

Measuring Owl Population Responses Following a Euthanasia Period

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Hypothesis: Following a Barred Owl (*Strix varia*) euthanasia period, the Northern Spotted Owl (*Strix occidentalis caurina*) range will expand, in where greater utilization of the area will be observable.

Introduction: Conservation management often entails thorough research of a given issue, detailed planning of a strategy to combat this issue, and implementation of this strategy. Rarely does this paradigm include research following the implementation stage of this process. As a result, the opportunity to understand the impacts of the management and how to better the process is regularly missed. In the case of managing invasive species, this lack of follow through may provide a window for native species loss. In light of this concern I ask: **(1) How does conservation management affect the invasive species? (2) What is the response of a native species threatened by this invasive following management?** In the case of the invasive Barred Owl (*Strix varia*) and endangered Northern Spotted Owl (*Strix occidentalis caurina*), previous works focus on native population declines in response to invasion along with management suggestions. My research studies population responses following management implementation to measure effectiveness of the plan.

Study System: *S. varia* is native to the eastern United States but has expanded its range to the western coast following newly formed forest corridors in light of anthropogenically reduced fires. This range has expanded to encompass that of endangered *S. o. caurina* which inhabits old growth forests in northern California, Oregon, and Washington (6,7). Pressure due to habitat loss, resulting from logging, coupled with newly applied pressure stemming from prey and nesting competition from *S. varia*, is posing an extinction risk for the native species (1,4). Habitat protection has driven the conservation of remaining old growth forests and invasive management has prompted controlled shooting of *S. varia* (2,5). The goal of this management of an invasive species is to reduce competition pressures on the native in hopes of increasing resources and bolstering the population. Little research has been done to understand the impacts following this invasive control method and in determining its effectiveness in achieving the overall goal.

Research Methodology: In order to study population dynamics following a euthanasia period as compared to that beforehand, methods will include measuring and recording population movement and utilization of a study area in northern California by both owl species. This includes taking individual counts, observing nesting and foraging behaviors, and creating visuals to display current trends. To do so, methods will be worked within a short term and long term scale model.

Short term scale focuses on individual movement throughout the study area along with utilization. Daytime surveys will follow transects 5km apart with positions set every 1.6km to reduce chances of detection of the same individual (8). Observations will fall under 1 of 2 categories: observed and nesting. The observed category entails recording observations of individuals of either species positioned in a tree or flying. Nesting observations include the sight of nest cavities or breeding pairs. Surveyors will utilize GPS units to record positions of each observation and to follow the predetermined transects. Since both species are nocturnal, day time surveys focus greater on nesting observations, expecting movement to be minimal during daylight. Nighttime surveys will follow the same transects and utilize playback recordings in order to induce responses of individuals. Along both sides of the transect lines will be placed

camera traps to capture foraging trends. Each daytime and nighttime survey will be done twice a week for a month before and after a euthanasia period. This method will be used for multiple study areas as euthanasia periods continue.

The long term scale looks to measure movement of *S. o. caurina* in and out of the study area in order to determine whether new individuals are inhabiting the study area. Following the completion of the short term scale, playback recordings will be placed with mist nests along transects and will play for 3 hours during nighttime hours (3). Every half hour mist nests will be checked and individuals banded and recorded, in where the site will be logged along with sex and body measurements. Each individual will be outfitted with a GPS transmitter in where data points will be sent every 30 minutes (9). The goal is to tag 20 to 25 individuals within 2 years of the program start and follow the movement of these individuals for three consecutive years (3).

Visuals will include maps that incorporate short term observations along with long term movement. This will help pinpoint where foraging and nesting occurs and is greatest along with in determining whether these behaviors are occurring by individuals already inhabiting the area or individuals newly moving throughout multiple study areas. Visual maps will also provide a comparison of use of the study areas before and after euthanasia periods in order to determine whether controlled shooting is the driving factor for any noticeable behavioral changes.

Intellectual Merit: This research will help determine the effectiveness of the management strategy in achieving the overall goal. As a result it opens the door for bettering the program or implementing new programs in addition or in place of the current. Greater understanding of population dynamics provides the basis for new and more in depth ecological research to determine the factors aiding in the formation of these dynamics along with predator prey relations following euthanasia periods.

Broader Impacts: The short term and long term scope of this research provides continuous opportunities for undergraduate and graduate research assistants in northern California. Surveys may include trained volunteers as well, increasing the knowledge of both species throughout the local community. The research builds a basis for conservation management of *S. o. caurina* on a greater scale possibly including more proactive approaches and including legislation focused on *S. varia* management.

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Declaration: I, Jessica Mack, declare that this proposed research is my original work.