

Sierra Frei, Kayla Garcia

Gina Culver, Arielle Lopez-Ibarra

## Elk Hunting and Habitat Suitability and Home Range in Humboldt County, California

### **Abstract**

Using ArcGIS is proving useful in techniques to monitor and manage wildlife. Roosevelt elk are found throughout California and have designated hunting zones, many of which are found within their home range. Creating maps to analyze where elk hunting zones and their home range overlap is a useful tool to manage their populations. California Department of Fish and Wildlife has an extensive data portal which includes data used to analyze aspects of Roosevelt elk distribution and hunting zones. Three maps were made to demonstrate elk habitat and hunting zone overlaps, habitat suitability overlap within hunting zones, and elk habitat suitability outside of hunting zones. This data can help hunters be more aware of where elk habitat is located and for scientific research.

### **Introduction**

The importance of managing native wildlife can be demonstrated using GIS analysis. California Department of Fish and Wildlife has important data demonstrating zones within California that are designated as “Hunt Zones.” Other data they display are Elk Home Range, displaying the maximum geographic range areas and a Predicted Habitat Suitability index indicating high, medium, and low suitability. With these data we are able to look at a wide variety of aspects pertaining to the different ways elk are distributed within hunting zones. Humboldt County is an area with a large community of hunters and providing maps that demonstrate areas within hunt zones that overlap with elk ranges could prove useful. Finding areas of high habitat suitability

might be useful to hunters or for researchers to use for future projects in finding areas where elk might be more present and available for studying.

The goal for this project is to create maps that will demonstrate areas in Humboldt County that are hunting zones and demonstrate the habitat suitability ranging from high to low of elk within those areas. If elk hunting zones overlap with their home range, then we will be able to see which areas elk hunting zones overlap with home range and which areas of elk home range are non-hunting zones.

## **Methods**

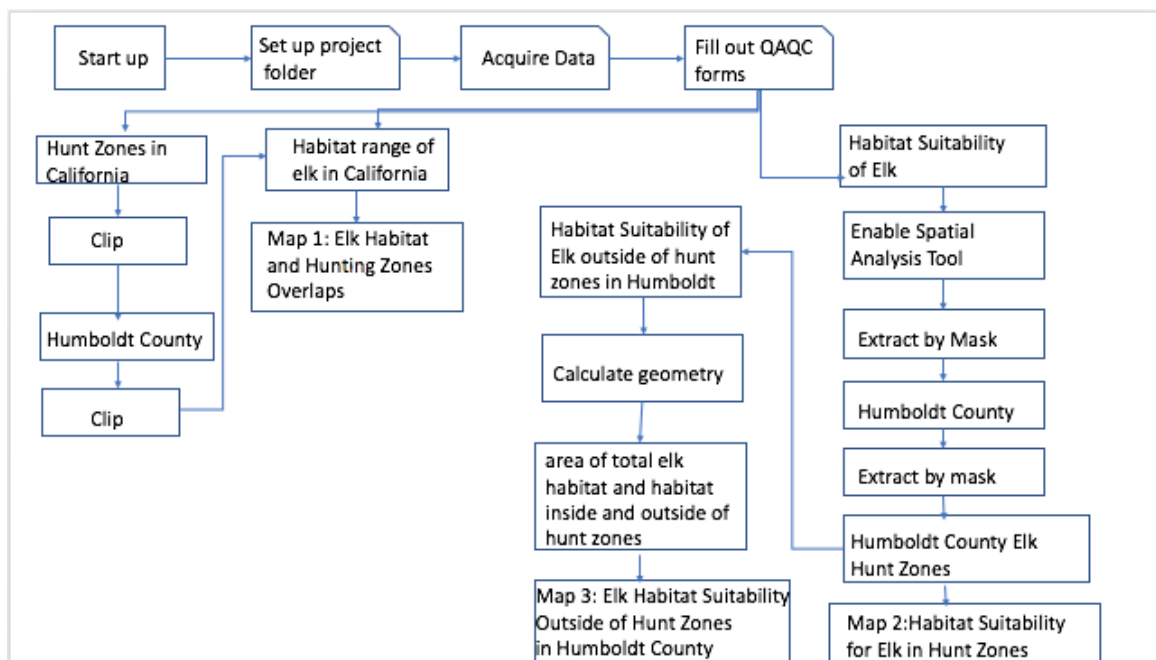
We obtained the majority of our project data from the United States Fish and Wildlife Service (USFWS) GIS data portal. Additionally, we utilized data from previous labs we have completed throughout the semester. For each dataset we downloaded, we completed Quality Assurance Quality Control (QAQC) forms to ensure data quality, and we projected all of the data into the NAD 1983 Teal Albers projection.

