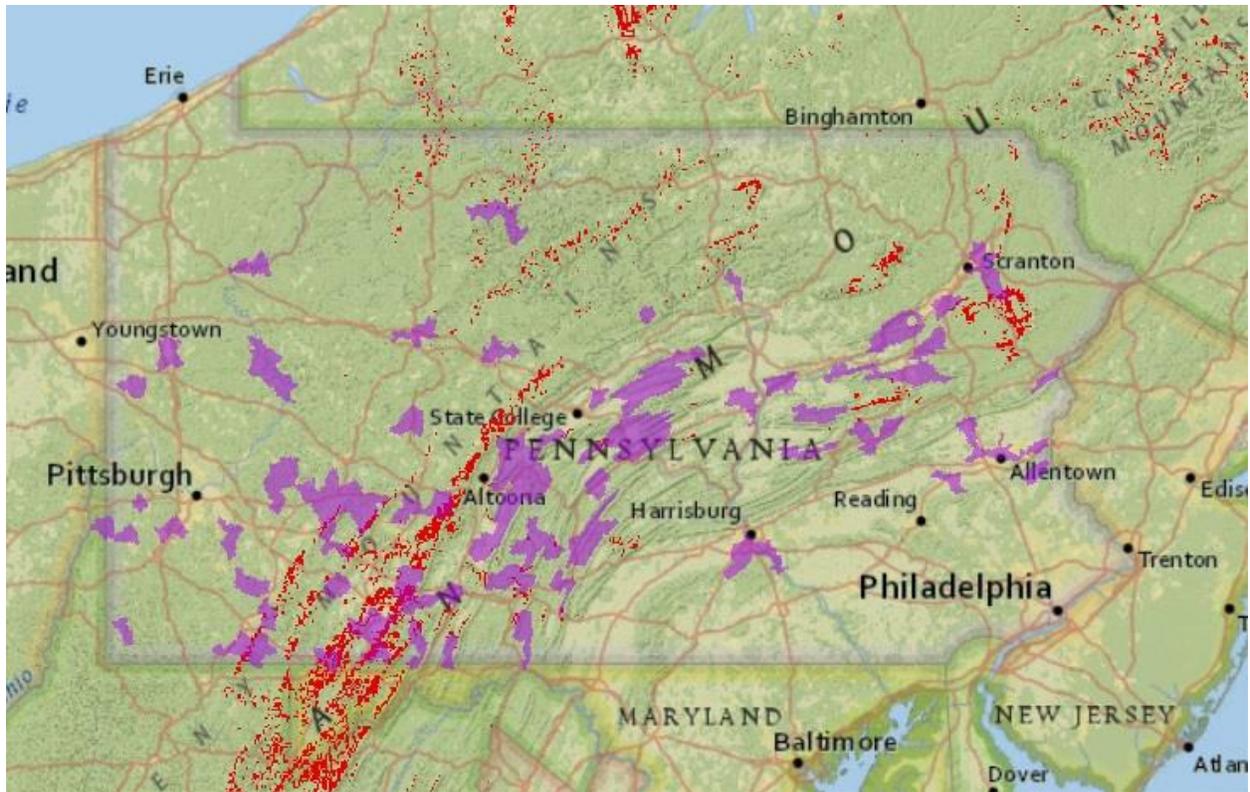
6. For this exercise, you will be selecting the areas at risk to wind energy development that are within 5 miles of a watershed with a documented bat occurrence. From the Selection menu, choose "Select By Location". In the "Select By Location" box, the selection method should be "select features from". For "Target layer", select the wind energy development risk layer. The source layer will be the Northern-long eared bat occurrences by watershed as shown in the example below. The spatial