



The Response of the Native aquatic fauna to the eradication of bullfrog (*Lithobates catesbeiana*) in a section of the Mora River, at Wind River Ranch

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Abstract

This poster summarizes the body of research on the vertebrate community of the Mora River being carried out by faculty and students of New Mexico Highlands University. This anchor poster presents the context in which many of the projects are taking place with reference to the general methods used and common study site and techniques. The core of the project consists on evaluating the impact of Bullfrog eradication in the community of aquatic vertebrates. For this purpose, a section of the Mora River was divided in two regions. One experimental where the bullfrogs were eradicated using different methods and another one, control, where bullfrog population is not affected. Most of the project associated in this site look at the impact of the presence or absence of bullfrogs on different aspects of the ecosystem

Introduction

Invasive species are the single worst conservation problem at the species level. The Department of the Interior estimates that invasive nonindigenous species in the United States cause major environmental damages and economic losses adding up to more than \$138 billion per year (DOI 2012). In Western North America, the introduction of invasive species, as well as man induced habitat changes are often cited as the two most extreme threats to freshwater ecosystems.

The American bullfrog (*Lithobates catesbeiana*) originated from the eastern United States however they now occur in the western U.S. because of human introduction. Some introductions have been because of their use as a food source. It is known to be a great threat to lentic breeding anurans endemic to the Western portion of the United States. The American bullfrog, is known as a generalist predator that can have a significant detrimental impact on native species direct predation (Adams 1999), competition for resources (Diaz de Pascual 2008) and as reservoirs for disease such as the chytrid fungus (Wang Li 2009). Bullfrogs are one of the largest frogs that live in the United States and have been introduced into Northern New Mexico for several decades producing unknown impact on the local aquatic fauna. Bullfrogs.

In this study we eradicated the bullfrogs, their tadpoles, and nests in an experimental region leaving another section of the river as control. In this system we are able to evaluate the impact of Bullfrogs on other species such as leopard frogs (*Lithobates pipiens*), several species of garter snakes (*Thamnophis* spp) as well as the fish community present in the river (Figure 1). This poster presents the set up of the big study on what other projects are taking place.

