

Radio Telemetry and Basking Behavior in Red-Legged Frogs (*Rana draytonii*)

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Introduction

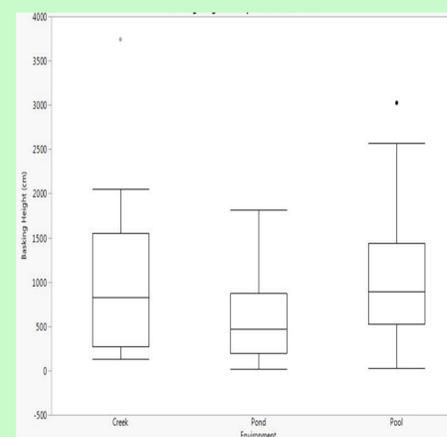
The California red-legged frog (*Rana draytonii*) is a threatened species native to California that lives in freshwater creeks and ponds (Storer 1925). Significant reduction in their range and decrease in population sizes has been attributed to habitat loss, habitat modification and predation by introduced invasive species (Jennings 1994, Lawler et al. 1999, US Fish and Wildlife Service, 2002). California red-legged frogs (CRLF) often rest outside of the water on warm nights, an action we have defined as basking behavior. This behavior may be an important part of thermoregulation, prey consumption or escaping predation and competition. The unique topographies of different environment types, ponds, pools and creeks, may elicit different basking positioning relative to the water. We have separated the aquatic environments with the following criteria: **ponds** are larger bodies of water with sloping water edges, **pools** are basin-like parts of the creek with sheer cliffs at the edge of the water, and **creeks** are narrow with medium ledges to water. Our project aimed to determine if habitat alters the distance of basking behavior in height from the water surface and distance to water edge.

Hypotheses

- Distance of basking places of CRLF will differ between ponds, pools and creeks relative to the **water edge**.
- Height difference of basking places to **water surface** of CRLF will differ between ponds, pools and creeks.

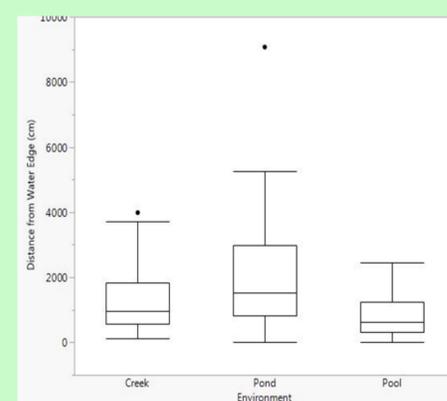
Methods

- Radio telemetry and pit-tagging were used to track individual adult CRLF movements.
- We used pin flags to mark basking sites of CRLF, then used a laser level to measure the height from the closest water surface, and estimated the linear distance to the nearest water body with a 100-m measuring tape.
- Aquatic Environments were categorized into three types: creek, pool and pond.
- ANOVA and Analysis of Variance were run to compare the distance differences between different aquatic environment types.



Basking Heights VS. Aquatic Environments

Figure 1. Frogs basked in significantly higher positions in pools compared to ponds ($F=13.65$, $p < 0.05$), but not significantly higher in creeks ($F= 0.0032$, $p 0.9553$). Basking positions in creeks were significantly higher than ponds ($F=7.25$, $p <0.05$).



Basking Distance from Water Edge VS. Aquatic Environments

Figure 2. Frogs basked further from the water edge in ponds compared to creeks ($F=3.79$, $p=0.0501$) and significantly further compared to pools ($F=23.708$, $p<0.05$). Basking positions in creeks were significantly further from the water edge compared to pools ($F=4.76$, $p <0.05$).

Results

- CRLF bask in significantly different distances from the water edge in each aquatic environment type. Frogs basked the furthest from the water edge in ponds and the closest in pools.
- CRLF in ponds rest significantly lower than in pools and creeks, but frogs in pools and creeks do not rest at significantly different heights.

Discussion

This study showed that these aquatic environments are used differently and thus should be protected differently. The flatter topography of ponds makes it easier for frogs to reach further distances from the water edge, without having the need to climb steep cliffs. Conservation efforts to protect ponds would likely be most effective by focusing on having a large enough area around the pond for the frogs to comfortably bask. In contrast, the steep topography associated with pools elicits basking behavior much higher from the water surface. We didn't see many frogs basking further away from the water edge in this setting, likely because the energy required to climb these heights and then travel out would be great, but more importantly staying close to the water edge makes it a simple hop back into the sanctuary of water from these high places. Conserving this habitat type would be most effective by protecting the steep climbs of the banks, as these frogs were seen to use it tremendously. The lack of difference between pool and creek height difference isn't too surprising, as these habitats are most related; pools are a part of creeks. These creeks present a unique blend of the challenges in protecting the distance needed in ponds and the height needed in pools. Our small-scale study has given evidence that frogs use habitats differently depending on the topography of the environment. Additional study of frog movements and use of habitat features would give even more insightful evidence of how to protect the home of this threatened species.

Citations

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Acknowledgments

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