

# **Assessing the Effects of Forest Management and Wildfire on Populations of New Mexico's Endemic Salamanders**

NMDGF Share with Wildlife, Interim Report FY2021

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## **Project Objectives**

The primary objectives of this project are to: (1) Quantify the population demography of Sacramento Mountain salamanders (*Aneides hardii*) (population size, density, sex ratio, and age class structure), as related to forest structure, composition, and disturbance history; (2) Calculate detection probabilities for populations; (3) Identify the temperature and precipitation thresholds and durations of those thresholds that initiate or cause the cessation of surface activity in *A. hardii*; and (4) Summarize results in a way that informs land managers about the status of *A. hardii* in relation to conservation and habitat restoration needs.

## **Project Accomplishments**

### ***Aneides hardii* in the White, Sacramento, and Capitan Mountains**

In May 2021, we began selection of sites on the Lincoln National Forest for establishment of salamander population demography plots and installation of weather stations. We selected two sites in the Sacramento Mountains (Lightning Lake and Russia Canyon) and two sites in the White Mountains (Upper Bonito and Carlton Canyon). We established plot boundaries and installed weather stations in June. Weather stations were set to record air temperature and relative humidity, precipitation, soil moisture and temperature, and within-log temperature continuously at 30-minute intervals for the next two years. Two days after weather stations were installed at Carlton Canyon, one set (of three) was stolen from the site. We searched the area intensively and found only the destroyed precipitation gauge about 60 meters from the site of installation, with a recently crushed beer can and cigarette butt nearby. We filed a police report and contacted local pawn shops. To date, the equipment has not been found, despite our (Karraker and Loehman) contact information appearing on the outside and inside of the HOBO datalogger. This represents a loss of about \$2,500 and loss of our ability to collect microclimate data at one set of demography plots. We immediately removed the other two weather stations at that site and located a new site, behind a locked gate, at Ski Apache (USFS land co-managed by the Mescalero Apache tribe). We established three demography plots there, but only two currently have weather stations installed and collecting data because we were unable to replace the stolen station. We have tried to find other sources of funding to replace the weather station but currently have no other resources to do so. As soon as we are able to replace the equipment, we will install it at the Ski Apache plot. Theft of the weather station was extremely discouraging and represents the first time in our experience that research equipment for any project has been vandalized or stolen. The stolen weather station was purchased with Share with Wildlife funding.

We have established four sites that include 12 population demography plots and will begin salamander surveys on July 1. Our plan is to conduct six surveys of the demography plots this field season. Although we had originally planned to establish demography plots on all three mountain ranges (White, Sacramento, and Capitan), we had to cut the number of demography

plots by 50%. Visits to historically-occupied sites in the Capitan Mountains took approximately three hours to reach for six hours round-trip from Ruidoso, where the crew is stationed. This distance would make it extremely challenging to survey these sites regularly and be able to accomplish the other work. Also, based on previous surveys by a U.S. Forest Service crew and a former UNM master's degree student, we learned that salamander densities were high at some of the sites we had selected and that it would be difficult to complete surveys at 24 demography plots regularly, given how many salamanders we were likely to capture. Thus, we cut the number of plots to 12, but we increased the plot size from the 20 x 20 meter plot originally proposed to plots that are 25 x 25 meters in size.

To replace the 12 demography plots excluded from the study, we will conduct occupancy surveys of 30 sites along a stratified random design of unburned sites, sites burned at low or moderate severity, and sites burned at high severity on the Lincoln National Forest from July into September. This would allow us to survey a broader extent of the Lincoln National Forest. These surveys are identical to those conducted in demography plots except that they are bounded by time rather than by area. Each occupancy survey will consist of a two-hour time constrained search in one of the three treatment types mentioned above. Each area targeted for occupancy surveys will be surveyed only once and target areas will be located >500 meters apart. Occupancy surveys will be conducted in 2021 and in subsequent years with the goal of determining how salamander presence is influenced by wildfire severity.

Beginning in mid-July, we will start sweeping the demography plots on a weekly basis with the PIT tag antenna and reader to record salamanders that are surface active and document sub-surface locations. We will use this information to relate salamander surface activity to microclimate conditions being measured by the weather stations.

Our crew this season consists of Ryan Healey (master's student at University of Rhode Island), Lesley Howard (Research Assistant at University of Rhode Island), and Abril Avila (undergraduate student intern from New Mexico State University). Nancy Karraker and Rachel Loehman assisted with site selection and installed weather stations and will provide field support periodically throughout the summer.