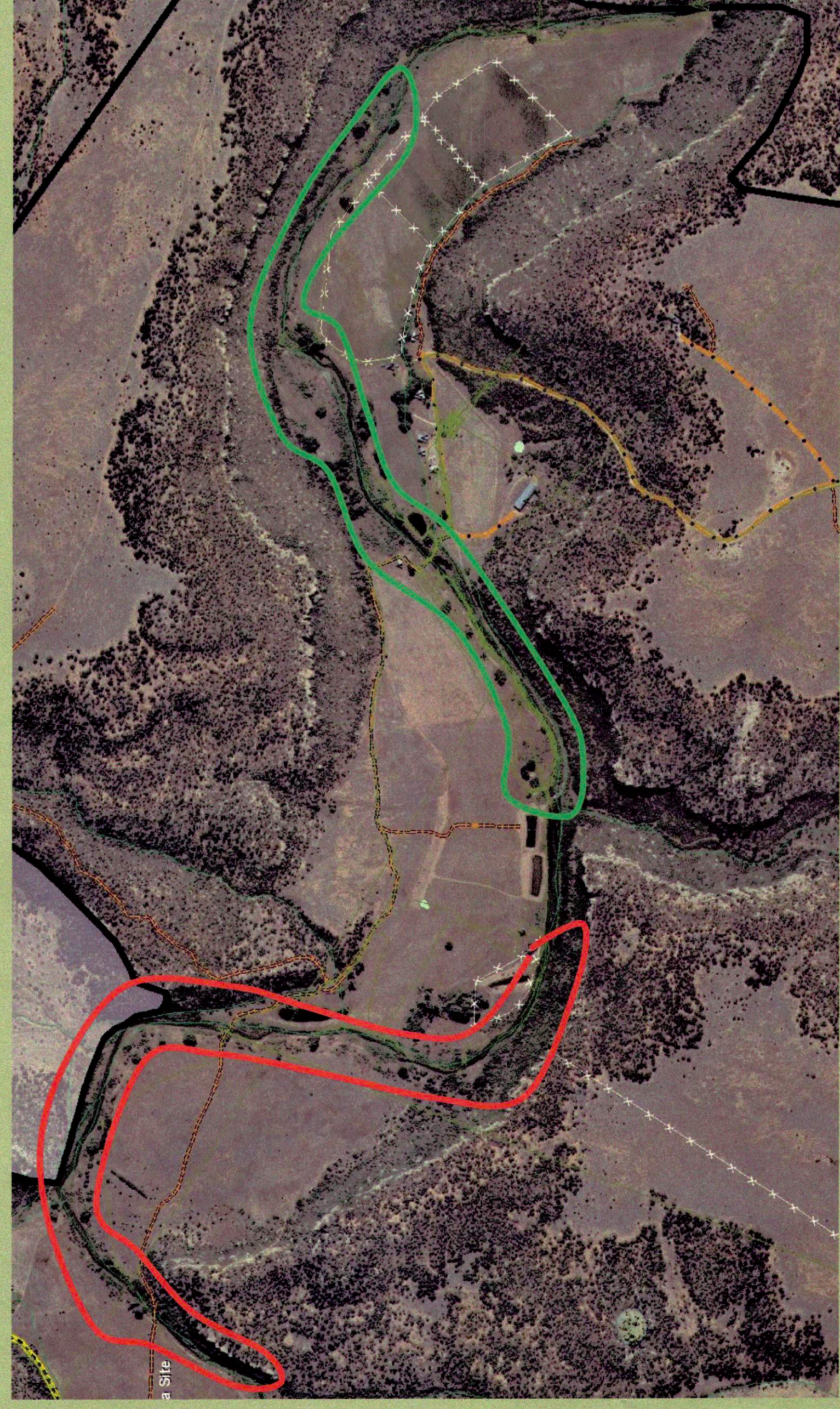


Figure 1. Aerial view of the Mora River at Wind River Ranch. The experimental area has been highlighted with a green line while the Control area is denoted with a red line

Methods

On February 6, 2012 we began the process of eradicating bullfrogs from the Mora River, starting with their tadpoles from Miller's pond. This process was done in several ways including using a seine net to drudge the entire pond. The seine was drug at a 45 degree along the bottom of the pond trapping many of the tadpoles in it (Figure 1). After each swipe the seine was brought horizontally and the tadpoles were then removed using smaller nets and placed into five gallon buckets. We also used a fish shocker, which was used to herd the tadpoles to a stationary seine while smaller nets were used to scoop up the tadpoles then placed in the five gallon buckets (Figure 2). Tadpoles euthanized in our lab using a solution of 10% ethanol. We euthanized in excess of 10,000 tadpoles from Miller's pond alone. Tadpoles were weighed individually to determine the population structure (Figure 3).

When the weather became warmer we began to hunt for adult and juvenile bullfrogs along the river as well as in Miller's pond in the experimental zone. Several different methods were used to capture the frogs fishing nets, hands, and trapping. Frogs that became to skittish were shot with a .22 caliber rifle. While initially we used regular bullets, we later switch to lead-free ammunition to minimize the environmental impact. All of the adults and juveniles were placed in the same ethanol mixture to euthanize them, even animals captured with gunshot that were still alive.

From all captured frogs we collected the following measures snout-to-vent length (SVL), left leg length, mass, sex, and locations of capture. We also preserved stomachs diet analysis, and other internal organs to survey them for parasites. Figure 4 shows the total number of males and females captured and analyzed to date.

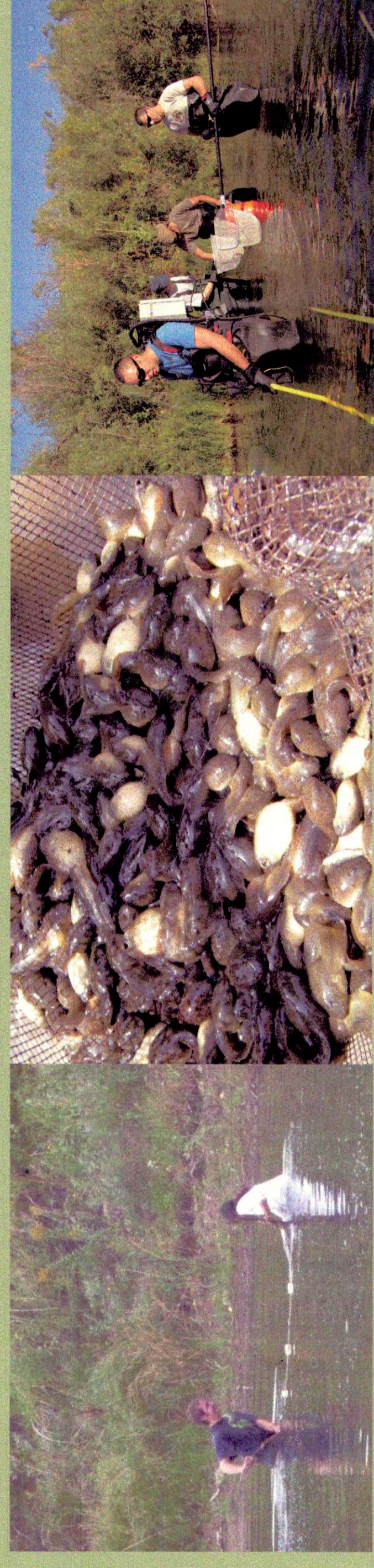


Figure 1. Left. Seining pond to eliminate bullfrog tadpoles. Right tadpole yield of a seine pass across the pond

Figure 2. Using a fish shocker to herd the tadpoles to a stationary seine.

