The gray wolf (Canis lupus) historically used to be native to all of North America. By 1960, wolves had been extirpated from the contiguous U.S. with the exception of a small population in Minnesota. Since gaining protection under the Endangered Species Act, wolf populations have slowly recovered and began to recolonize parts of their former range. However, wolf populations in the Pacific Northwest has reached in a few wolves dispersing into Northern California to seek out new habitat. These dispersing wolves have generated a high level of public interest.

The California Department of Fish & Wildlife has begun a planning process for gray wolf management to address concerns that arise with the presence of wolves, such as wolf-livestock conflicts, maintenance of prey species, and conserving a sustainable population. Another concern is that wolves are returning to a different landscape here in California today after almost 100 years of absence. Much of the habitat once occupied by wolves has been developed or converted to agriculture. Road densities have increased substantially, and the population of California has grown to over 38 million people. The objective of this study was to explore the prospects for wolf recovery in Northern California. ArcMap (ESRI, Redlands,CA), a Desktop Information System (GIS), was used to identify suitable habitat for gray wolves and potential wolf-livestock conflict areas.

Potentially suitable gray wolf habitat is found in forested areas that are dominated by mixed-conifer or coniferous forest, with a high percentage of Douglas fir. The landscape should provide sufficient cover at different scales, including both large-scale cover and local habitat features such as forest edges and riparian areas. Wolves are native to North America and have lived in these forests for thousands of years, adapting to their environment and developing specific behavioral strategies that allow them to thrive in such settings.

Results & Conclusion

The results indicate that Northern California has substantial amount of suitable wolf habitat, with most of the highest quality habitat located in the Klamath Mountains in Northwestern California. Large areas of public land and forest cover combined with low road and human population densities allow wolf recolonization. However, the small elk population and depressed deer populations are problematic, especially in the northeastern portion of California. Elk density was not included in this study, because elk populations are patchy and the vast majority of prey biomass for wolves in this region will come of deer. Moreover, while sheep densities are low, high cattle densities generate high potential for wolf-livestock conflicts. Significant funding and effort will be necessary to implement nonlethal livestock protection measures to minimize predation on livestock. Low prey density and high potential for conflict indicate that the region can only support a relatively small wolf population. Wolf densities can vary tremendously, ranging from less than 6 wolves per 1,000 km² near the arctic coast to over 50 wolves per 1,000 km² in prey-rich areas. Applying an equation that relates wolf density to prey abundance, wolf habitat identified in the study area can support an average of 18 wolves per 1,000 km². This total potential habitat is 54,946 km², meaning that Northern California would be able to support 649 wolves. However, this does not account for habitat fragmentation, edge effects and the need for core areas. The reality is that the biological carrying capacity hinges on the political will of the people, regulatory decisions of government agencies and the willingness of humans to share the landscape with this apex predator.

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I thank the staff of the California Wolf Center, especially Erin Hurry, John Marut and Heidi Pedrotti, for being such supportive mentors and providing me with a positive and meaningful internship experience during the summer of 2015. I also thank Dr. Suzanne Wolfth from the University of San Diego for being a passionate and confident mentor in previous semesters.


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Conservation, Education, Research

Gray Wolf Habitat

Wolves are habitat generalists and, therefore, can live in most places in North America that have a sufficient prey base (primarily large ungulates). Conflicts with humans typically occur, however, when they overlap areas close to human habitation. The majority of wolf mortality in the wild is human-caused. Identifying favorable wolf habitat is thus becoming a process of locating areas that contain sufficient prey and provide security from humans to lessen conflict.

Methods

To determine suitable habitat for wolves in Northern California, five variables were examined: prey density (primarily deer in this region), public land ownership, forest cover, road density and human population density. To identify potential wolf–livestock conflict areas, sheep density, cattle density and land use (agricultural and rangeland) data was also taken into account. Data was acquired from the California Department of Fish & Wildlife, California Department of Forestry & Fire Protection, California Department of Transportation, U.S. Bureau of Land Management, U.S. Census Bureau, U.S. Forest Service, U.S. Geological Survey and the U.S. Department of Agriculture. The data was converted into GIS layers through table joins between excel datasheets and shapefiles containing administrative boundaries, using the spatial unit name as the join key. Density tools and several geoprocessing functions (clip, dissolve, etc.) were performed to prepare the layers for further spatial analysis. Thresholds were determined for each variable based on previous research to reclassify attributes into favorable and unfavorable conditions for wolves. The intersect tool was then used to identify areas in which favorable wolf habitat overlapped. Areas of overlap were then classified into “best,” “good” and “intermediate” wolf habitat based on how many favorable attribute values intersected in a given area. Similarly, to identify potential conflict zones, the intersect tool was used to overlay livestock data with predicted wolf habitat.

Results & Conclusion

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