selection method for target layer feature will need to be changed to "are within a distance of the source layer feature". Enter a search distance of 5 miles. Note: The default units will need to be changed to miles. Click "OK".All areas that have a 90 percent or higher risk of wind development that are within five miles of watershed with a documented bat occurrence will be selected.
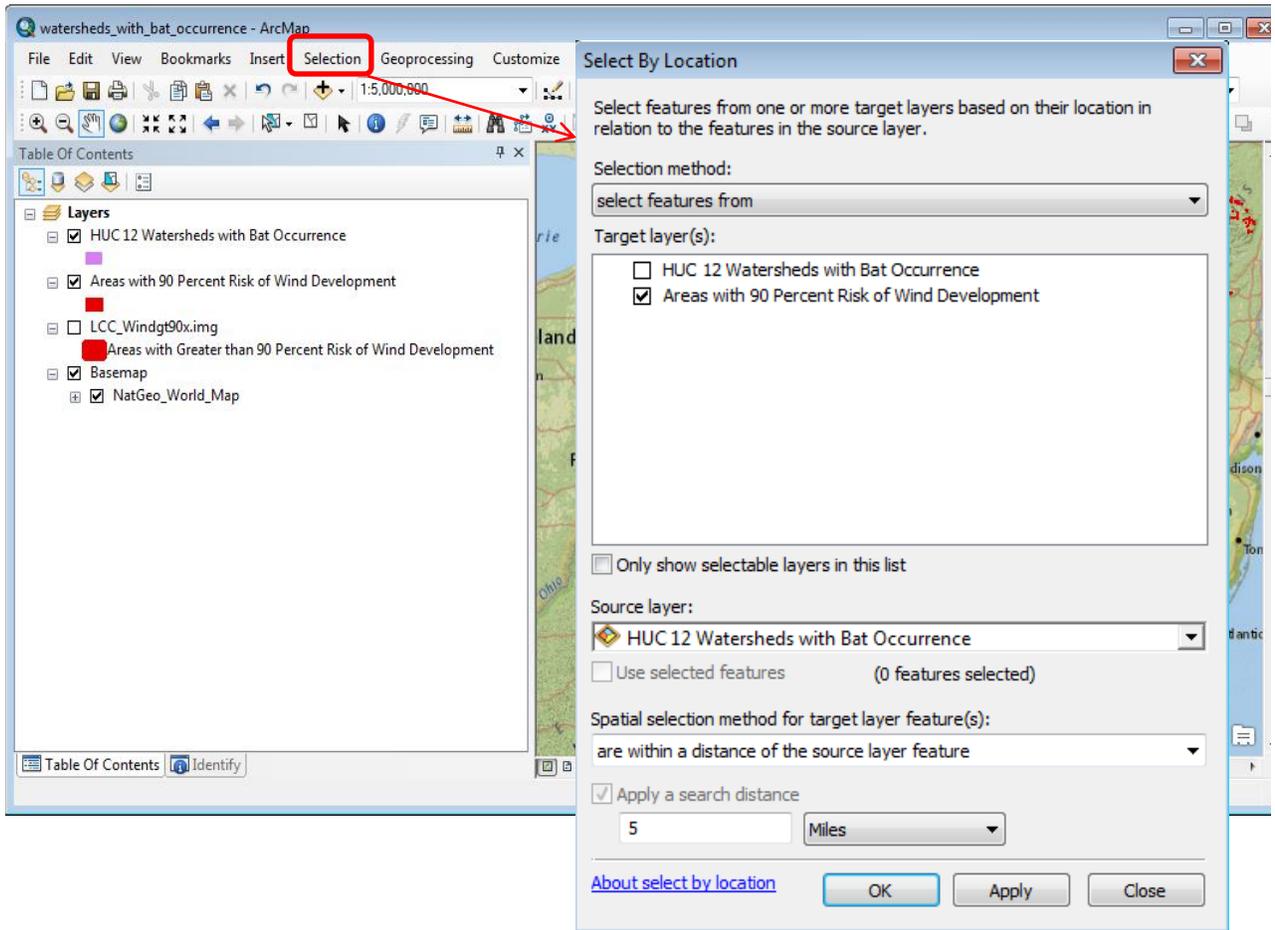
7. The resulting map will look similar to the example below with the areas identified using the selection tool highlighted in blue.