For our first map, we clipped the “Humboldt County” shapefile to the “elk hunt zones shapefile”, and created a new layer of just the elk hunt zoned in Humboldt County. Next, we clipped the “Humboldt County” shapefile to the “predicted elk range” shapefile. We clipped the resulting layer to the layer of elk hunt zones in Humboldt County, and created our map of where elk hunt zones and their predicted range overlap (figure 1).

For our second map, we enabled the “spatial analysis” tool in order to use the “Extract by mask” tool on our raster file. We used the “predicted habitat suitability” raster as our input, and the “Humboldt County” shapefile as our output. In the new layer, we categorized habitat suitability into low, medium, and high habitat suitability for elk. We used the “extract by mask” tool again with our categorized habitat suitability layer as our input raster, and the

Humboldt County elk hunt zones as our output, and we created our second map comparing habitat suitability for elk in hunt zones (figure 2).

For our last map, we followed the same steps as we did for our second map, but we analyzed habitat of low, medium, and high suitability outside of hunt zones in Humboldt County (figure 3). In addition to our maps, we calculated the area in miles <sup>2</sup> of total elk habitat, and using the “calculate geometry” tool.



## Results

Once finished, we generated our three individual maps displaying Elk Habitat and Hunting Zones Overlaps, Habitat Suitability for Elk in Hunting Zones, and Elk Habitat Suitability Outside of Hunting Zones. These three maps clearly showed the areas of elk habitat suitability, and how much of that area overlapped with hunting zones. Our final maps can be seen below.

