



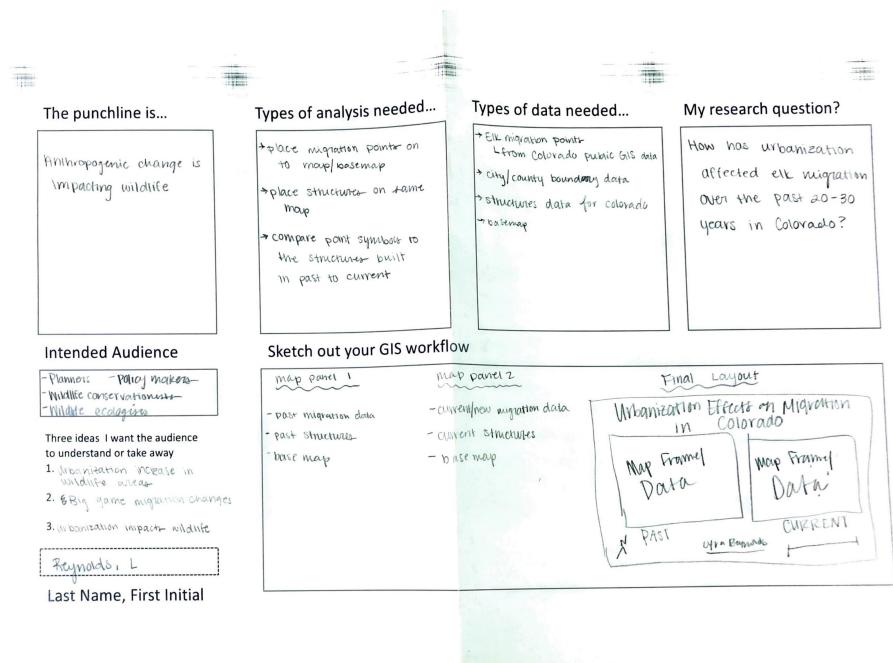
# Finding The Elk

How I did an analysis to show the distribution of elk herds across elevation in Wyoming.

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## Hunting Down Data

When I started this project, the goal was to map how elk migration looked over time in Colorado as a result of urbanization. This became a difficult goal to achieve soon after submitting the initial check-in. The fish and wildlife department of Colorado had some data available for free download. However, this data had a lot of holes. These gaps included the date of when the data was observed, like when the deer migration corridor was being used, as well as the seasonal use of each migration corridor. This made it hard to compare the past usage of corridors to the current usage, which then made it nearly impossible to see the effects that urbanization had on these migration corridors.



Initial Project Flow : Trying to map urbanization effects on elk migration in Colorado

Due to these difficulties, I came to face a bit of a dilemma: what would I do for the project? Wanting to keep with the theme of elk migration or distribution, I began to consult Dr. Sproles and the internet. The goal was to find an area that had elevation data as well as some elk migration/distribution data. While researching other possibilities, Dr. Sproles recommended looking into Wyoming GIS data.

## Wyoming Was the Way to Go

I looked into migration data for Wyoming. Turns out, there is a huge project being conducted by the University of Wyoming that is working on collecting and providing data on the migration of game. It is called the Wyoming Migration Initiative. Since this project began, it has become much easier to get geospatial data regarding game and other large mammals that inhabit Wyoming.

The elk data available from the Wyoming Fish and Game department was not as thorough as the mule deer data, but still had data that included feeding grounds and the general distribution of elk across the state. I found the data that the

migration initiative had produced for the fish and game department and decided it was time to start the analysis.

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## Time to Get Cooking

I downloaded elk herd data from the Wyoming fish and game department website, as well as data for feeding grounds and DEM data. In ArcPro, I uploaded the 3 data files into a new project. Once all of the data was displayed on the map, I decided I also needed to include the Wyoming border. I found a shapefile on the Wyoming geospatial hub that had line data for municipal boundaries. All data layers were projected in "wylam", which is a Wyoming-centered Lambert Conformal Conic projection. The raster data sets used Nearest Neighbor as the resampling technique.