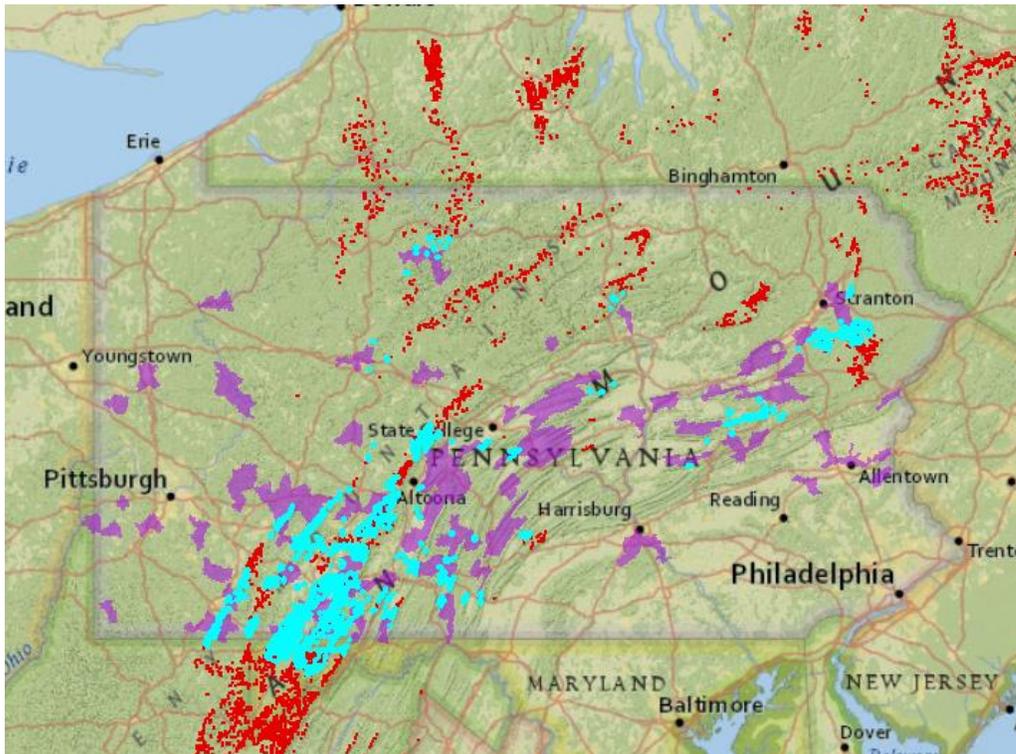
8. For the purposes of this exercise, you will create a new data layer from the selected features. Right click on data layer in the Table of Contents and select "Data" then "Export Data" to create a new shapefile of the selected areas.
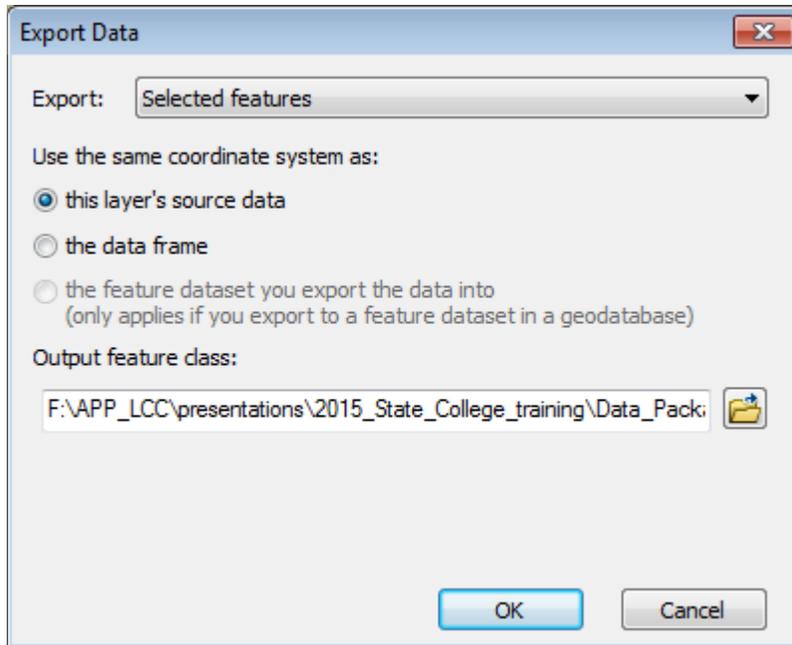
9. The red area in the map below displays the newly created data layer depicting areas identified as having a 90 percent or greater risk of wind energy development that are also within 5 miles of a HUC12 watershed with a documented bat occurrence.
