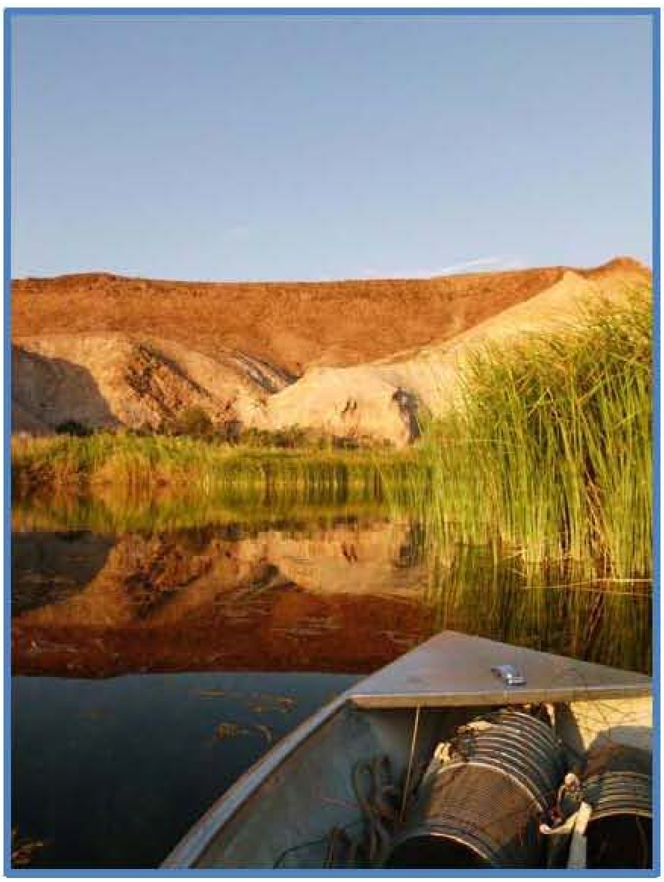
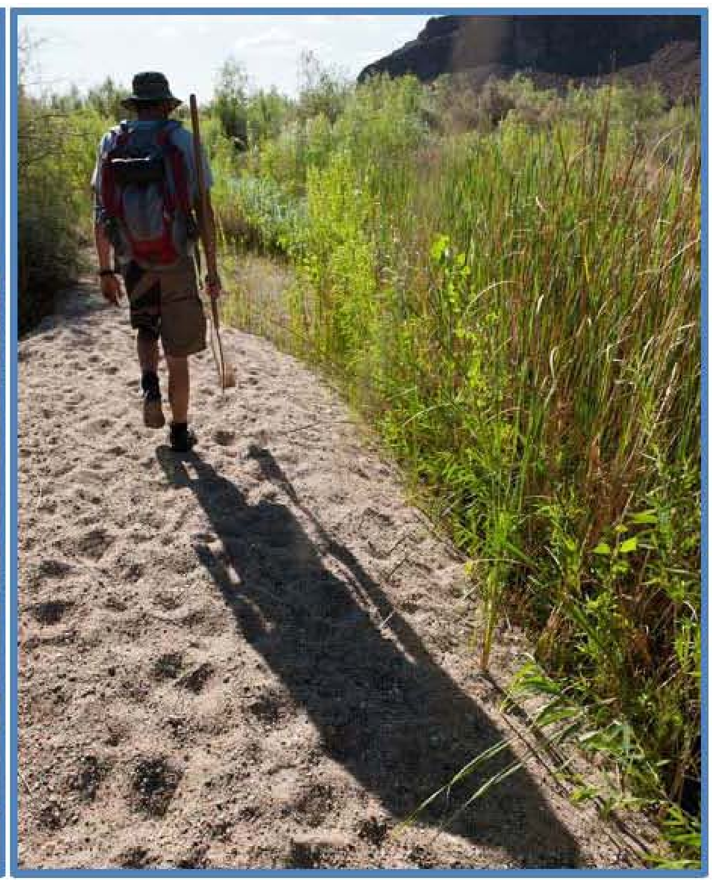
Lower Colorado River
Multi-Species Conservation Program

Balancing Resource Use and Conservation

Lowland Leopard Frog (*Rana yavapaiensis*) and Colorado River Toad (*Bufo alvarius*) Distribution and Habitat Use in the Greater Lower Colorado River Ecosystem





U.S. Department of the Interior
Bureau of Reclamation

October 2011

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Lower Colorado River
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ACRONYMS AND ABBREVIATIONS

AGFD	Arizona Game and Fish Department
GIS	Geographic Information System
LCR	lower Colorado River
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
NWR	National Wildlife Refuge
USGS	U.S. Geological Survey

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ABSTRACT

The purpose of this project is to address current data gaps in relation to two native Arizona amphibian species. The lowland leopard frog (*Rana yavapaiensis*) and the Colorado River toad (*Bufo alvarius*) are included in the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) (LCR MSCP 2004) list of evaluation species. Exploring and outlining the gaps in range and distribution data of these two species is necessary to implement any conservation needs according to Work Task D12 of the LCR MSCP. The study area entails Reaches 3–7 of the lower Colorado River (LCR) (outlined by the LCR MSCP), extending from Davis Dam south to the International Boundary within the United States. In addition to the Colorado River, we surveyed the Bill Williams River from its confluence with the LCR up to and including Planet Ranch due to sightings of *Rana yavapaiensis* and reported presence of *Bufo alvarius* within the area. Beginning in January 2011, habitat assessment surveys were performed throughout the study area based on Geographic Information System (GIS) analysis of aerial imagery and remotely sensed data specifically identifying backwater systems that may contain potential habitat. Areas targeted by GIS analysis were then visited by Arizona Game and Fish Department biologists to determine the locations with the highest probability of occupancy. These high probability areas were then revisited for occupancy surveys. Inverted conical wire mesh funnel traps were deployed at localities to sample the aquatic system for amphibian larvae and adults. In addition to trapping, dip net, nocturnal spotlight visual encounter, and auditory call response, surveys were conducted within the high probability habitat areas. We captured and marked six individual *Bufo alvarius* adults from one location on Planet Ranch. We did not observe any *Rana yavapaiensis* adults or larvae within the study area.

