# The Relationship Between Bird Abundance and Trail Use

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## Background

### Tourism is a risk for avian species

Tourism has been found to pose a risk to 188 bird species which have been designated “at risk” by the IUCN Red List. While the majority of these threats are considered minimal, more research needs to be completed to evaluate the risk of ecotourism to avian species (Steven & Castley, 2013).

### Species density are influenced by human disturbances

Bird species have been found to be more present along the Paraguay River farther away from towns and in areas where there was less human activity. The study also found that certain species are more sensitive to human activities than others (Lozano & Malo, 2013). A study using transect data found that mammal sightings were less frequent along hiking trails in Hubei, China that were more visited by tourists and were more frequent farther away from trails (Zhou, et al. 2013; Fig 1).

### Tourism and the Vermont economy

Tourism brough 2.88 billion dollars into the state economy in 2017 which makes it the second largest economic sector in Vermont (Jones, 2017). In 2015, forest recreation was 57% of Vermont’s forest-based economy which was a 3.4 billion dollar economic sector (Roman & Erickson, 2015).

## OBJECTIVES

### Objectives:

- To determine the relationship between trail use and bird species density.
- To discover if certain bird species are more sensitive to human activity compared to others.

### Hypothesis and Predictions:

I hypothesize that there is a relationship between trail use and bird species density. As bird species density increases, trail use will decrease (Fig 1). As the distance from the trail increases, bird species density will increase (Fig 1). This will happen because there will be less human impact of the environment. These results may be more significant for certain species of birds compared to others.

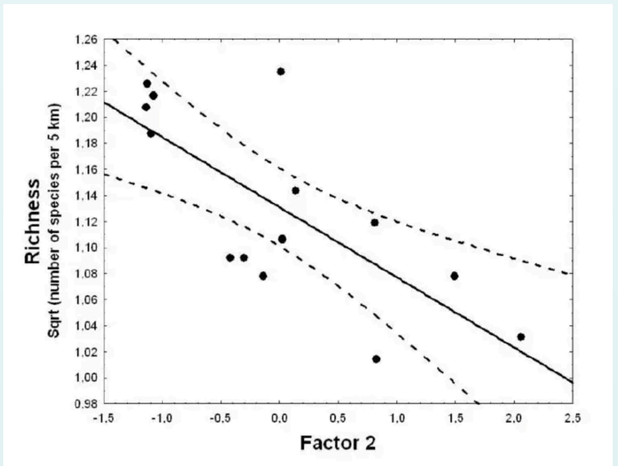


FIG. 2.—Relationship between the mean bird richness per transect and factor 2 from PCA (distance to town increasing in negative values and fishermen, motor boats and large boats increasing in positive values).

**Fig. 1** Negative correlation between bird species richness and human activity (Zhou, et al., 2013)

## MANAGEMENT IMPLICATIONS

Given the importance of tourism in the Vermont economy, informed park management practices are necessary. This research can help parks set visitor limits and or seasonal visitor limits in order to protect bird species. It will also help park management understand which bird species they need to pay special attention to because they are sensitive to human activity. These sensitive species may act as a guide for the overall impact of human activity in the park.

## METHODS

### Study Sites:

Mt. Philo State Park and Mt. Mansfield West: Underhill State Park will be used as study sites for this research. Mt. Philo is a small mountain which has campgrounds and busy trails (Fig 2). Mt. Mansfield has the highest peak in Vermont and has numerous trails with varying degrees of use (Fig 3). Overall, Mt. Philo likely receives more visitor traffic than Mt. Mansfield.


**Fig. 2** Mt Philo, Umbrella Terms by Malachi Champion

**Fig. 3** Mt Mansfield, Vermont Agency of Natural Resources

### Determining Trail Use:

In order to determine which trails receive are the most used, camera traps will be set on trails to observe the amount of visitors per day during the fall tourism season. On Mt. Philo, camera traps will be set along House Rock Trail, Summit Trail, Devil’s Chair Trail, and State Park Road which people can also walk along to the summit (Fig 4). On Mt. Mansfield, camera traps will be set on the Long Trail, Sunset Ridge Trail, Halfway House Trail, Butler Lodge Trail and CCC Road Trail (Fig 5).

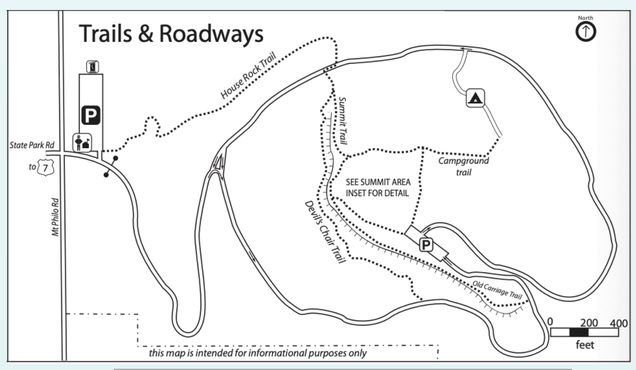


**Fig. 4** Mt. Philo Trail Map, Vermont Agency of Natural Resources

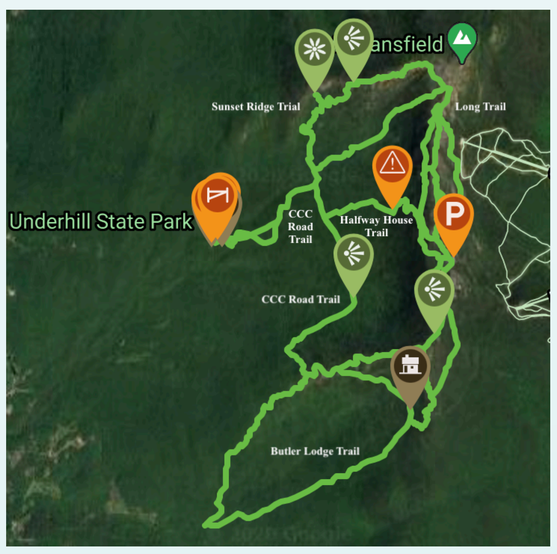


**Fig. 5** Mt. Mansfield Trail Map, Trailfinder

### Experimental Design:

Once data is collected for trail use, trails will be given a numerical score based on the amount of visitors. Researchers will walk each trail on a regularly determined basis watching and listening for birds. The amount of species and number of individuals in each species will be recorded. This will provide data for the variable of trail use. Similarly to Lozano and Malo 2013 and Zhou, et al. 2013, transects will used to collect data at different distances from each trail. Along five points on each trail, a transect that is 5 kilometers long and 1 kilometer wide will be drawn away from the trail. Researchers will walk this transect while looking and listening for birds and record their findings. This will provide data for the variable of distance from the trail.

### Intended Analysis:

The independent variables (trail use and distance from trail) and the response variable (bird species density) are both continuous, a regression will be used to analyze the results. This will determine if there is a correlation between the two variables, and if so, what is the strength of the correlation.

### Literature Cited

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