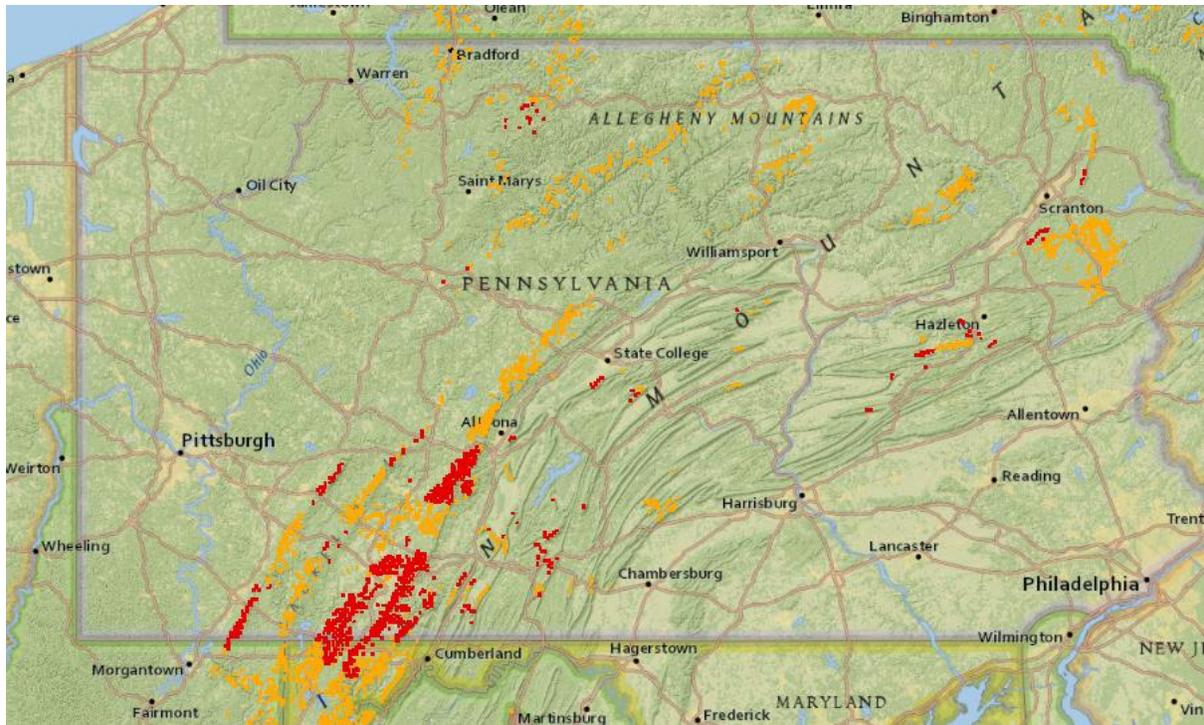
10. Northern-long eared bats utilize forested habitats for summer habitat and foraging. Maternity colonies also rely on forested areas. Threats to forested areas ca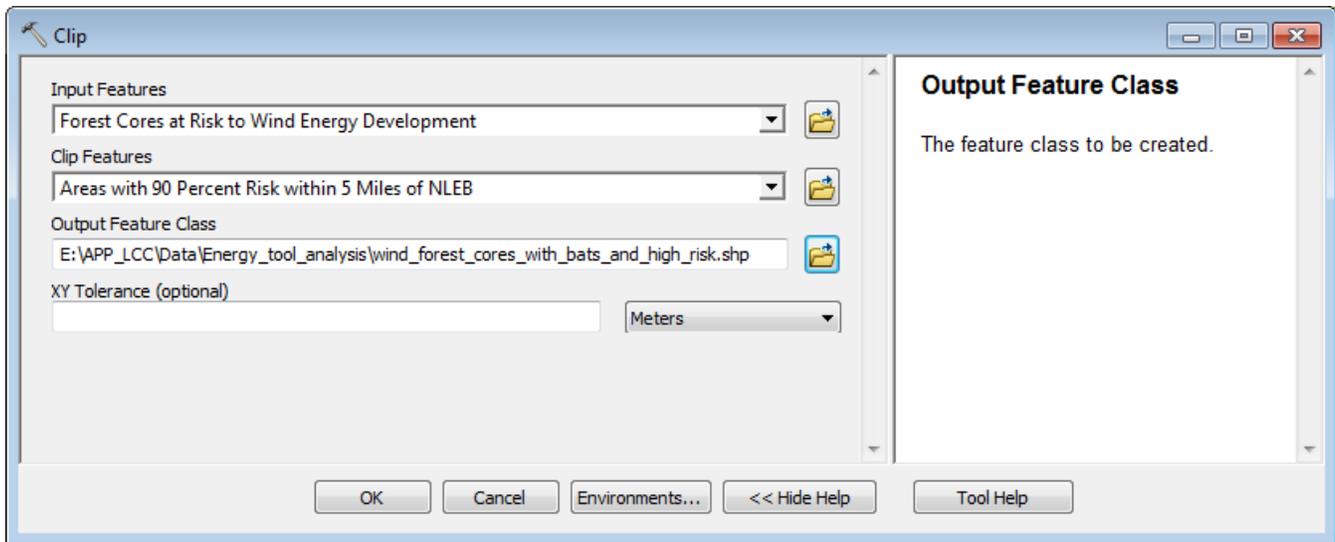n have a significant impact on this bat species. As a result, forest cores at risk to wind energy development should be considered when identifying areas at risk to wind energy development that may also be important to bat species which rely on forested habitat. The previously identified areas (Step 9) can be overlaid on forest cores at risk to wind energy development to determine the at risk forest cores that are also important to bats. The identified forested areas would be considered a higher priority for protection. This prioritization could be used in discussions with industry when discussing avoidance of these high priority areas and identifying alternative areas. Non-forested areas may be considered a priority for restoration.

