



Lab 3 — Road Density and Wolves in the Poudre watershed

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The goals of this lab are:

- to examine the patterns of roads in the entire Poudre watershed
- to assess the feasibility of reintroducing wolves to the area.

Studies on wolves have revealed an ecological threshold regarding road densities. These studies report an approximate road density threshold of 0.5 km/km² for long-term persistence of wolves. That is, wolves do not persist on a landscape that has road densities that exceed this threshold. More recent research in Wisconsin suggests that areas that have road densities up to 0.7 km/km² have been found to have a 50% chance or better of being settled by a wolf pack. **For this lab we'll use this figure of 0.7 km/km²** for identifying possible wolf habitat. We wish to know whether there is any suitable wolf habitat with road densities below this threshold within the Poudre watershed. Of course, it is also important to map vegetation and prey base to understand wolf habitat, but for now we'll simply look at road density as a surrogate for wolf habitat.

After you work your way through the exercises below, you will need to complete the lab assignment. I encourage you to work together throughout this lab -- help each other out! The lab write-up, however, needs to be completed individually and should reflect your own, independent work. **You will have 1 week to complete this lab assignment.**

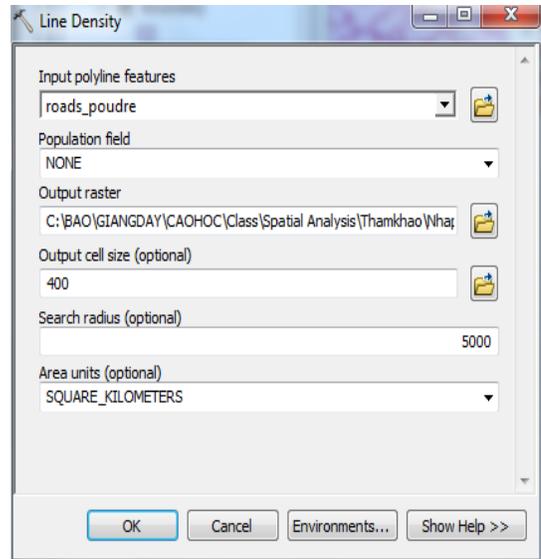
Steps:

1. Computing road density in Poudre watershed

- Start a new map document in ArcMap
- Add *roads_poudre.shp*, *boundary.shp*, and *boundary_nfc1p.shp*.
- Calculate road density: **Spatial Analysis => Density => Line Density**

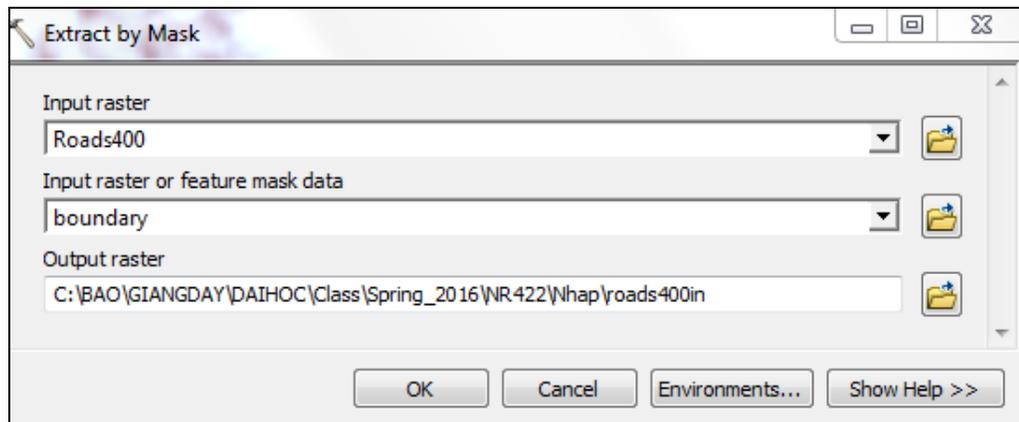
Options:

Output cell size: **400**
Search radius: **5000 m (5km)**
Output: **roads400**



- Extract road density in Poudre watershed

Spatial Analysis – Extraction – Extract by Mask



2. Identifying wolf habitat from road400in density grid.

We will reclassify our density map to identify the area that is suitable wolf habitat (based solely on road density) from the rest of the watershed.

Spatial Analysis – Reclass – Reclassify

Specify the Input raster to **roads400in**

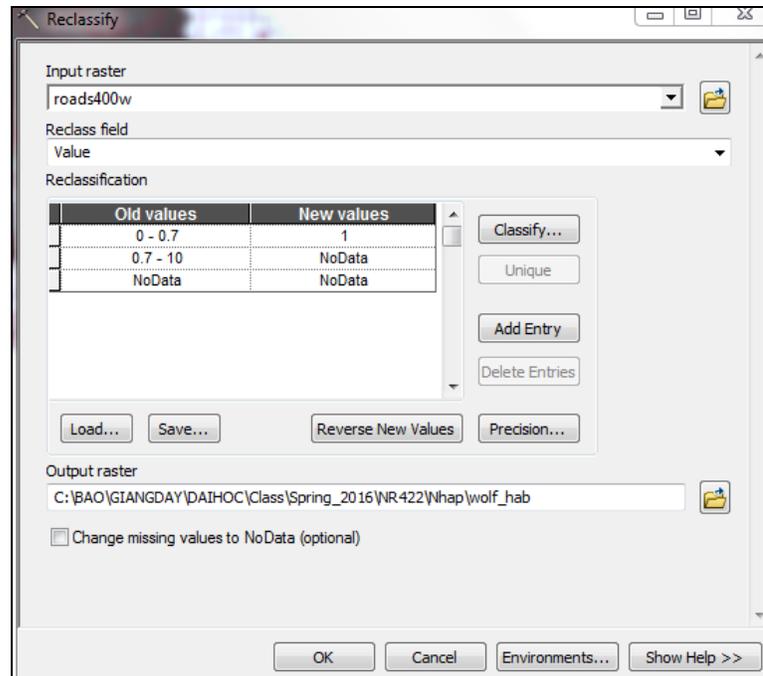
Set the old values to **0 - 0.7** to a new value of **1**

