Effects of Wildfires on Coyote Migration in California

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Background / Motivation

Coyotes are an abundant species in California that play an integral role within the region's ecosystems. Wildfires in the state are most common between June and September, but climate change is leading to increased fires throughout the year (Pierre-louis & Schwartz, 2020). These fires are altering the landscape and affecting the various species that reside there (Westerling & Bryant, 2008). With these fires resulting in habitat destruction and ecosystem disturbances, coyote populations may have to migrate to new areas. Our study will focus on how the class of wildfires affects coyote distribution in California by looking at the percentage of coyotes that migrate out of burned patches.

This study would provide valuable information in the future to the effect that wildfires have on coyote population dynamics and behaviors within California. With trends of wildfires and coyote attacks continuing to rise, research can be done in the future to figure out whether this is correlation or causation.

Hypothesis

- We hypothesize that there is a relationship between class of wildfires* and coyote migration.
- We predict that with higher class of wildfires, there will be more migration out of the area, exemplified in Figure 1.

This prediction is based off of the fact that with a higher class of wildfire, there is likely more damage and it may be harder for species to reestablish in the area, prompting coyotes to migrate out of the patch.

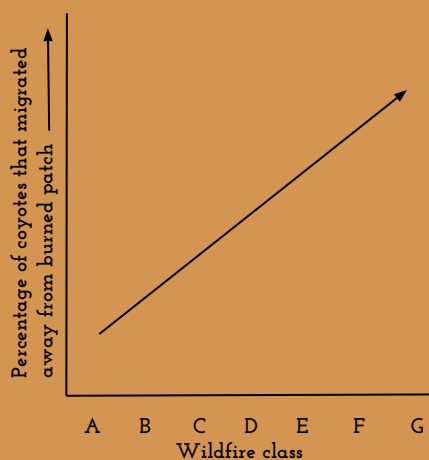*Wildfire classes are defined in Table 1

Figure 1. Hypothesis on relationship between wildfire class and coyote migration

Study Design

Our study will be a natural experiment in which nature will implement the treatment, which is wildfires. We will place GPS tracking collars on members of Coyote populations in California and track their movement over multiple years. During these same years we will be looking at the wildfires that occur in California, and the severity of them which is measured by class. Comparing this data will enable us to see if there is a relationship between wildfire class and coyote migration.

- Independent Variable: The class of the wildfire
- Dependent Variable: The percentage of coyotes that migrated out of the burned patch
- Control group: Coyotes in patches that are not experiencing wildfires

Wildfire Class	Acres Burned
CLASS A	¼ or less
CLASS B	¼ - 10
CLASS C	10- 100
CLASS D	100-300
CLASS E	300-1000
CLASS F	1000-5000
CLASS G	5000+

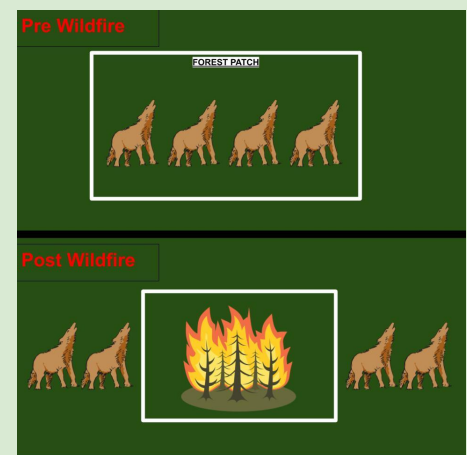Table 1. Wildfire Classes (U.S Forest Service, 2016)

Figure 2. Natural Experiment Design

Intended Analysis

- ANOVA Test to find out whether or not our results are statistically significant by measuring the variance between percentages for each fire class (Armstrong, Eperjesi, & Gilmartin, 2002)
- Map of California, overlaying where each wildfire occurred (color-coordinated by class), and the movement of coyote populations to help to visualize the migration patterns. An example of mapping wildfire may be seen in Figure 3.
- These results may be generalized to coyote populations in California, and future wildfires that may occur. The scope would not extend outside of California due to unique conditions of each state.
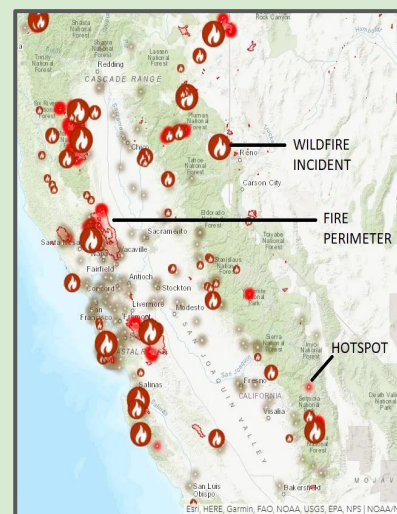

Figure 3. California Wildfires. (Frontline, 2020)

Literature Cited

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