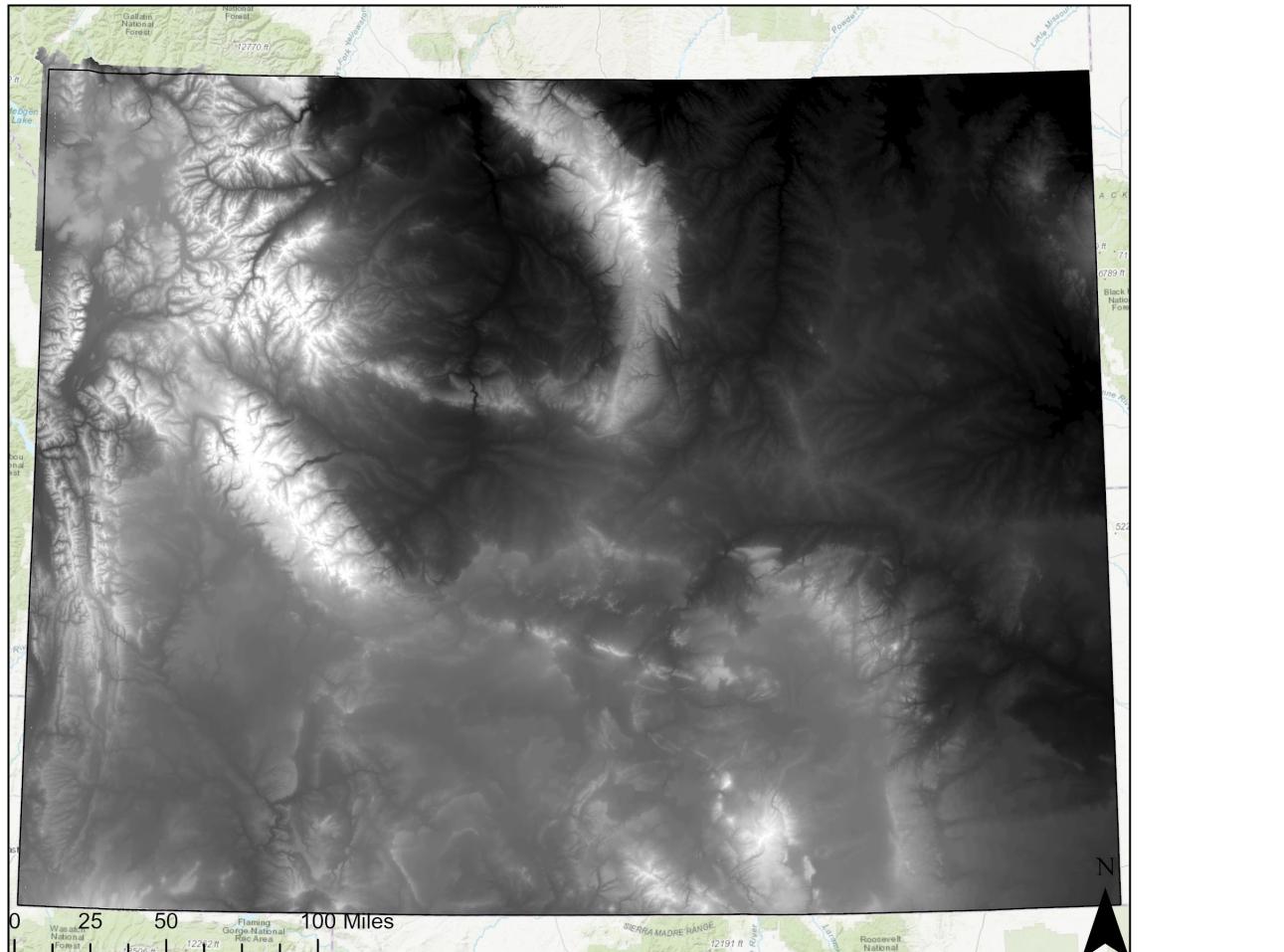
## Reclassify the Raster

The first step in the analysis was to reclassify the DEM raster data. When it was originally placed in ArcPro, the DEM had no unique values and it was hard to tell the differences in the distribution across elevations. To do this, I used the Reclassify Spatial Analysis tool. This allowed me to create 9 classes for the elevation, which helped visualize the distribution later. I gave each of the classes a elevation value, after converting the original elevation values from meters to feet. The bins shown on the map are the maximums for a range (i.e. the second bin is all the land in the elevation range 3,000 ft to 5,500 ft). The highest elevation in this data set is at 13,500 ft.

## Visualize the Distribution

The next step was to visualize the herd unit data so that it was easy to differentiate between the herds in Wyoming and see what elevations they were at. This data was polygon data. In order to have the individual herds show up, I changed the

symbology of each polygon. Each herd had a different colored outline and no fill; this layer was also placed above the DEM layer in the contents tab in ArcPro. I also enabled labels for this data layer, so the label of each herd would appear in the center of the polygons. Elk feed grounds were then added to give spatial reference to where these herds might migrate to.