11. To identify the forested core areas that are a high risk for wind energy development that also are within a watershed with a documented bat occurrence, first import the Pennsylvania Forest Cores at Risk to Energy Development data layer into the exiting map document. The forested areas are displayed as green hatch marks in the following map. The red areas on the map represent the areas identified in Step 8 that having a 90 percent or greater risk of wind energy development that are also within 5 miles of a HUC12 watershed with a documented bat occurrence.
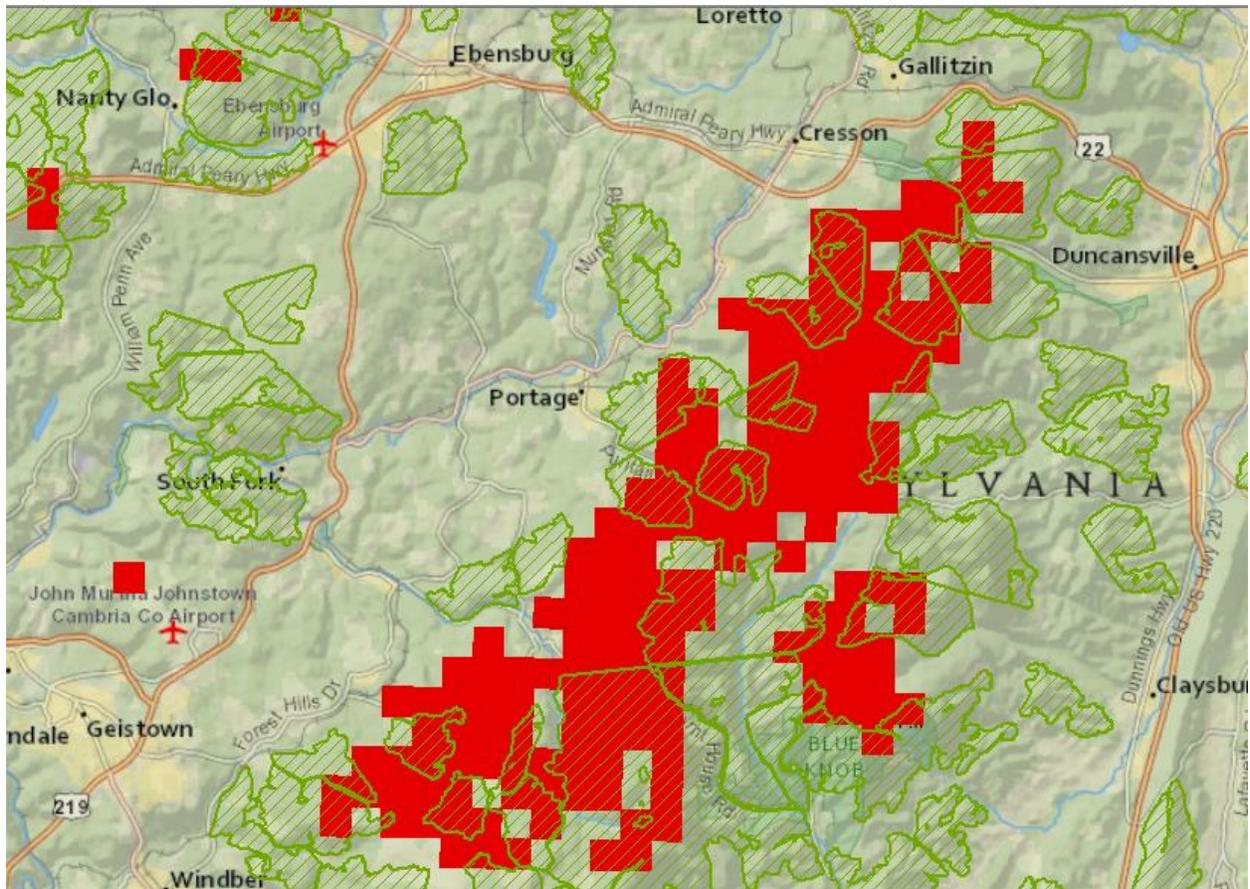
12. The next step is to create a layer of only forested cores that have a 90 percent greater of wind energy development that are also within 5 miles of a watershed with a documented bat occurrence. For this task you will use the "Clip" tool in ArcGIS Desktop (available in the Data Management Tools toolbox). The Input Features should be the data layer you created in Step 8. Clip Features are the forest cores data layer you added in Step 11. The Output Feature Class is the location for the newly created data layer.

