Diet Specialization in Cougars
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Introduction

Ecosystems are filled with webs of different types of relationships that animals share with one another. Although it is very important to look at species to species interaction through a large lens, there is also crucial information that can be gathered by looking at animals from an individual point of view. For example, there are many predator species labeled as generalists. Generalists are defined as animals which eat a wide variety of things (Elbroch and Hicko 2013). However, there have been studies showing that some generalists species are actually comprised of individuals who are specialists (meaning that they specialize on a prey specie) (Woo et al. 2008).

This study focuses on the cougar (Puma concolor), a species classified as a carnivore generalist which eats many different types of prey and is able to survive in many different terrains. The picture to the left shows a map of both the current and historic range of cougars.

Methods

The study site for this research project was within Snoqualmie National Forest, located in Western Washington State, USA. This site is about 3,500 km² and encompasses a variety of landscapes including urban, wildland and logged forest.

Methods for data collection were as followed:
• 11 Cougars were captured and outfitted with a GPS collar.
• Potential kill sites were identified using satellite signals from the collars (Anderson et al. 2003).
• Kill sites where visited by a team who collected information about the prey species that had been killed and consumed.

Data Analysis methods were as follows:
• Compiled the kill site data by individual cougar.
• Estimated the biomass of each individual prey for every cougar.
• Ran both an exact binomial test and a Marascuillo test on each individual cougar’s diet.

Results

The exact binomial test was used with the null hypothesis being that the real probability of a prey species was equal to the estimated proportion. A total of 40 right tailed exact binomial tests were ran, one for every prey species within each individual cougar’s diet.

The results are summed up as followed:
• Out of the 11 individual cougars, all except M131 had deer with a p-value <0.05.
• One cougar, M131, had elk yield a significant p-value of 0.04437.
• Out of all 11 individual cougars, three had p-values of greater than 0.05 when using the Marascuillo procedure.

The Marascuillo procedure was used to compare proportions when analyzing the individual cougar diets with biomass of prey included. The null hypothesis being tested is that the two proportions are equal.

The results are as followed:
• Nine out of the 11 cougars had p values <0.05 for deer proportion.
• One cougar had a p-value <0.05 for elk.
• One cougar had a p-value of >0.05 when deer was compared to closest specie.

Discussion

All 11 cougar diets without biomass of prey yielded a significant p-value therefore rejecting the null hypothesis. This shows that all the individual cougars have at least one prey species occurring in their diet at a higher then estimated probability. Ten of the eleven cougars ate more deer, while M131 ate elk at a higher probability than expected. In order to say that an individual exhibits specialization in a prey species they must also be eating that particular prey species at a higher proportion than the other prey species in their diet.

The Marascuillo procedure allows us to see if two proportions are significantly different from each other. This procedure was applied to both the diet without biomass and with biomass. When ran without biomass data, the null could be rejected for eight cougars, meaning they were specializing in that species (which in all cases was deer). However, when this procedure was applied to the cougars’ diet with biomass, the null was rejected for all but one cougar. This shows that nine cougars exhibit specialization on deer, one on elk and one did not exhibit specialization.

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References