INTRODUCTION

The Lower Colorado River Multi-Species Conservation Program (LCR MSCP) includes two amphibians, lowland leopard frog (*Rana yavapaiensis*) and Colorado River toad (*Bufo alvarius*), in its list of evaluation species. The current range and distribution for both *Rana yavapaiensis* and *Bufo alvarius* along the lower Colorado River (LCR) are unknown. Arizona native ranid frogs are declining throughout their historic ranges (Clarkson and Rorabaugh 1989; Sredl et al. 1997). *Rana yavapaiensis* specifically has been thought to be extirpated from the LCR since 1974, and subsequent surveys have reaffirmed this hypothesis; however, individuals have been observed on the Bill Williams River as recently as 2010 (Vitt and Ohmart 1978; Clarkson and Rorabaugh 1989; Sredl et al. 1997; Kathleen Blair, personal communication). Throughout other parts of *Rana yavapaiensis*' range, they are commonly found in pools associated with streams, springs, arroyos, and stock tanks usually remaining near permanent water (Stebbins 2003). However, their range may be shrinking towards the most secluded streams and springs due to a suite of threats against native southwest amphibians (Degenhardt et al. 1996; Stebbins 2003; Sredl 2005). *Bufo alvarius* is a common species throughout much of the Sonoran Desert, occupying a variety of habitats including mesquite-creosote flats, grasslands, and the pine oak juniper and deciduous montane communities (Stebbins 2003). There have been a handful of anecdotal reports and sightings of *Bufo alvarius* along the LCR and within our study area. However, there has not been a confirmed documented sighting of the species in several years.

The apparent decline and potential extirpation of *Rana yavapaiensis* has been attributed to a suite of potential factors including the introduction of non-native ranid species and non-native fishes, habitat alteration, toxicants, pathogens, and parasites (Hayes and Jennings 1986). The range of *Bufo alvarius* may overlap that of *Rana yavapaiensis*; however, evidence suggests threats to the toad species is primarily from urbanization and hydrological alterations of the riparian habitat (Lovich et al. 2009). The lack of information in regards to the current distribution of both *Bufo alvarius* and *Rana yavapaiensis* along the LCR confounds the employment of effective conservation measures for the recovery of these species. The goals of this study are to address those data gaps and to gain a better understanding of the current status of the two species, thus allowing for preliminary steps towards conservation. Specifically these objectives are:

- Locate potential habitat for *Rana yavapaiensis* and *Bufo alvarius* along the LCR

- Determine distribution of *Rana yavapaiensis* and *Bufo alvarius* within our study area

- Collect genetic samples from *Rana yavapaiensis* and *Bufo alvarius*

- Determine habitat selection for *Rana yavapaiensis* and *Bufo alvarius* along the LCR

STUDY AREA

The study area consists of Reaches 3–7 of the LCR extending from Davis Dam south to the International Boundary within the United States (figure 1). In addition to the LCR, we also surveyed the Bill Williams River from its confluence with the LCR up to and including Planet Ranch. We did not survey any areas north of the Havasu National Wildlife Refuge (NWR) due to a lack of historic occupancy by either species along the LCR in that region.

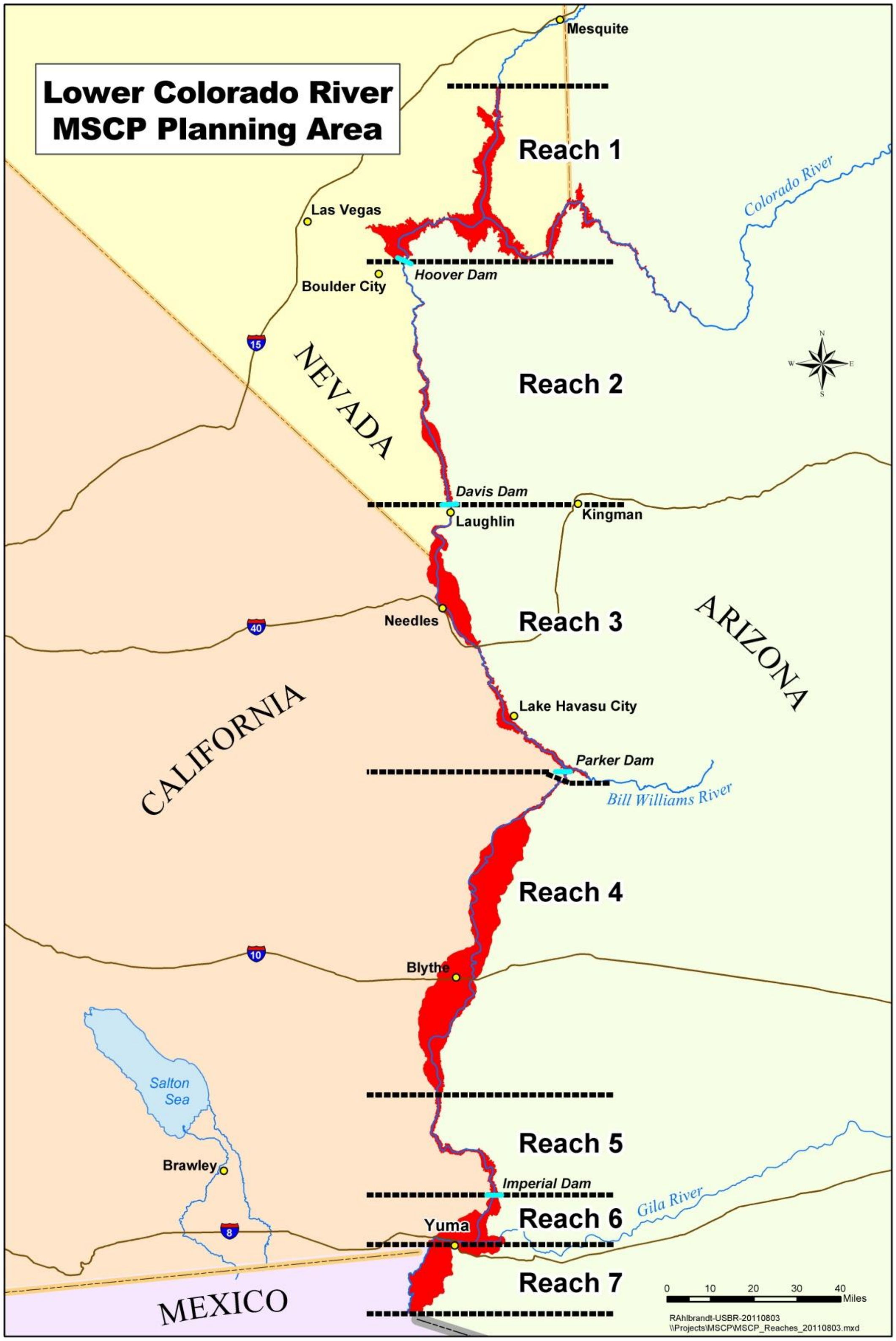

Figure 1.—Location of study area.

Objective 1 – Locate Potential Habitat for *Rana yavapaiensis* and *Bufo alvarius* along the Lower Colorado River

Methods

Potential habitat was first identified through a Geographic Information System (GIS) layer analysis of aerial imagery and remotely sensed data to identify both permanent lentic backwaters and small lotic backwaters along the LCR. Beginning in January 2011, these areas, as well as suitable mid-sized lotic backwaters and dry desert washes identified during field visits or based on historic and anecdotal evidence, were identified and systematically visited by an Arizona Game and Fish Department (AGFD) biologist. Backwaters that were greater than 5 acres in size were omitted due to the high probability of introduced non-native predatory fishes and bullfrogs (*Rana catesbeiana*), which will prey upon and out-compete native anurans. Each site that was visited was ranked based on presence of predators, size, water quality and characteristics, and type of site (lentic, lotic, canal etc.). Sites visited were ranked from one to five, with five being ideal habitat based on the recorded parameters. Locations ranked three or higher were selected as potential locations for further surveys.

