



# Habitat preference of the American bullfrog (*Lithobates catesbeianus*) in the lower watershed of the Mora River

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## Abstract

The means to control and manage against the effects of invasive species has not been well explored. We believe that an understanding of the habitat preference by an invasive species provides a theoretical background on which to base habitat management decisions. In this study we utilize temperature sensitive radio telemetry transmitters attached to four adult bullfrogs to document the habitat preference of post-metamorphic bullfrogs on the Mora River located at wind River ranch in northern New Mexico. Preliminary data for the month of July, suggests a strong correlation between time spent in daytime hours and banks consisting of heavy or thick vegetation. This study provides a foundation on which to develop effective strategies to better manage and control invasive American bullfrogs in the lower watershed riparian ecosystem of the Mora River in northern New Mexico.

## Introduction

The American bullfrog (*Lithobates castesbiana*) is known as a generalist predator that can have a significant detrimental impact on native species through direct predation (Adams 1999), competition for resources (Diaz de Pascual 2008), and as reservoirs for disease such as the chytrid fungus (Wang Li 2009). American Bullfrogs have been established in the Western United States since the 1940s (Snow and Wimer 2010) with the lower watershed riparian ecosystem of the Mora River being no exception. It is surprising, however, that the American bullfrog, which is native to much wetter climates in Eastern United States (Barrasso et al. 2009), has managed to survive in the semi arid watersheds of northern New Mexico and even being able to exclude the native, frogs adapted to these habitats.

In northern New Mexico floodplains riparian vegetation like that of the Mora River has suffered more from human activities than other riparian vegetation in other areas of New Mexico (William a 1993). Along with intensive overgrazing of the pastures, most of the riparian trees were harvested long ago and few stands have been allowed to regenerate and mature.

We believe that it is this human caused degradation of the Mora River's original riparian gallery forest ecosystem that has allowed the American bullfrog to succeed in these habitats. They may utilize and depend the current riparian vegetation which is now composed of mostly seral stages of thick grassy vegetation that were not as common in the original habitat of Northern New Mexico. In this contribution we test the hypothesis that human mediated environmental degradation has allowed the invasive American bullfrog to establish itself in the lower watershed of the Mora River.

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## Methods

Four adult specimens two male and two female American bullfrog (*Lithobates castesbiana*) were captured (Table 1). Upon capture we attached a temperature sensitive ATS transmitter model R1170, to them using 3/8 inch plastic tubing, combined with a section of 1/8 inch beaded copper chain to securely fasten a 3/8 inch by 1/2 inch radio transmitter.(Figure 1). Animals were located using a three element antenna model F 16 4– 3FB, and a receiver made by advanced telemetry systems model AR410 (Figure2.) We found the radio-tagged frogs with the help of the radio telemetry equipment every other day through the month of July. Upon locating an animal the following data were collected: location, movement from last location, temperature of the frog ,water temperature, ground temperature ,water depths and flow rate, bank slope, vegetation density and dominance, activity of the frog, and visibility.



Figure 1. Left, Temperature sensitive radio transmitter and plastic tubing and beaded copper chain. Right, radio transmitter attached to bullfrog about to be released.



Figure 2. Utilizing the ATS transmitter model R1170 to locate banded frogs.