Set the old values to **0.7 - 8.13** to a new value of **NoData**

Highlight and **delete all other entries**

Set the output raster to **wolf_hab**

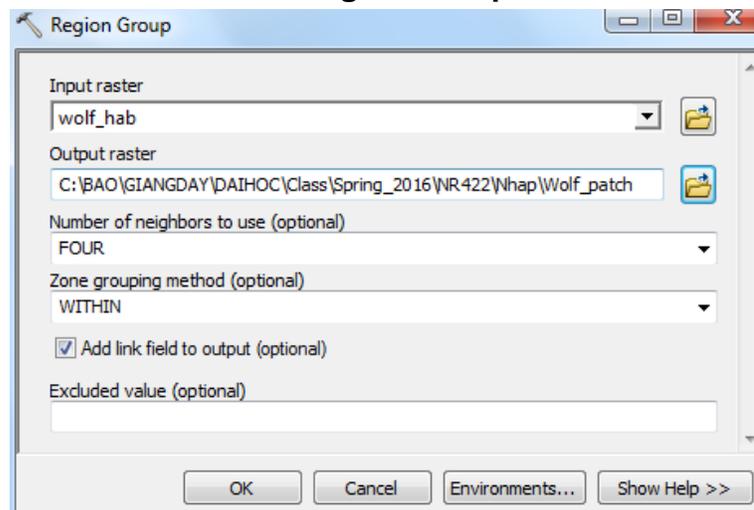
Click **OK**



Besides habitat with a certain road density, wolves also need enough space to survive. Small areas even with a low road density cannot support wolves. For this lab we'll use a threshold of 5000 acres as the minimum size for viable wolf habitat. First we find the distinct patches of wolf habitat.

- Distinct patches of wolf habitat

Spatial Analysis – Generalization – Region Group

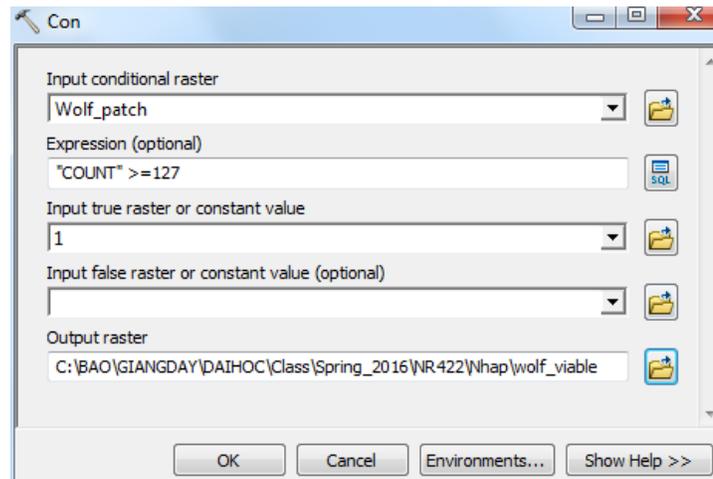


Notice that the output from the previous step contains twenty different patches, some of which are quite small. Now we'll find the patches of habitat that are larger than 5000 acres.

Since each cell is 400m by 400m, the area of each cell is 160,000 square meters which equals 39.537 acres. So only patches that are at least $(5000/39.537) \approx 127$ cells large will be considered viable wolf habitat.

To find the habitat patches that are at least this size we'll use another Raster Calculator operation to find only those patches that are large enough to be possible viable wolf habitat.

Spatial Analysis – Conditional – Con



Lab assignment:

The purpose of this lab assignment is for you to examine the potential for the Poudre watershed to support wolves. Please answer the following, and be sure to *briefly* (one sentence or so) describe how you got your answers.

Questions:

1. How many patches are “big enough” (or viable) wolf habitat? Are any of these in the North Fork watershed?
2. How many acres of viable wolf habitat are there in the watershed (hint: *if you open the attribute table of your Wolf_viable layer the count field shows the number of 400x400m cells that are habitat... each cell = 39.537 acres*)
3. If a wolf pack requires minimum of 32,000 acres of viable habitat to survive what is the maximum number of packs that could persist in our entire watershed?
4. Please make a map showing the distribution of the wolf viable habitat, within the entire Poudre watershed including an outline of the North Fork of the Poudre watershed. Describe the spatial distribution of viable wolf habitat in the watershed?
5. Describe *three other ecological, sociological, or economic* considerations that should be considered in an assessment of wolf reintroduction to our watershed.