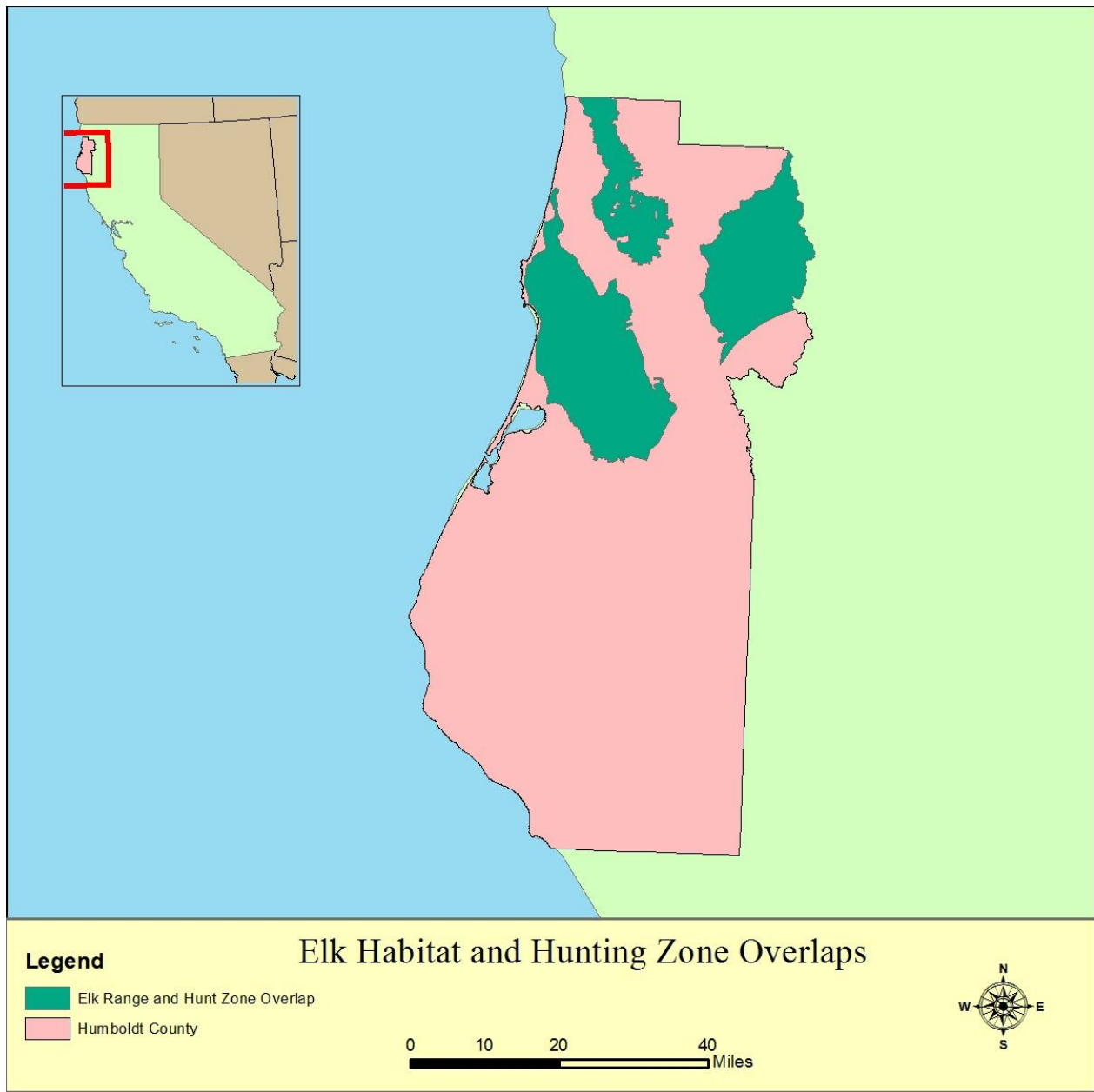


Figure 1: Zones in Humboldt County where elk habitat suitability and hunting zones overlap.

