2020 Project Report

How Do Ecological Traits Mediate Hybridization Dynamics? A Case Study of Free-ranging Prairie (*Crotalus viridis*), and Mojave (*Crotalus scutulatus*) Rattlesnakes Across a Hybrid Zone.

Principal Investigator: Dylan Maag

Amount Awarded by CDM Painter Grant in Herpetology: $1000.00
Total Project Budget: $18,900.00

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Project Period: May 2020–August 2020

Project Location: Animas, NM, U.S.A. (just south of I-10 and north of granite gap)

Summary of project objectives or methods used

Objectives: The objectives of this study are to: 1) Sample individuals across the hybrid zone to establish the population densities, population structure, and the shape/extent of the zone. 2) Use radio-telemetry, habitat analyses, and behavioral assays in captivity to compare hybrid and parental populations and establish the mechanisms determining relative fitness.

Methods Used: I recruited and trained a team of undergraduate researchers to conduct field work during the summer of 2020. We used visual encounter surveys across natural habitats and roadways to locate and capture individuals. We sampled tissues and venom from all snakes. We also measured the defensive and exploratory behaviors of the captured snakes using three behavioral assays employed in an artificial arena. A subsample of individuals across the hybrid zone were surgically implanted with radio transmitters and released at the point of capture. Each snake was tracked every other day; GPS points, microhabitat measurements, and foraging videos were taken from these radio-implanted snakes. In addition to the fixed videography technique, we also collected data on diet from stomach and fecal samples and field observations to help characterize foraging ecology. All ecological and behavioral data is currently being combined with the genomic and venomic information obtained by collaborators to produce a series of studies on the dynamics and mechanics of hybrid zones.

Conclusions

A total of 78 snakes were collected for morphometric and tissue sampling. Most of them where either putative hybrids (31) or prairie (37) rattlesnakes, however, ten of the 78 were putative Mojave. We performed behavior assays on 88 snakes at least once after the initial capture to measure their defensive and exploratory behaviors. Only a fraction (23), of the snakes were suitable for implantation of a radio transmitters. Of these 23 snakes, five were recaptures from the 2019 season, and we recorded three fatalities during the subsequent active season. Eleven of our 23 implanted snakes were released early enough in the season to obtain a usable amount of spatial, microhabitat, and hunting data. We also conducted mammal trapping for nine weeks throughout the summer resulting in 245 total captures, a data set that will allow us to assess prey resources in different habitats. We marked, measured, and extracted tissue samples from all captured mammals. Herpetological surveys were conducted through road surveys and ground searching while we searched for more rattlesnakes throughout the summer. These surveys resulted in observing 17 additional snake, lizard, and amphibian species within the study area. After combining these ecological and behavioral data with the 2019 data, initial statistical analyses are showing that there is difference between individuals based on their ancestry. Further analyses are being done and collaboration with other labs on the genetic and venomic aspects of the animals is ongoing.

Recommendations:

Moving forward with this research requires a 2021 field season to occur in order to recapture and resample individuals implanted with radio transmitters in 2020. This will measure the effects of year on their behavior and ecology. Additionally, the 2021 season should focus on sampling the Mojave populations near the hybrid zone. This way the research will have a more balanced data set since 2019 and 2020 were focused on sampling inside of the hybrid zone and the prairie populations near the hybrid zone, respectively.

Statement of Expenses:

As planned, all of the $1000 granted to me by the Chiricahua Desert Museum through the Charles W. Painter Grant in Herpetology went to funding the housing for myself and the field technicians for the first four weeks of the project.