The initial DEM file was uploaded to ArcPro, which is displayed here. There are no unique values to show the distribution across elevations.



Once the DEM was reclassified, there were 9 values. This picture shows the reclassified elevation with better symbology.



The polygon data was then added to the map and changed to have no fill and distinct outlines. Each polygon was then labeled.



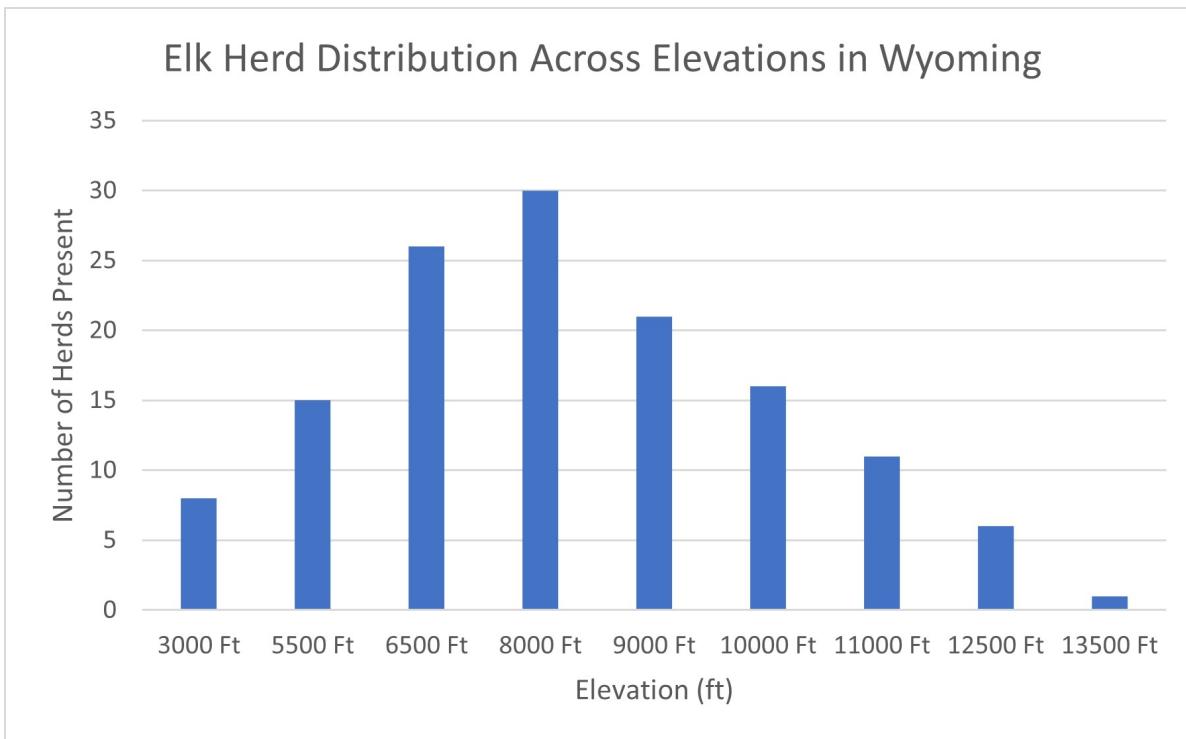
The final map shows all labels for the herd units, as well as the legend for the elevation distributions and other standard cartographic elements. The feed ground data was also added here.

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## Graphing the Results

The last portion of the project was to graph the results of the analysis. To do this, I decided to graph the distribution of the elk herds across the different elevation values. I counted how many herds were present at each elevation bin. Some herds were present at multiple elevations, so they were counted multiple times. If the herd unit had any land cover at the elevation, that herd was included in the overall spread. There are a total of 34 total herds on this map, but multiple exist at a variety of elevations. It appears that moderate elevations,

meaning 6500 to 8000 feet, have the highest amount of herds present.



Bar graph showing the distribution of elk in Wyoming based off previously shown maps

## Final Thoughts

This project is a good way to start thinking about migration patterns and distribution of large game animals across multiple states. Other data that could be included to enhance this map is the crucial areas to each range or the placement of cities in relation to the herd areas. There is much still that needs to be done to fully understand the habits of these animals, which is the first step toward conservation of these species.



*Understanding the location and use of these areas is critical to conserving and managing these herds for future generations. - Wyoming Migration Initiative*