Results

Over 1,740 locations were identified through the GIS analysis. With many overlapping areas identified as potential sites, 139 individual locations were visited by AGFD biologists. Locations reviewed were considered promising areas and, in many cases, were a centralized point for a cluster of backwater sites. Of those 139 sites, 69 localities were given a ranking of three or better, with no localities receiving a ranking of five, which indicates ideal habitat. Only localities with a ranking of three or better were visited on subsequent surveys and trapping efforts. The highest concentrations of quality habitat were located on and adjacent to Havasu NWR in Reach 3 (figure 2), Cibola NWR in Reach 4 (figure 3), Imperial NWR in Reach 5, and Mittry Lake in Reach 6 (figure 4). The Bill Williams River NWR returned only a modest number of backwater points likely due to the dynamic flow regime of the river and predominance of lotic habitat. However, we still considered the Bill Williams River and NWR high priority areas based on their intact riverine and riparian system (figure 5). These primary locations and a few isolated sites such as Desilt Wash near Parker, Arizona, the Colorado River Indian Tribe's 'Ahakhav Tribal Preserve, and the Yuma East Wetlands with the confluence of the Gila River were deemed the highest priority for subsequent surveys.

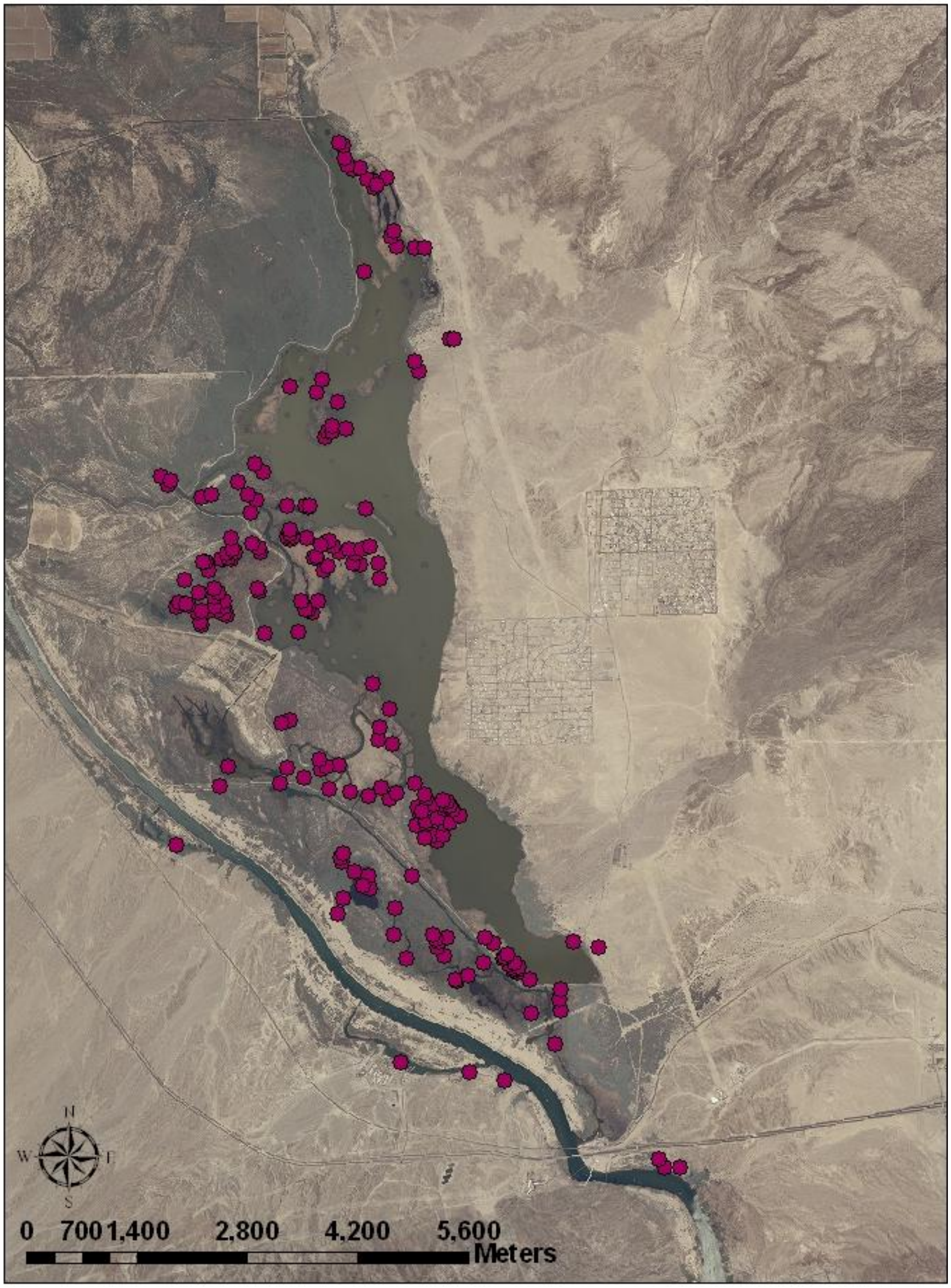

Figure 2.—Havasu NWR.
(Points indicate backwater sites based on GIS analyses.)

