

Analysis of the designation process for Critical Habitats under the Endangered Species Act

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This summer I worked to collect and analyze data on Critical Habitat (CH) designations required under the Endangered Species Act. CHs are areas on the landscape where the US government requires additional protections for the US' most endangered species. Many biologists argue that protection of habitat in CHs is essential to the preservation of these species. Therefore, decisions on which habitats on the landscape are granted additional protection could have profound effects on America's biodiversity.

The purpose of this project is to better understand the factors that drive the CH designation process. The primary driver in designation decision-making is supposed to be protection of land that is most biologically important to a species. However, other factors are considered in the designation process, such as the economic impact of designation, impacts to national security, tribal lands, and other relevant impacts. Therefore, in designating CH for endangered or threatened species, the United States Fish and Wildlife Service (USFWS) must weigh the benefits of designating a certain section of land against the potential costs. My research identifies trends in the lands that are included in CHs and, after consideration for inclusion, are ultimately excluded from CH designations. I hope to explain the reasons for inclusion and exclusion and whether decision-making trends are in line with the goal of species preservation.

I collected data about individual species' designations as well as the overall designation process, and analyzed this data to identify important influences and trends in designation of land for CHs. Thus far, I have collected data for three taxonomic groups (mammals, birds, and reptiles) including every land-dwelling species with a CH designation established between 1978 and present. This process required reading the US Federal Register documents, that document the proposal of CH, revised proposals, and final proposals, for every species. Many species went through multiple rounds of this designation process, making them more complex. I coded the information found through the reading of these documents into a dataset containing important pieces of information about each species and the process it's designation followed. This included simple information such as taxonomic group, region of the country inhabited, and date of document publication. It also included the breakdown of land ownership (federal, state, private, tribal, etc.) both proposed and finalized for each species, as well as the reason for any change in land acreage across publications, which I coded using a binary system in the dataset.

Additionally, I used text analysis to analyze the comment section of each Federal Register document that described a species' final CH designation. This section summarizes the suggestions the USFWS received during the CH designation process from special interest groups such as government or state entities, private companies, and the general public. These sections convey each special interest group's sentiment regarding USFWS's decision-making. I used Jupyter to do topic modeling for each final document's comment section, which created groups of topics brought up along with their frequency in each document. I also used Voyant to explore other ways to model the topics covered in each of these comment sections. The dataset I created takes the qualitative and complex information in the Federal Register documents and aims to simplify it into a quantitative representation that summarizes the information and makes it usable for statistical analysis.

I will be continuing this project throughout the 2021-22 academic year as an honors project and therefore am still far from my final results. However, the data I collected this summer allowed me to do some preliminary analysis on the trends seen across CH designations. For example, one interesting finding was that complex designations (meaning species whose CH designations went through multiple rounds of proposed and final designations) were more likely to have an increase in designated acreage than those with simpler processes. Additionally, I found that private land is more likely to be removed entirely from a designation than federal land is. Examples of other relationships I will explore are the effect of land currently unoccupied by the species but still considered essential to its survival, the impact that lawsuits have on the designation process, and an in-depth analysis of the reasons mentioned for excluding land from a final designation.

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