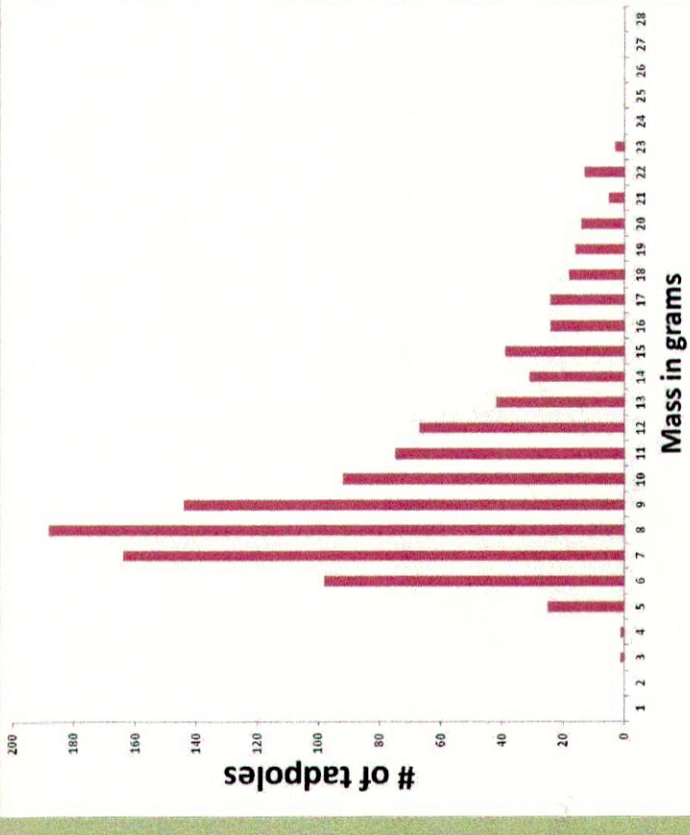


Figure 3. Population structure of a sample of tadpoles removed from Miller's Pond

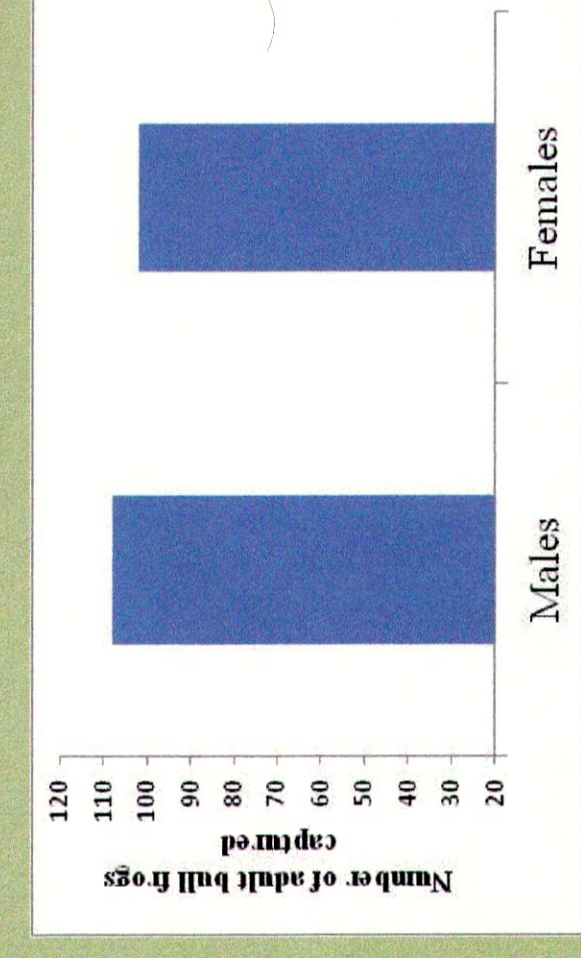


Figure 4. Histogram with the sizes of males and females bullfrogs captured to date