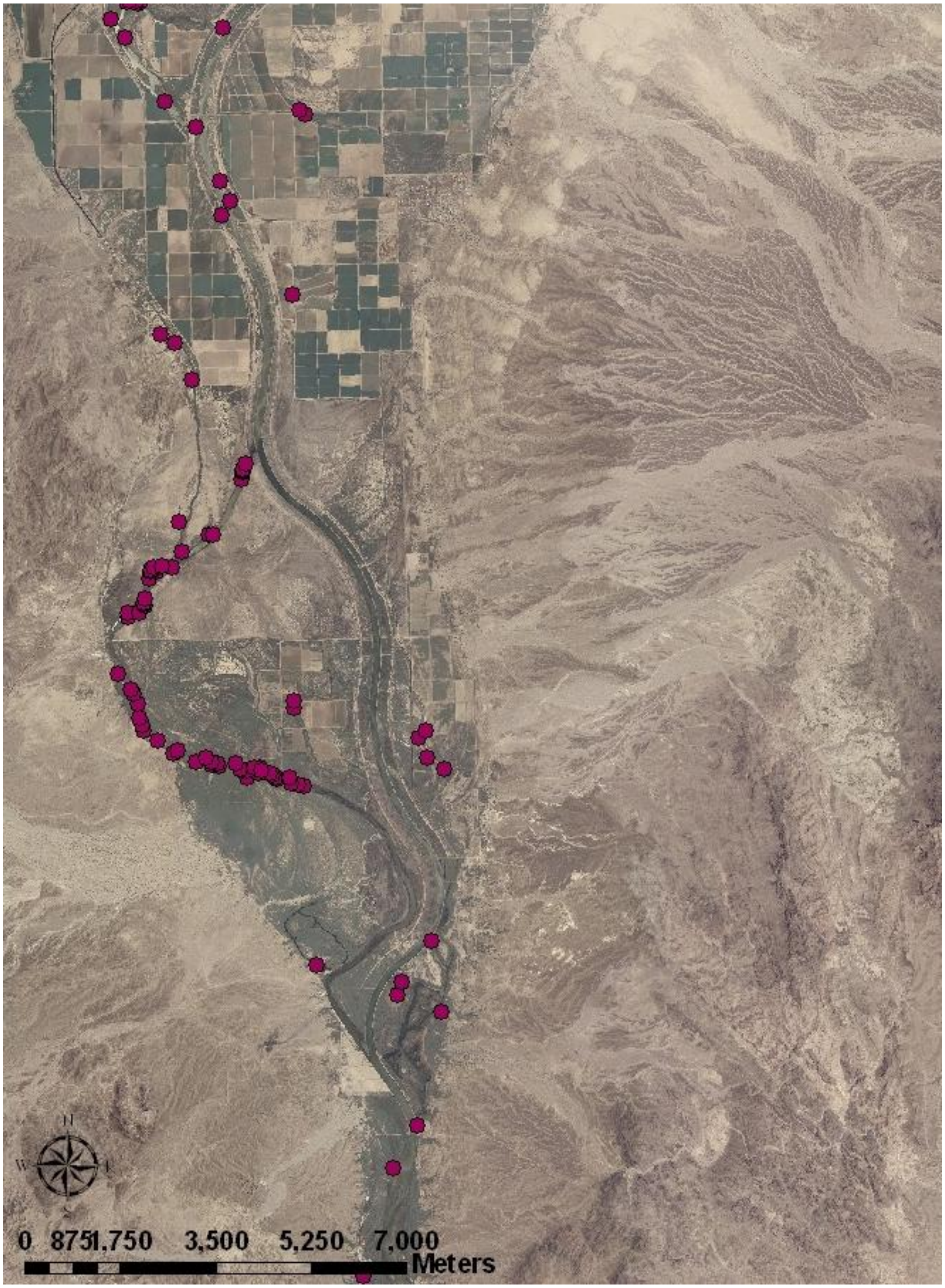

Figure 3.—Cibola NWR.
(Points indicate backwater sites based on GIS analyses.)

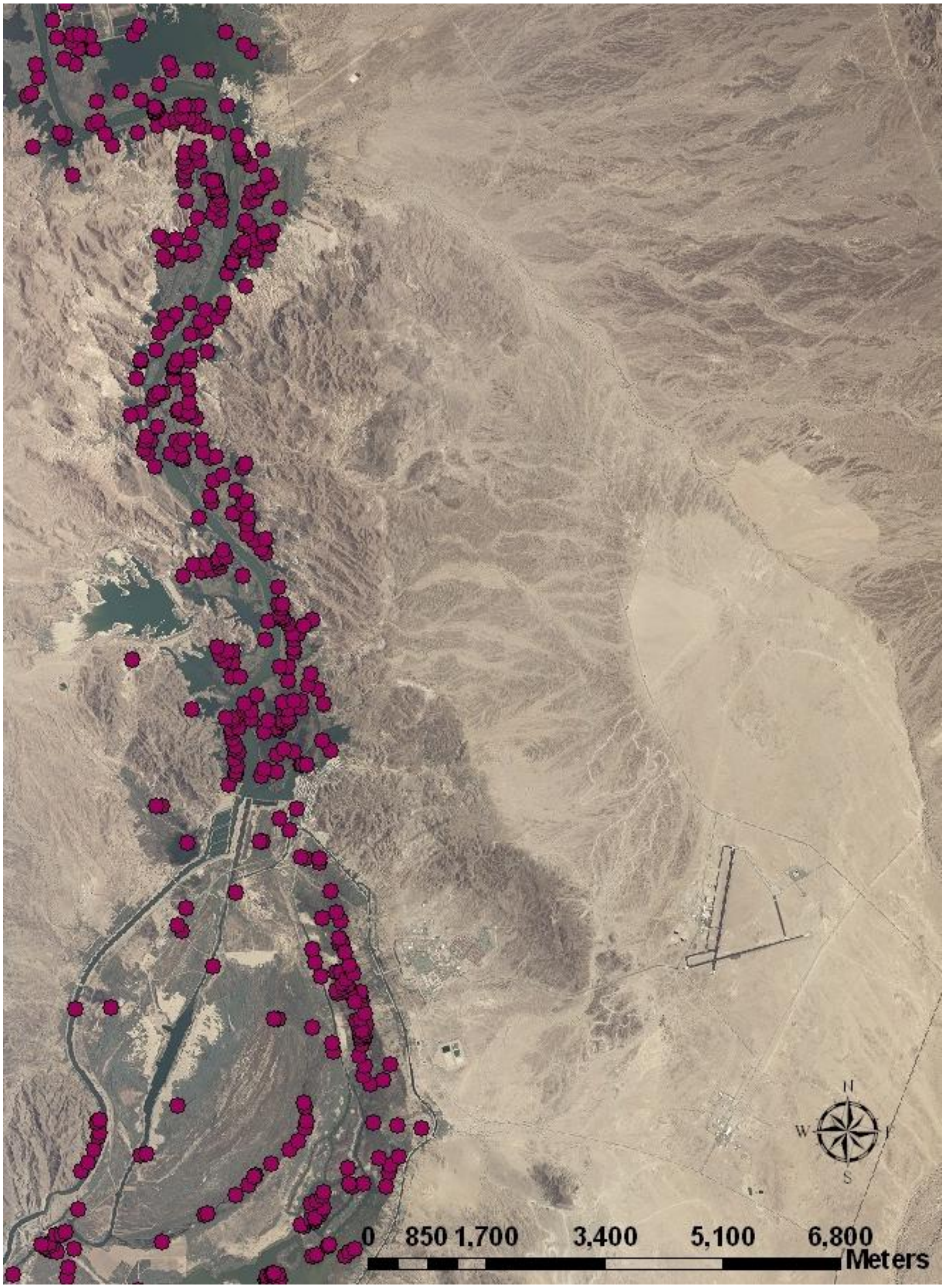

Figure 4.—Imperial NWR and Mittry Lake.
(Points indicate backwater sites based on GIS analyses.)

