Can wildlife tunnels limit biodiversity loss on expanding ski resorts?

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Background and Motivation

The downhill ski industry is expected to grow by 2.7% in the next five years and with that growth comes the expansion of ski resorts (Olson et al., 2017). Ski resorts present a unique threat to alpine biodiversity and wildlife populations through extensive and abrupt habitat fragmentation (Arlettaz et al., 2007). Wildlife corridors and tunnels have been shown as an effective tool to reduce habitat fragmentation caused by roads (Clevenger & Waltho, 2000). This project proposes the application of wildlife tunnels in ski resorts to better facilitate unobstructed animal movement and thus minimize negative impacts on the environment.

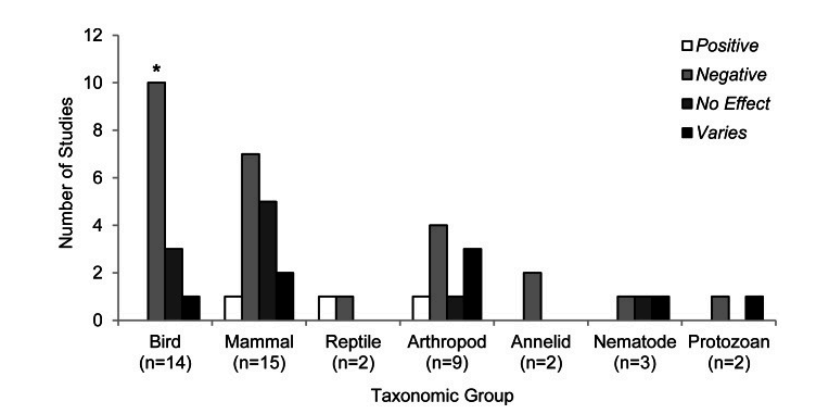

Figure 1: A meta-analysis of studies on the impacts of ski runs on different taxonomic groups (Sato et al., 2013)

Hypothesis

It is hypothesized that there is a relationship between species abundance on a ski mountain and the amount of wildlife tunnels those animals have access to throughout the ski mountain.

Prediction

I predict that species abundance will increase as the quantity of tunnels across trails increases because the animals will have access to more habitat and fewer potential hazards (Naidoo et al., 2018).

Figure 2: Example of a wildlife corridor in Banff National Park (*How Wildlife Bridges over Highways Make Animals—and People—Safer*, 2019)

Study Design

This study will be a manipulative field experiment. Of Vermont's twenty ski resorts, ten will be randomly chosen to construct wildlife tunnels underneath their major ski trails. After construction of the tunnels, cameras will be installed to monitor all observed crossings. Cameras will also be installed on the major trails at the ten control ski resorts that do not have wildlife tunnels to monitor crossings. The quantity of crossings will be collected over the course of five years to allow for possible changes due to the tunnels.

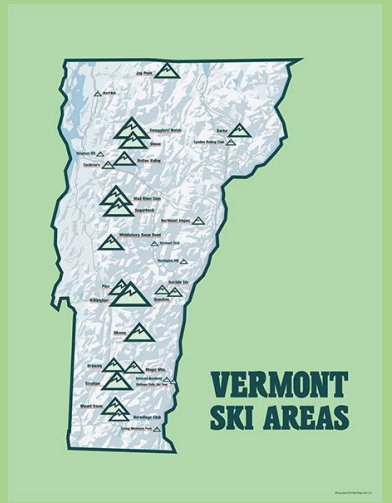

Figure 3: Map of Vermont ski resorts. In the study, 10 will construct wildlife tunnels and 10 will be monitored as controls (left).

Figure 4: Deer using a wildlife tunnel in Colorado (Hoffman, 2018).

Intended Analysis:

The independent variable in this study is the wildlife tunnel and whether wildlife tunnels are present is a categorical variable with two groups. The response variable is the number of animal crossings, which is continuous. Due to these variable types, the data will be analyzed using a T-test to determine if the mean number of crossings is different between the tunneled and un-tunneled ski resorts. Once the data is analyzed, recommendations and policies for wildlife tunnels can be made.

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