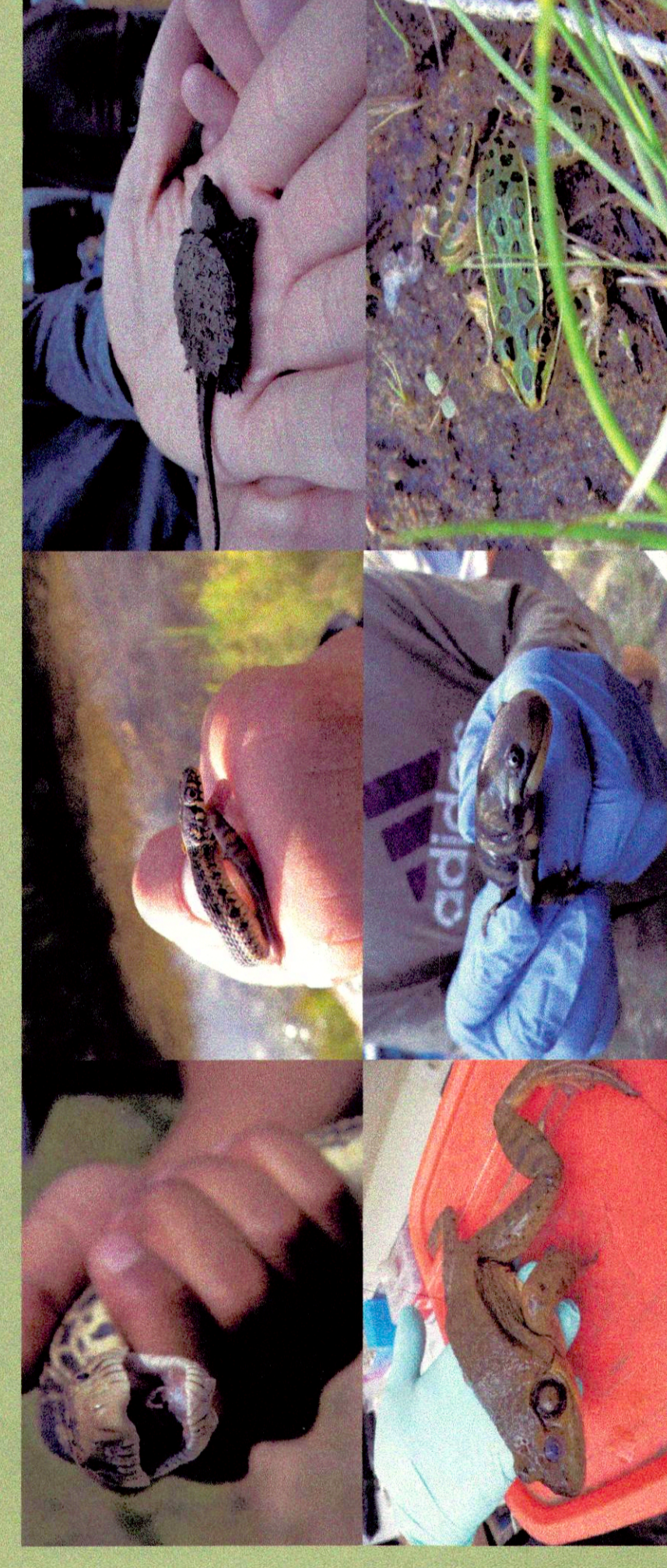


Figure 6. Native Fauna: From top left: Gopher Snake (*Pituophis melanoleucus*), Plains Garter Snake (*Thamnophis radix*), Snapping Turtle (*Chelydra serpentina*), Bullfrog (*Lithobates catesbeiana*), Tiger Salamander (*Ambystoma tigrinum*), Leopard Frog (*Lithobates pipiens*)

Current projects

Having this system, there are a number of projects that are assessing the impact of the eradication of bullfrogs in different elements of the ecosystem. Bullfrogs affect many of the native fauna (Figure 5) The following is list of research projects taking place. The * indicates a Master thesis, the symbol # indicates that there is a poster about it in this exhibit.