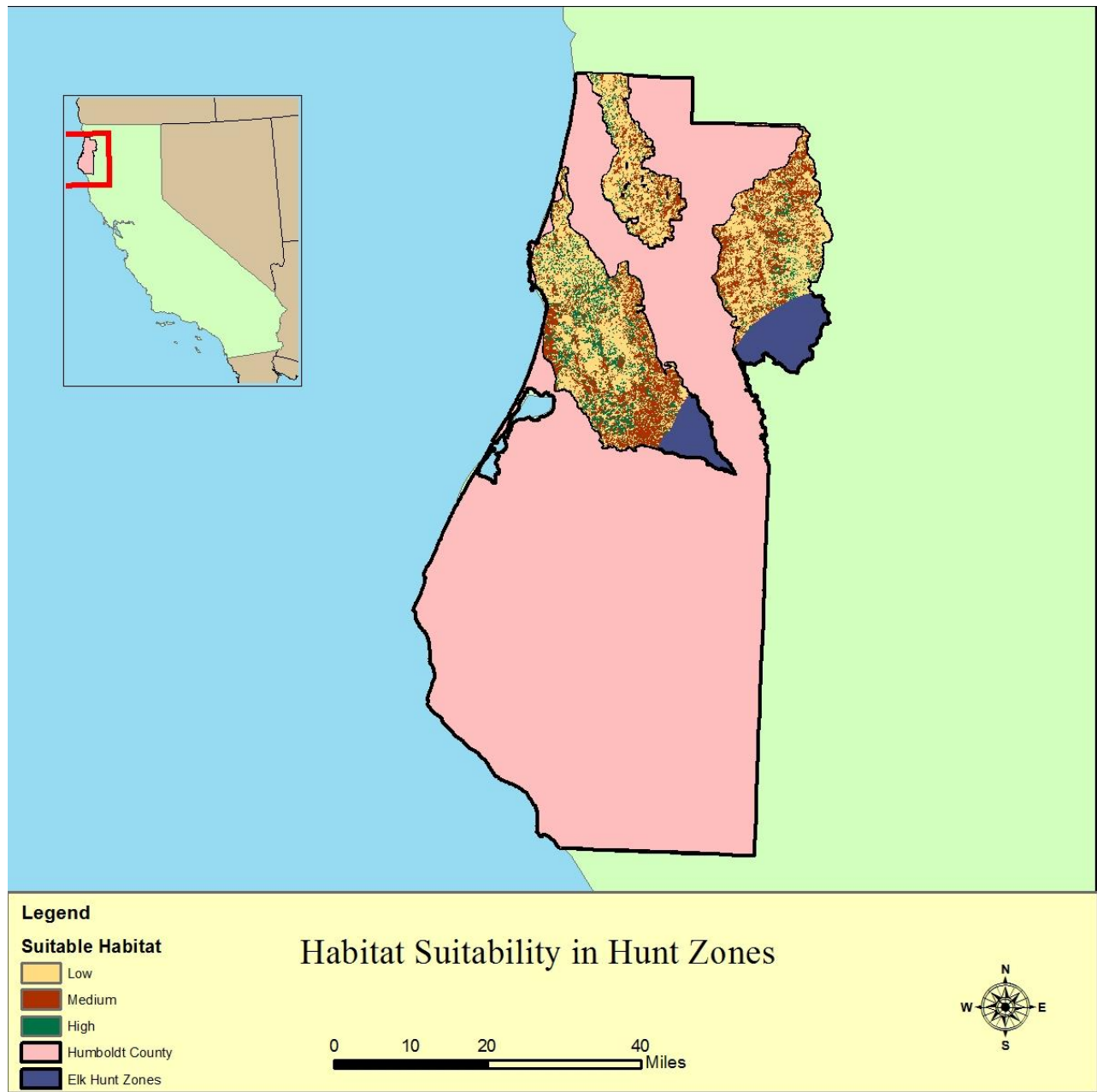


Figure 2: Elk habitat suitability from a range of low, medium, or high located within hunting zones in Humboldt County.

