

UtahStateUniversity
ECOLOGY CENTER

Dr. Tiffany Garcia

Oregon State University, Corvallis, OR

Wednesday, September 16, 6:00 p.m., NR 105

Invasion Biology and the Successful Establishment of Novel Species: It Takes a Village.

The field of invasion biology is experiencing a dramatic paradigm shift in research methodology and perspective. Research has focused mainly on invasions that harm specific species or regions of conservation concern, economic importance, or that have been deemed harmful to human health. This limited perspective has created a disconnect between invasion biologists, land managers charged with eradicating invasives, and other ecological disciplines. Incorporating ecological concepts such as biogeography and metapopulation theory into the study of invasive species will allow researchers to view invasions in a broader context while maintaining regional or taxonomic applicability. To demonstrate this, I will present three methodologies we are using to explore Bullfrog invasions (*Rana catesbeiana*) in the Pacific Northwest, which is one of the 100 worst invasive species in the world. Preliminary studies conclude that bullfrog populations at the southern extreme of the Pacific Northwest invasion range are capable of metamorphosing at an accelerated rate. We hypothesize that these larval phenotypes have diverged from the native range (the eastern U.S.), and that local adaptation and/or phenotypic plasticity are the mechanisms facilitating this bullfrog invasion. The frequency and origin of this phenotypic divergence will be looked at using biogeographical and metapopulation approaches, while population-level differences in trait response will elucidate the specific mechanisms driving this invasion. This integrated method of investigation is a powerful and unique approach for understanding biological invasions and will serve as a useful model for future studies of invasive species.

Thursday, September 17*, 3:00 p.m., ENGR 101

Conflict Avoidance Strategies in Amphibians: Correlated Trait Response to Stressful Environments

Larval amphibians inhabiting complex aquatic habitats often face multiple dangers simultaneously. When multiple environmental stressors are present, individuals can mediate potential conflicts by relying on coupled responses from both behavioral and physiological traits. Stressors such as ultraviolet-B (UV-B) radiation, temperature, competition, and predation risk can cause changes in amphibian body coloration and behavior. These behaviors include microhabitat preference, refuge use, activity levels and feeding rates. Interactions between body color and behavior in response to environmental stressors, and how individuals correlate these trait responses, may vary across stress gradients (e.g., elevation and corresponding UV-B exposure rates), and thus species and populations. We quantified color and behavior trait response in larval amphibian species native to Oregon and found significant species and population differences. I will review three studies investigating the trait combinations amphibian larvae can employ to mediate multiple, sometimes conflicting pressures. In the first two studies, we tested individuals from low elevation and high elevation populations to quantify differences in trait response along a stress gradient. The first examined changes in activity rate and body color in response to predators and UV-B. The second employed experimental mesocosms to determine the direct and indirect effects of competition and UV-B on larval growth and development rates. Our third study investigated the conflicting demands of increased larval development rates in ephemeral systems. In this study, we quantified larval microhabitat choice when exposed to both high water temperatures and UV-B radiation. These studies combine to create an interesting picture of how amphibians can correlate trait response and prioritize defenses for particular stressors. Strategies differed across species and stress gradients, emphasizing the importance of understanding the site-specific factors influencing amphibian trait response.

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*The September 17th seminar will be preceded by refreshments in the ENGR atrium at 2:30 p.m.

**To schedule an appointment with Dr. Garcia, please contact Stephanie White—x2555 (stephanie.white@usu.edu)