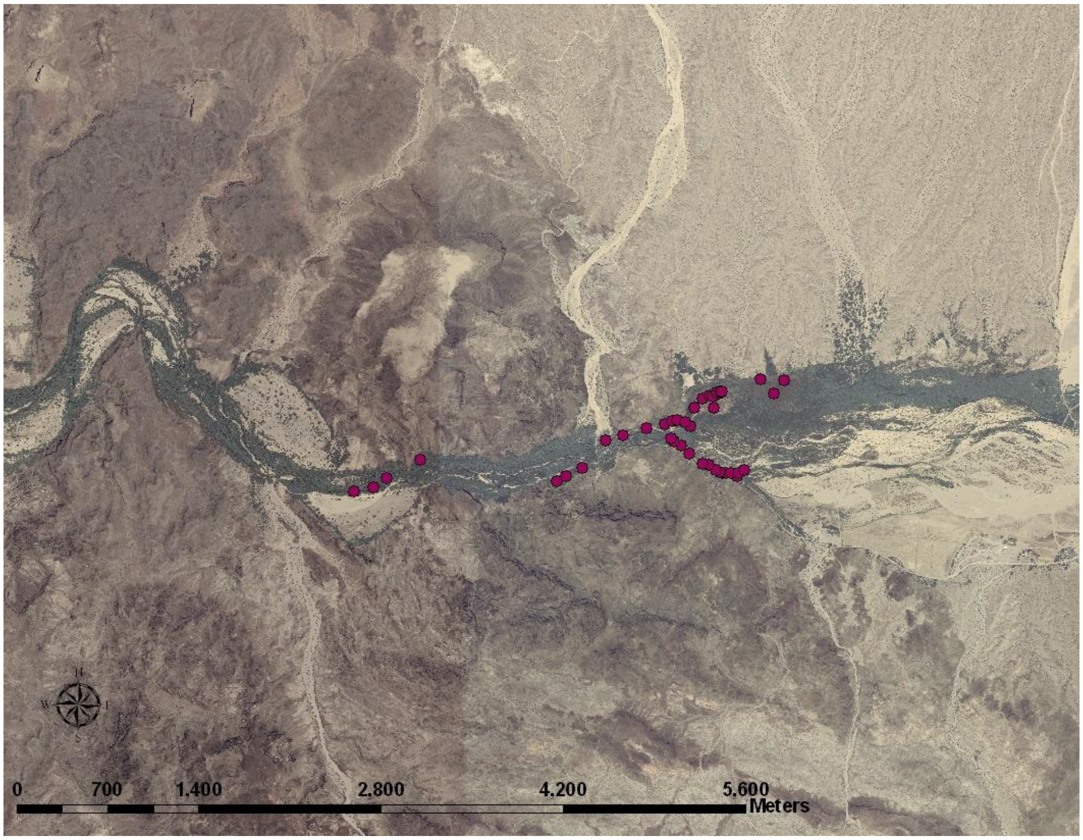

Figure 5.—Bill Williams River and NWR.
(Points indicate backwater sites based on GIS analyses.)

Discussion

Areas including and around the Havasu NWR, the Bill Williams River NWR, the ‘Ahakhav Tribal Preserve, Cibola NWR, Imperial NWR, Mittry Lake, Desilt Wash, and the Yuma East Wetlands and Gila confluence were deemed to be the most likely places for occupancy of *Rana yavapaiensis* within the study area and where search efforts should be concentrated. While there may be some overlap in habitat suitability and habitat use with *Rana yavapaiensis* along the LCR, primarily *Bufo alvarius* will be breeding and active in the rocky desert washes, arroyos, and ephemeral pools holding water during the summer monsoons. This type of habitat was not identified with the GIS techniques utilized for this project. Areas observed during field visits that had potential for harboring toads during the summer monsoon rains and breeding season were noted and recorded. Localities having anecdotal reports of toad presence within the past few years (Planet Ranch, Parker Golf Course, Arizona Highway 1 between Ehrenberg and Poston) were also recorded in preparation for return visits after suitable rainfall.

The highest concentration of highly ranked habitat was along the Bill Williams River and NWR. The Bill Williams River and NWR still contained areas of natural riparian corridor with diverse plant species, a lack of *Rana catesbeiana*, and long stretches of water that have not been overly encroached upon by invasive plant species such as cattail (*Typha* spp.) and non-native salt cedar (*Tamarix* spp.) (figure 6). In general, outside of the Bill Williams River and NWR, most of the habitat along the LCR was very similar, involving monoculture stands of *Typha* spp., *Tamarix* spp., bulrush (*Schoenoplectus* spp.) and common reed (*Phragmites* spp.) (figure 7).

Figure 6.—Example of habitat commonly encountered along the Bill Williams River.

Figure 7.—Example of emergent wetland habitat commonly found along the majority of the LCR.

OBJECTIVE 2 – DETERMINE DISTRIBUTION OF *RANA YAVAPAIENSIS* AND *BUFO ALVARIUS* WITHIN OUR STUDY AREA

Methods

Using those data collected in the inventories of potential *Rana yavapaiensis* and *Bufo alvarius* habitat, sites were selected that were suitable for occupancy surveys. Selection of sites was weighted based upon habitat rankings determined by field visits and the GIS analysis from Objective 1. Sampling began at the permanent lentic and lotic locations in January 2011. On occasions of sufficient summer monsoon, rainfall dry desert washes, arroyos, or other areas identified as potential *Bufo alvarius* habitat were also sampled. Three techniques were utilized when performing occupancy surveys:

Funnel Trap Arrays

Six grids of up to 10 inverted conical wire mesh funnel traps were deployed at suitable potential habitat locations. Individual traps were wired to emergent or bank vegetation and placed along high-traffic corridors for aquatic fauna. Traps were submerged so that the entrance of the funnel was entirely below the water surface, but allowed ample breathing area at the top of the trap for any adult amphibians or other air breathing by-catch (figure 8). Traps were left deployed for a minimum of 24 hours and checked at least once within a 24-hour period. All amphibians and by-catch captured were identified and recorded, including the date, time, and location (Heyer et al. 1994; Olson et al. 1997).

Visual Surveys

Visual surveys were conducted based on techniques outlined by Heyer et al. (1994), but modified to better suit the habitat and subject matter of this study. Survey locations were initially performed in daylight, looking for amphibians floating in the water, basking on the banks, or among the aquatic vegetation. Binoculars were used to scan the banks and shorelines. D-ring dip nets were used to sample the littoral zone for amphibian larvae. When possible, we surveyed along the entire perimeter of the survey site, searching under logs and rocks, as well as in the vegetation watching for adult amphibians to flush. We also used large dip nets to search under ledges and along submergent vegetation for hidden adults. Any amphibians encountered were identified and recorded.

Figure 8.—Funnel trap properly deployed at Havasu NWR.

Nocturnal surveys were also performed at site locations. Beginning approximately 30 minutes after sunset, survey sites were scanned using flashlights, primarily searching for the eye shine of adult amphibians on the bank, but also observing the littoral community for feeding amphibian larvae and breeding adult amphibians.