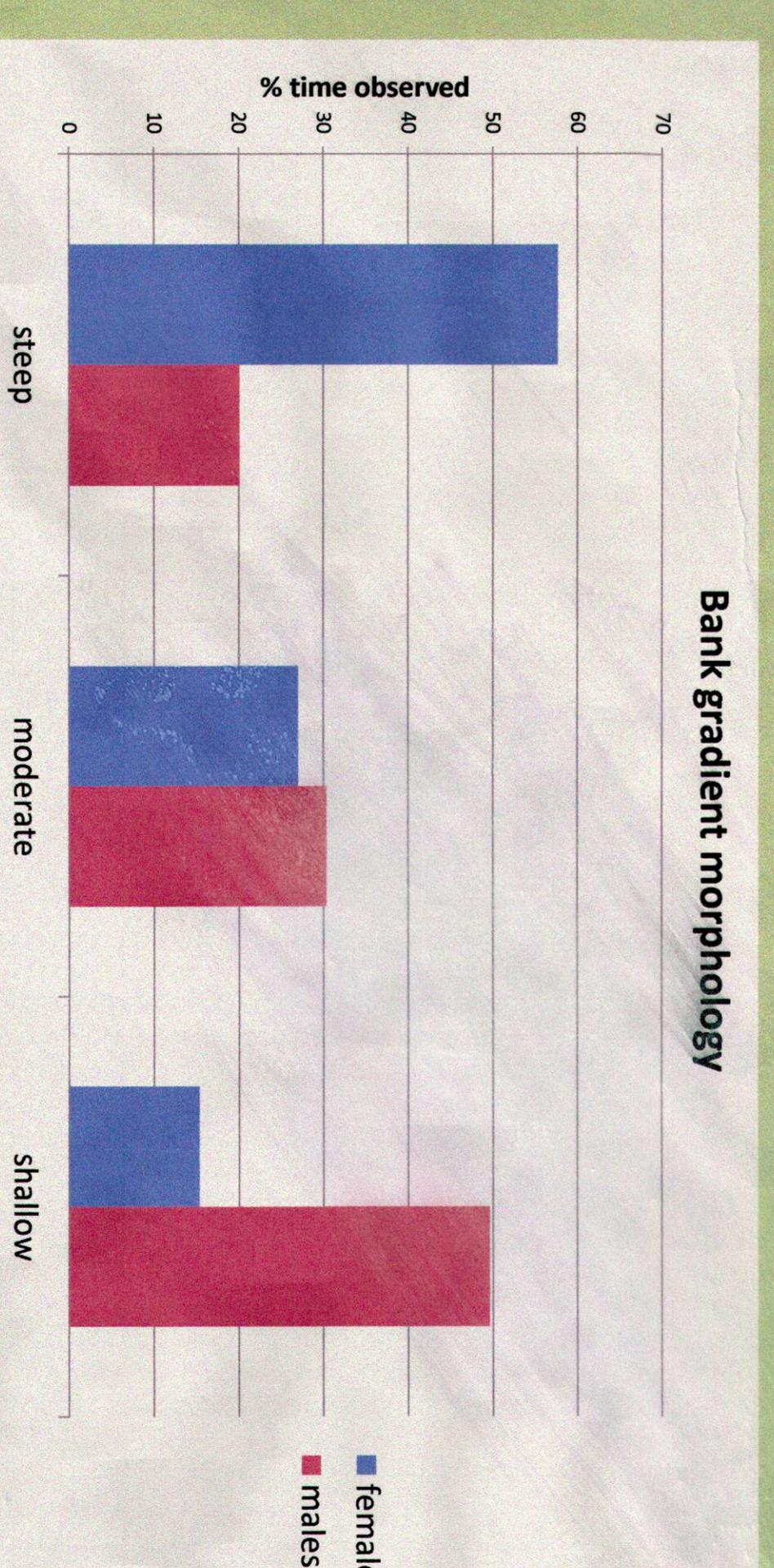


Figure 3. Average time male and female frogs spent in a region of specific bank morphology based on gradient.

	SVL	Mass	Mean	Max
Shantini	16.8	467	149.9	1027
Frida	16.5	440	108.3	978
Bubba	15.3	345	13.3	27.2
Chester	14.3	265	14	57

Table 1. Measures of animals tagged in this study with the average distance traveled per day, and Maximum distance traveled in one day.

## Preliminary Results

Females show far more mobility than males both in maximum movements as well as average distance per movement (Table 1). Both males and females were found more often in thick, and moderately dense grassy vegetation dominated by (*Salix exigua*) and (*schoenoplectus acutus*) (Figure 4). Females seem to prefer steep river banks while males seem to selecting for shallower banks (Figure 3).

Data also indicates that the American bullfrog never travels laterally towards the vegetation green-line away from the edge of the river, or pond more than 1.2 m. This suggests that the bullfrogs are preferring and have a strong dependence on the heavy seral growth along the banks edge.

Cursorry evaluation of the data also suggest that there may be a negative correlation between the presence of the American bullfrog and the abundance of native frogs, suggesting that the American bullfrog represents a suppression of the native frogs or native frogs preferentially colonize habitat areas absent of bullfrogs.



Figure 4. Illustrates percentage of time spent in specific bank morphology based on vegetation density.

## Discussion

Data suggest that Bullfrogs are using exclusively thick successional vegetation in the riparian area of the Mora River. This is not the original vegetation found in the lower watershed of the Mora River area, rather this is a new habitat that has developed due to human influences in the landscape. Male and female bullfrogs have different preference in the bank slope chosen with females using deeper cut parts of the river than shallower ones. This is perhaps due to the fact that males spent most of their time calling from breeding ponds, and the females spend most of their time in the river. We believe that females go to the river to forage and come back to the pond to breed.

The deep cut banks of the river, where a lot of the foraging occurs, are a consequence of strong erosion produced by human induced environmental degradation. Also the deep pools where the males breed, are a man-made lagoons that are foreign to the original landscape. Since the lagoons are not natural and the regions of the river selected for by females are also produced by human activities. We believe that it is principally man-made habitat transformation that plays a crucial roll in allowing (*Lithobates castesbiana*) the American Bullfrog to inhabit and colonize the lower watershed of the Mora River. Because of this we believe that efforts in the area of riparian restoration will not only be beneficial for water conservation and erosion prevention. We also believe that riparian restoration of the Mora River will also help control invasive species and help foster a broad diversity of native species.