- *#.- Runnels, J. Effects of Bison Grazing vs. Cattle Grazing on Bird Diversity in Northeastern New Mexico
- *#.- Daboub, M. Habitat preference of the American bullfrog (*Lithobates catesbeiana*) in the lower watershed of the Mora River in northern New Mexico
- # Salinas, S. Bull Frog Diet of the Mora River: Why can't we find a frog inside a frog?
- *Guilez, J., The effects of invasive in the trophic cascade in a Section of the Mora River: Crayfish, bullfrogs and small vertebrates
- McBride, L. Assessing the presence of Chytrid fungus in the Mora River in populations of Bullfrogs and Leopard frogs
- *#Ortega, R. Demography Response of *Lithobates pipiens* to Agriculture, Climate Change, Channelization, and an Invasive Species
- Garcia, C. Response of the rodent community to the eradication of Bullfrogs in the Mora River: How far does the impact of Bullfrogs goes?
- *Taylor, C. Impact of Restoration on habitat use and mobility of Black bears (*Ursus americanus*) in the Mora River think about?
- Bryant, J. Parasitological Survey in Bullfrogs (*Lithobates pipiens*) in a section of the Mora River
- *Wright, M. Effect of fire in the amphibian community: can fire be used to control invasive bullfrogs
- *Griego, J. Hybrid zone of Leopard Frogs (*Lithobates* spp) in Northern New Mexico: is climate change increasing hybridization?

References

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- Diaz de Pascual, A. D., and C. Guerrero. 2008. Diet composition of bullfrogs, *Rana catesbeiana* (Anura: Ranidae) introduced into the Venezuelan Andes. *Herpetological Review*. 39:425-427
- DOI (Department Of Interior) 2009. The National Invasive Species Council. http://www.invasivespecies.gov/main_nav/doi.html. Accessed on July 1st 2012.
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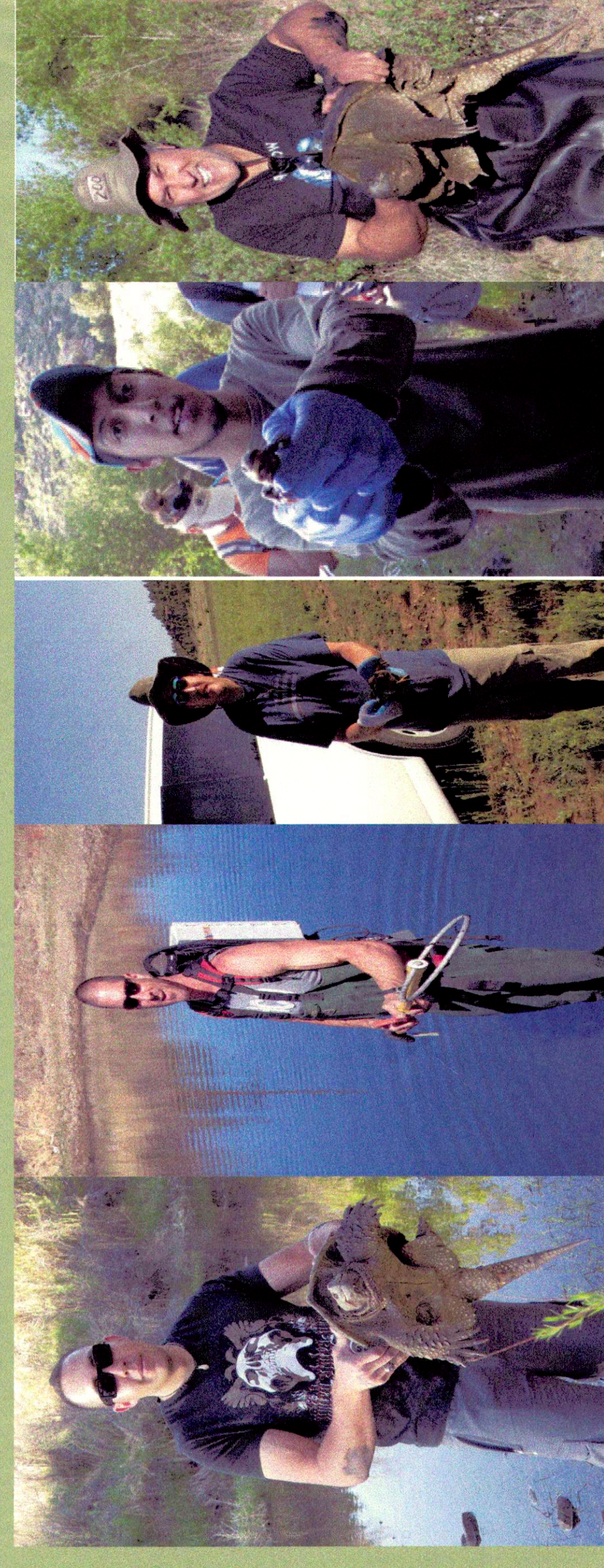


Figure 6. Crew from right to left: Justin T Saiz, Micah A. Daboub, Robert Ortega, Steven Salinas, Dr. Jesús Rivas