Nocturnal Audio Surveys

Beginning approximately 30 minutes after sunset, we began listening and recording male amphibian vocalizations at each survey site. Audio survey methodology was based on the U.S. Geological Survey (USGS) North American Amphibian Monitoring Protocol (http://www.pwrc.usgs.gov/naamp/index.cfm). After initially listening for several minutes at a location, using a portable audio system, we played either a *Rana yavapaiensis* or *Bufo alvarius* male advertisement breeding call for a minimum of 30 seconds and then listened for male responses at the survey location. All vocalizing amphibian species were recorded as well as an estimate of numbers of individuals calling and observed. In addition, wind speed, air temperature, water temperature, pH, conductivity, cloud cover, and the presence of non-target noise, all of which may potentially affect amphibian vocalizations and breeding behavior, were recorded. Any target species, or potential target species, was captured for proper identification. Any captured target species were marked by toe clipping and released.

Visual and nocturnal audio surveys were performed at all funnel trap grid locations at least once while traps were deployed.

Results

We deployed traps at 101 different sites, logging approximately 55,276 trap hours, performed approximately 127 hours of nocturnal call back surveys at 216 different locations (figures 9–12), and conducted over 430 hours of visual encounter and dip net surveys. The dominant species observed throughout the study was *Rana catesbeiana*. Other non-target amphibian species observed included *Rana berlandieri*, *Bufo woodhousii*, *Bufo cognatus*, *Bufo punctatus*, *Bufo microscaphus*, *Hyla regilla*, and *Scaphiopus couchii.* Table 1 lists all amphibians and potential predators found at the seven major survey areas. We found no individuals or evidence of *Rana yavapaiensis* at any of the survey site locations or within our funnel trap grids. Two adult male and one adult female *Bufo alvarius* were captured on June 29, 2011, on Planet Ranch. These three individuals were marked as TC1, TC2, and TC3 by removing phalanges from the left front first, second, or third digits, respectively. Additionally, one female and two male *Bufo alvarius* were captured on August 14, 2011, at the same location. These three individuals were marked TC4, TC5, and TC6 by removing phalanges from the right front first, second, or third digits, respectively. Each individual was marked and released successfully. Individuals TC1–3 were re-observed on subsequent trips to this location.

Figure 9.—Havasu NWR.
(Green points indicate funnel trap grid locations with audio and visual surveys, and purple points indicate auditory and visual surveys without funnel traps.)

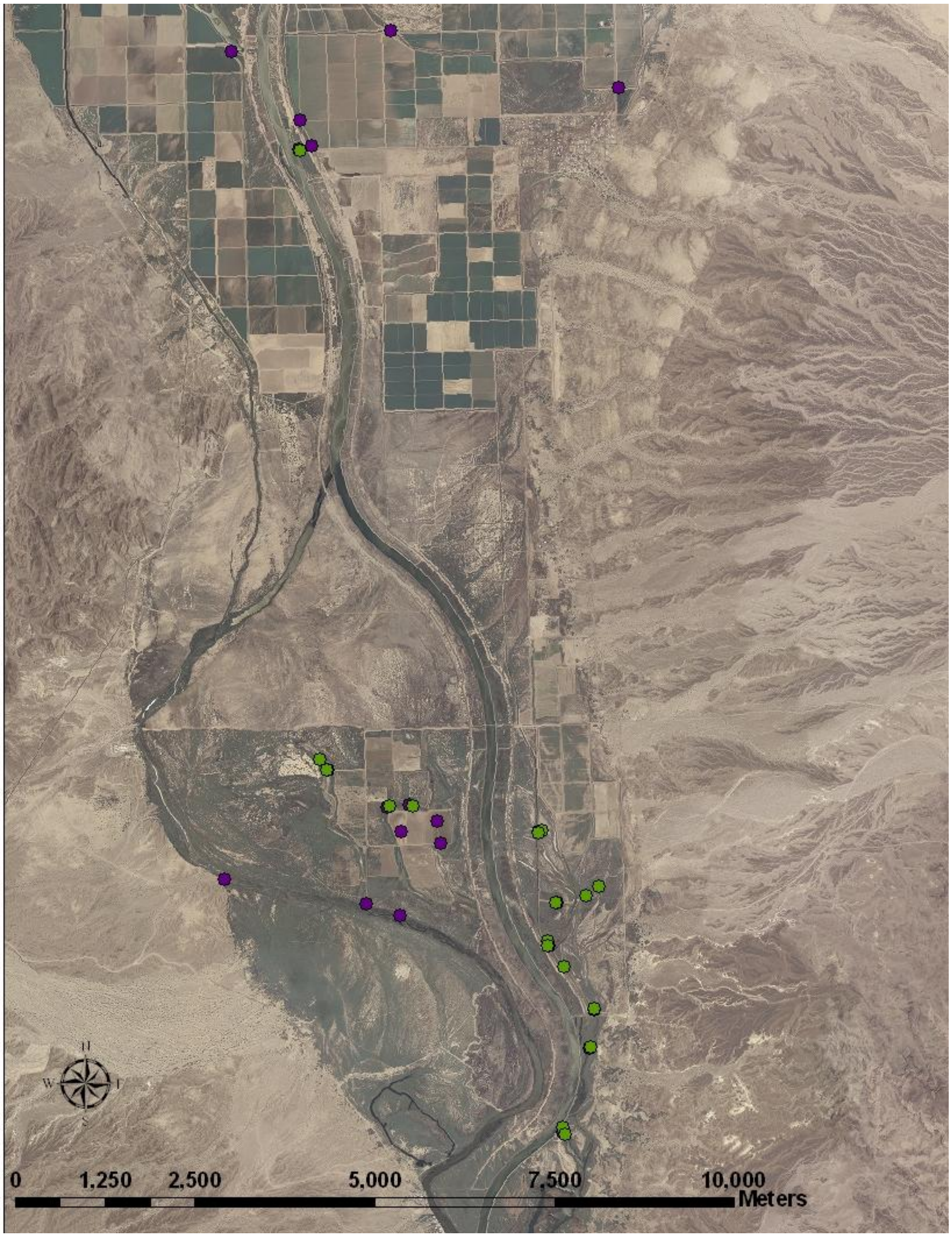

Figure 10.—Cibola NWR.
(Green points indicate funnel trap grid locations with audio and visual surveys, and purple points indicate auditory and visual surveys without funnel traps.)