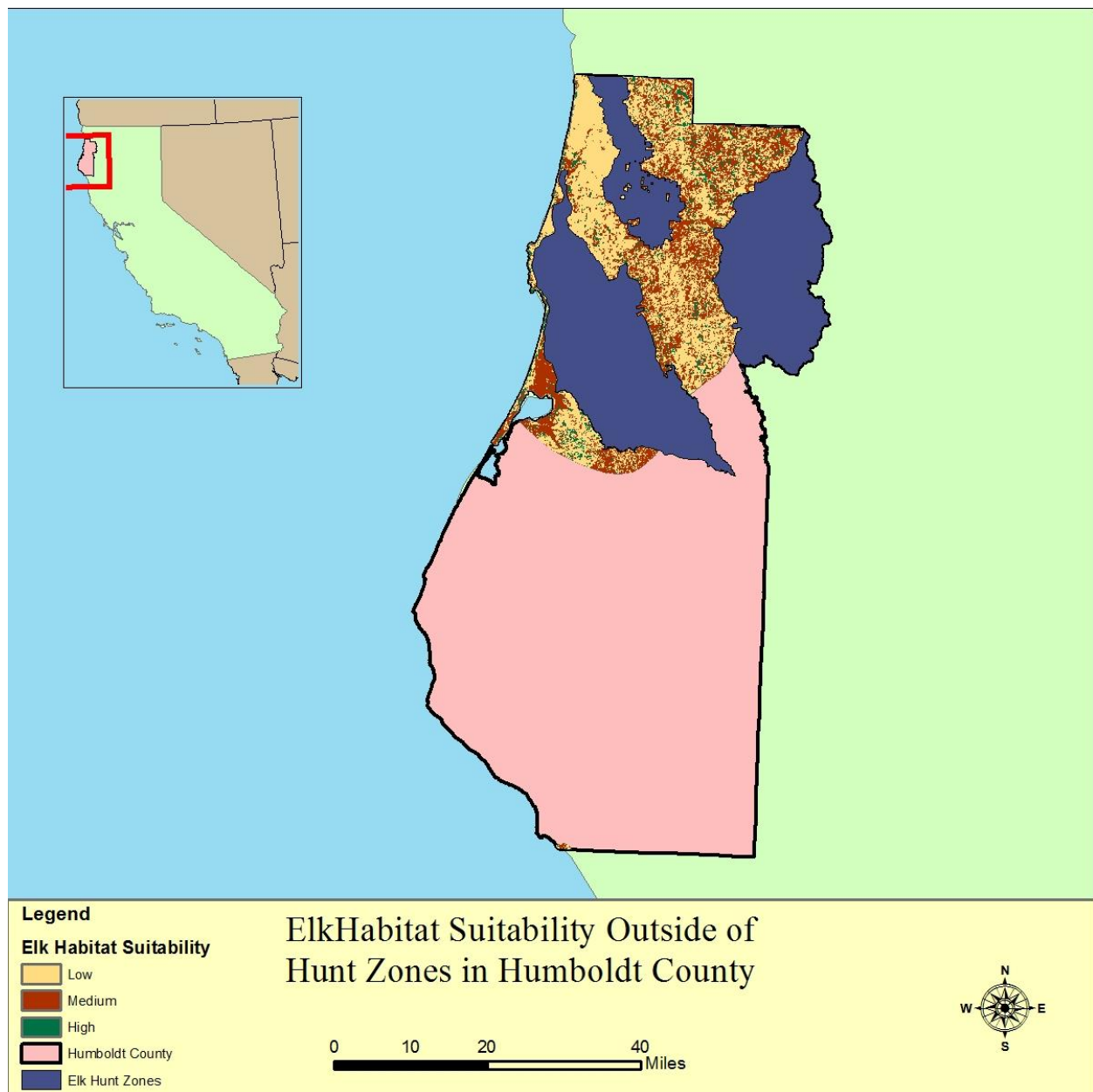


Figure 3: Elk habitat suitability locations from a range of low to high, outside of hunting zones in Humboldt County.

	Elk Habitat Within Hunt Zones	Total Elk Habitat	Elk Habitat Outside of Hunt Zones
AREA (sq miles)	692.5	1373.6	681.1

Table 1: This table demonstrates the total area within specific types of elk habitats.

## **Discussion**

From these maps, we see that a majority of the hunting zones in Humboldt County contain significant amounts of possible elk habitat. It appears that a little more than half of all potential elk habitat areas are located within a hunting zone. There are also many dense areas with medium and high elk habitat suitability inside the hunting zones. Furthermore, there are many zones for potential elk habitat outside of hunting zones, and overall in most areas in the northern half Humboldt County

These maps provide insight to what areas of Humboldt County elk species are in danger from hunters. Although there is much additional area for elk to live outside of hunting zones, we hope to bring awareness and provide useful information on elk habitat areas for locals and hunters coming from anywhere. By using the information provided in these maps, they may prove very useful in locating elk in the wild for research or for hunting purposes, showing areas where one is more likely to track or find elk.

## **Conclusion**

The goal for this project was to create maps that demonstrated areas in Humboldt County that are considered hunting zones and that also demonstrate high to low habitat suitability range for elk within those areas. This data also allowed us to see the locations where elk habitat suitability ranges from low to high in both areas that are considered hunting zones vs. non-hunting zones. We were able to easily access our data primarily through the California Department of Fish and Wildlife website. We created three maps: Habitat Suitability in Hunt Zones, Elk Habitat and Hunting Zones Overlaps, and Elk Habitat Suitability Outside of Hunt Zones in Humboldt County. With these three maps we were able to accurately see elk distribution throughout Humboldt County and the areas where they are located within hunting zones. Through our data

were able to get a good picture of the areas where elk hunting zones overlap with home range and which areas of elk home range are non-hunting zones. The areas that were found with high habitat suitability can be used to locate elk that can be studied by researchers or hunted by hunters in the future.

## **References**

“Elk Range”. *United States Department of Fish and Wildlife Geospatial Data Portal*. United States Department of Fish and Wildlife, n.d. Web. 9 April 2018.

“Elk Predicted Habitat Suitability”. *United States Department of Fish and Wildlife Geospatial Data Portal*. United States Department of Fish and Wildlife, n. d. Web. 9 April 2018

“Elk Hunt Zones”. *United States Department of Fish and Wildlife Geospatial Data Portal*. United States Department of Fish and Wildlife, n. d. Web. 9 April 2018.

“United States Shapefile”. *Humboldt State University Geospatial Data Collection*. Humboldt State University, n. d. Web 9 April 2018.