



Habitat Use and Movement of the Threatened California Red-Legged Frog (*Rana draytonii*)



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Introduction

Research on animal movement patterns and the factors that influence these patterns is vital to conservation of endangered and threatened species. The California red-legged frog (*Rana draytonii*) is a threatened species native to California that lives in freshwater creeks and ponds. During the breeding season, adults travel to ponds and creeks to reproduce (Storer 1925). Significant reduction in the range and population sizes of California red-legged frogs (CRLF) has been attributed to habitat loss, habitat modification, and threat of predation and competition posed by introduced invasive species such as American bullfrogs (*Lithobates catesbeianus*) (Jennings 1994, Lawler et al. 1999, US Fish and Wildlife Service, 2002). The goal of our study was to better understand the timing of movement of CRLF and if interactions with American bullfrogs (BF) influenced movement patterns. CRLF and BF were tracked via radio-telemetry from May 2017 to June 2018 on the Mitsui Ranch in Petaluma, CA. The results of this project can potentially be used to help determine the pathway buffer sizes necessary to protect and manage CRLF movement.

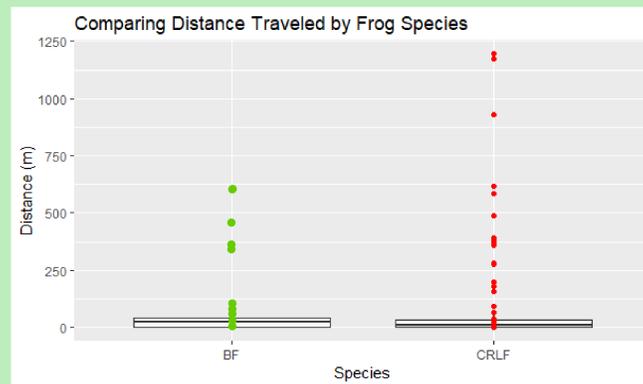
Hypotheses

- 1) Does presence of invasive bullfrogs have a significant effect on CA Red-legged frog movement distance?
- 2) Does rainfall or season have a significant effect on CA red-legged frog distance traveled?

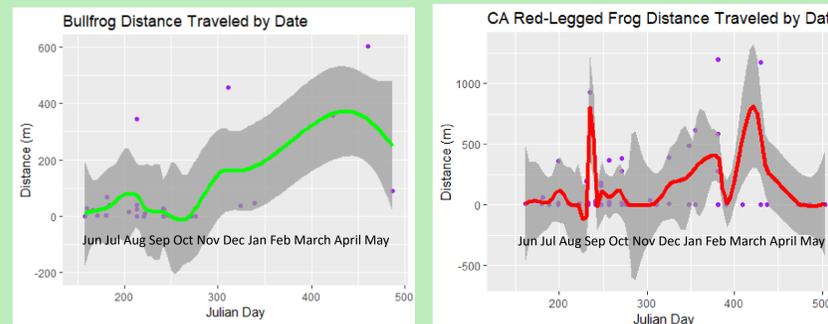
Methods

- Caught frogs by hand or net during night surveys ~once per week
- Beaded belts were fitted around frog waist to hold transmitters. Frequencies found using Yagi antenna.
- GPS point marked
- Analyzed by Graphical Information System (ArcGIS Pro)
- Statistical Analysis: Using R, we ran an ANOVA test to compare CRLF and BF average distances. We also ran a regression analysis and plotted a loess line to look for patterns in the time of year long distance travel occurs.

Study Site: Mitsui Ranch, Petaluma, CA



ANOVA test comparing average distance traveled by bullfrogs (n=12, mean=85.1, SD =155.5) and CA red-legged frog (n=27, mean=102.8, SD=245.6). Bullfrogs (BF) and CA red-legged frogs (CRLF) **do not have a significant difference** between average distance traveled (F=0.2943, p=0.5886).



Distance plotted over Julian Day, starting with day 136, June 10th, 2017 ending on day 504, May 19th 2018. LOESS (locally weighted smoothing) line outlines trends of movement and highlights timing of long distant movement trends. Long distances recorded are especially notable in **September and March** for CRLF. An increase in BF movement during wet season is notable.

Preliminary Results

- The longest distance traveled by a CA red-legged frog was 1196 meters long, but the average was 102.8.
- There is no statistical difference between the averages of bullfrog and CA red-legged frog distance traveled.
- CA red-legged frogs moved the longest distances in September and March. Bullfrogs moved the farthest in the wet months.

Discussion

Preliminary analysis of the data has illustrated trends in CA red-legged frog (CRLF) movement patterns. By comparing the movements of CRLF and bullfrogs (BF), we are able to draw some conclusions about CRLF movement patterns. CRLF distance range is highly variable, especially compared with bullfrogs. Like bullfrogs, we found that CRLF are often sedentary, however CRLF have bursts of long distance traveling. These surges in long distance travel are CRLF moving to and from breeding ponds for reproduction. We are able to confirm this through GPS and map analysis using ArcGIS Pro. Our results are similar to seasonal patterns of movement in other CRLF populations, including in Point Reyes (Bulger et al. 2003, Fellers & Kleeman 2007).

Data still to be analyzed includes effect of rainfall on distance traveled and effect of bullfrog presence. We predict that rainfall will be a significant driver of long distance movement. Wet grass conditions likely elicit travel for these desiccation-prone amphibians. Bullfrog presence is likely not a significant driver of long distance travel of CRLF, but may be a driver of small-scale movements.

This research is important as knowledge of movement patterns is critical to making conservation decisions about size buffers necessary to protect and manage habitat and movement corridors. Our study is unique in that it also includes bullfrogs. After all analyses are complete we may have a more detailed idea of how this invasive species is affecting our native CA red-legged frog. Protecting this

Citations

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STEVE NORWICK
Memorial Fund