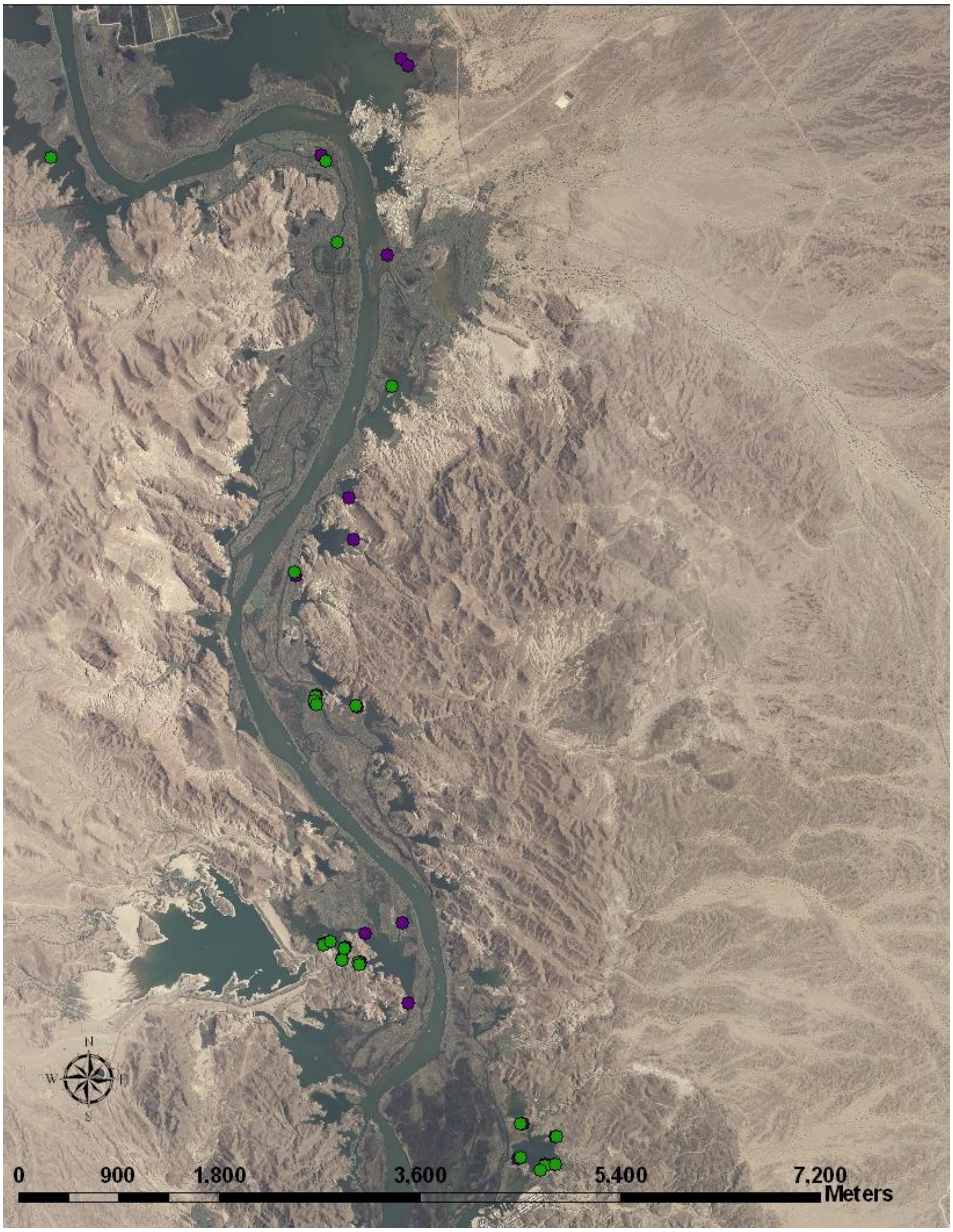

Figure 11.—Imperial NWR and Mittry Lake.
(Green points indicate funnel trap grid locations with audio and visual surveys, and purple points indicate auditory and visual surveys without funnel traps.)

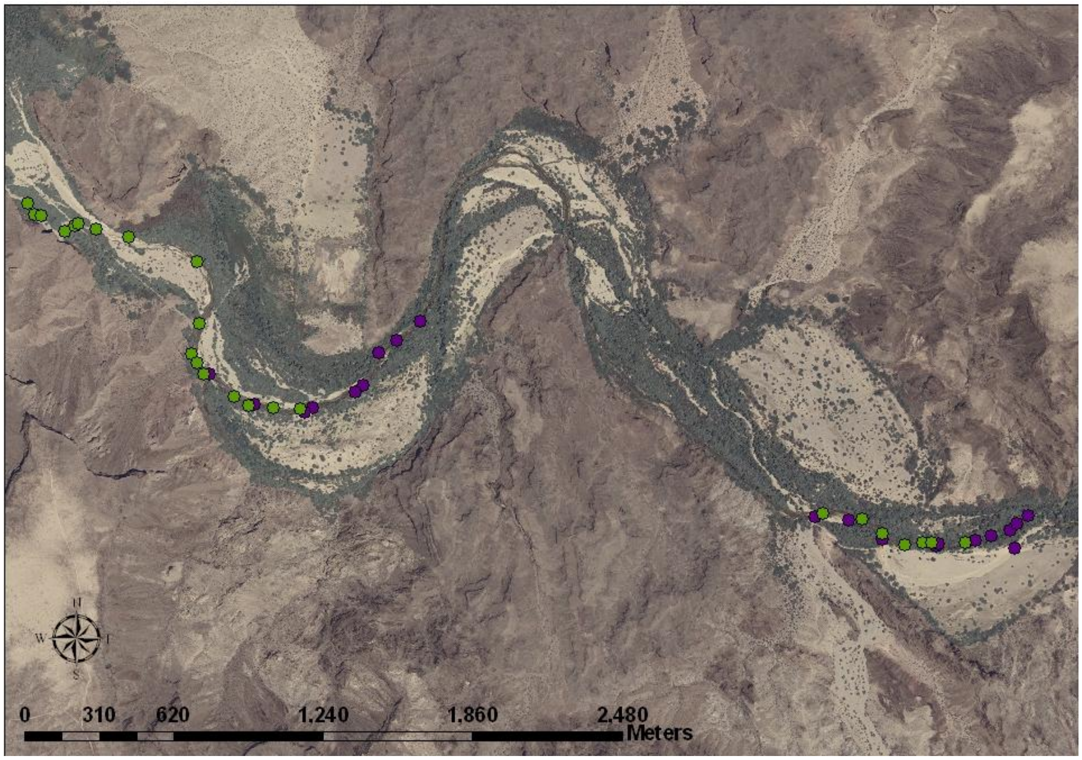

Figure 12.—Bill Williams River.
(Green points indicate funnel trap grid locations with audio and visual surveys, and purple points indicate auditory and visual surveys without funnel traps.)

Table 1.—Summary of findings from funnel trap captures, auditory surveys, and dip net visual encounter surveys
Species codes: BUAL (*Bufo alvarius*), RABE (*Rana berlandieri*), BUWO (*Bufo woodhousii*), BUCO (*Bufo cognatus*), BUPU (*Bufo punctatus*), BUMI (*Bufo microscaphus*), SCCO (*Scaphiopus couchii*), HYRE (*Hyla regilla*), and RACA (*Rana catesbeiana*)[1]

	BUAL	RABE	BUWO	BUCO	BUPU	BUMI	SCCO	HYRE	RACA	Bass	Crawfish
Bill Williams River NWR				X	X	X				X	X
Havasu NWR			X	X				X	X	X	X
Cibola NWR			X	X					X	X	X
‘Ahakhav Tribal Preserve			X	X					X	X	X
Mittry Lake/ Imperial NWR		X							X	X	X
Gila River		X	X						X	X	X
Planet Ranch	X			X	X	X	X				

[1] Appendix A lists all species codes, common and scientific names, and synonyms.