Clip

Input Features

Forest Cores at Risk to Wind Energy Development

Clip Features

Areas with 90 Percent Risk within 5 Miles of NLEB

Output Feature Class

E:\APP_LCC\Data\Energy_tool_analysis\wind_forest_cores_with_bats_and_high_risk.shp

XY Tolerance (optional)

Meters

Output Feature Class

The feature class to be created.

OK   Cancel   Environments...   << Hide Help   Tool Help

13. The result is a data layer which identifies forest cores that have a 90 percent or higher probability of wind energy development and are also within 5 miles of a watershed with a documented bat occurrence. The areas in red represent the areas with a 90 percent or higher probability of wind energy development that are also within 5 miles of a HUC 12 watershed with a documented bat occurrence.
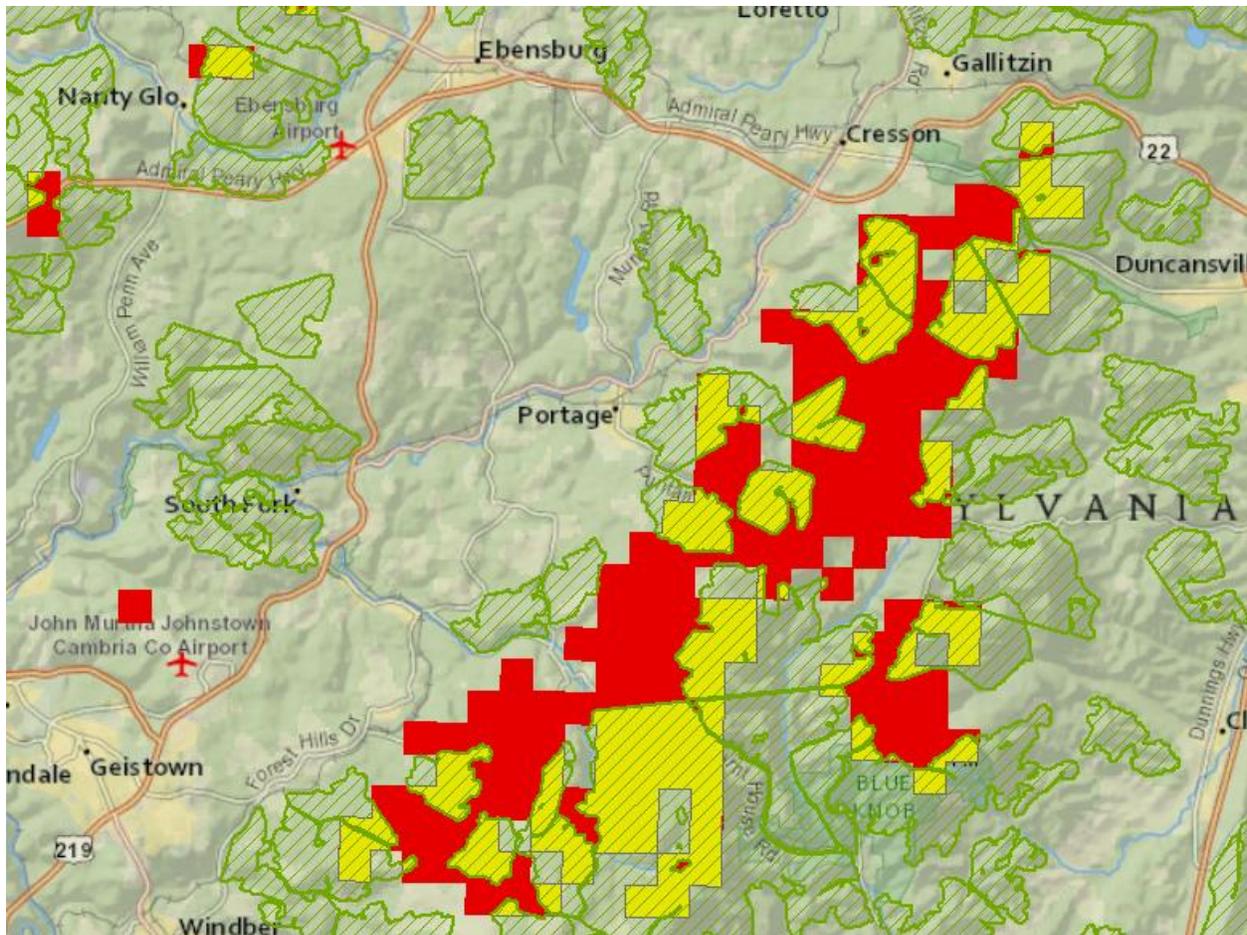
Conclusion:

This exercise demonstrated one way users could perform an analysis to identify areas at a high risk of wind energy development that may also be important to bats species. The areas identified by the example may be considered a high priority for habitat protection if they are not already protected or these areas could be used to discuss alternative wind energy development locations. Industry could use these areas when planning future development projects and attempt to avoid them if possible. Even if these areas were originally identified for a proposed development, the analysis could be used to discuss potential alternatives that avoid the areas. Industry could alter their plans so that they are still in a desirable location for wind energy development, but not in an area that was adjacent to documented bat occurrences and hibernacula.

Additional Considerations:

Considering the distance to hibernacula and maternity colonies is important when analyzing the potential impacts of wind energy development on northern-long-eared bat. The five miles used in the exercise took into consideration the impacts associated with construction of wind energy facilities only. However, operational impacts associated with wind energy may require you to consider a larger area of

impact. For the highest quality hibernacula, it is recommended that areas within 20 miles be considered. For lower quality hibernacula, a distance of 10 miles is recommended.

This exercise used a limited number of data layers to provide an example of how data from the Energy Forecast Model can be used in conjunction with other data layers to identify and prioritize areas at risk to wind energy development. There are numerous additional data layers which could also be used. Based on organization priorities, different layers may be incorporated using a similar approach. In addition, a similar analysis could also be performed on the shale gas and coal energy forecast models which are available.