Discussion

While we were successful in finding a small population of *Bufo alvarius*, this site was atypical of the habitat we were generally searching for and would consider ideal for this species. The six individuals were captured in heavily altered habitat adjacent to permanent manmade buildings and a concrete swimming pool. There is a regular source of water from a sprinkler system as well as grey water runoff from the structures creating a small ephemeral pool (figure 13). However, there did seem to be breeding activity within this site (figure 14), and an abundance of *Bufo punctatus*, *Bufo microscaphus*, and *Bufo cognatus* sharing the surrounding habitat suggests conditions at this location are favorable for bufonids. While the study area did receive some rainfall during the summer field season, there was rarely, if ever, sufficient rainfall to induce breeding or even foraging behavior in areas that looked suitable for *Bufo alvarius.* In other parts of *Bufo alvarius'* range, it has been reported to only breed 2 out of 6 years due to inadequate rainfall (Sullivan and Fernandez 1999). Therefore, it is difficult to make any assumptions regarding the range and density of *Bufo alvarius* within our study area at this time.

Figure 13.—Sample of habitat located on Planet Ranch near the location where all six marked *Bufo alvarius* were captured.

Figure 14.—A small ephemeral pool with tadpoles on Planet Ranch adjacent to the location where all six *Bufo alvarius* were marked.

There were no *Rana yavapaiensis* adults observed or heard during any of our surveys. Moreover, we did not capture any *Rana yavapaiensis* larvae in the funnel trap grids or while dip netting. For the large majority of our study area, the habitat is just not favorable for this species. Even areas that were given a habitat ranking of three and above should be considered marginal at best for the bulk of the study area. Conditions along most of the main channel of the LCR are overgrown with invasive plant species and have high densities of non-native predators including *Rana catesbeiana,* various predatory fishes, and crawfish. At sites near the Gila confluence and Mittry Lake, there is also a population of introduced *Rana berlandieri,* which may compete with native ranid species (Platz et al. 1990; Rorabaugh et al. 2002). Before this study, *Rana berlandieri* had not been observed north of Imperial Dam along the LCR. We did, however, observe an individual male *Rana berlandieri* well north of Imperial Dam, suggesting they are still colonizing habitat upstream along the LCR. We did not observe *Rana berlandieri* within the parameters of Imperial NWR.

The only exception to this monoculture of poor habitat is within the Bill Williams River NWR and along the Bill Williams River. While the river still supports predatory fish and crawfish, we found no evidence of *Rana catesbeiana*. In addition, the vegetation and riparian corridor is still intact in some places, making it the most favorable habitat within the study area. The sites located within this system did sustain native species of amphibians, including *Bufo microscaphus,* which in riverine systems is usually associated with a healthy riparian corridor similar to *Rana yavapaiensis* (Brian Sullivan, personal communication). Unfortunately, we did not encounter any target species on the Bill Williams River NWR While there have been reports of observations of the species as recent as 2010, there does not appear to be a stable breeding population, and these observed individuals are perhaps remnants or dispersers from more robust populations further upstream of the study area. That being said, the bulk of the surveys during this field season were conducted after the prime breeding time period for *Rana yavapaiensis*. Future surveys should be conducted primarily in the spring to ensure the highest probability of detecting the species. In addition, high water flow from upstream reservoirs could have also had an impact on the current population of the species. *Rana yavapaiensis* breeding phenology is adapted to periods of drought and flooding more so then *Rana catesbeiana* (Sartorius and Rosen 2000), and this adds to the quality of habitat along the Bill Williams River. A dynamic flow regime along the Bill Williams River may contribute to keeping the area inhospitable to *Rana catesbeiana* as well as larger populations of predatory fish. However, extreme high water events, such as what occurred in the spring of 2010, could have displaced the species into less favorable habitat (figure 15). This displacement could increase mortality and create a temporary population sink until dispersers arrive from more stable upstream populations.

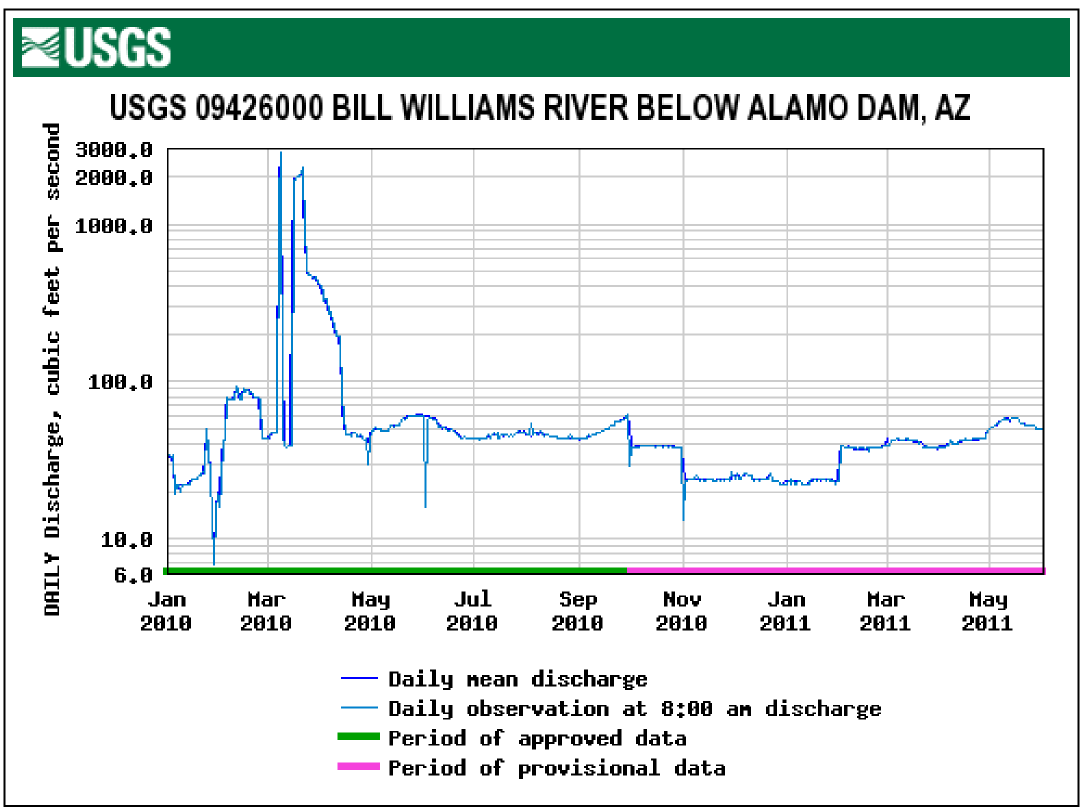

Figure 15.—Water discharge on the Bill Williams River in cubic feet per second from January 2010 until June 2011 (USGS Surface-Water Daily Data for Arizona).

OBJECTIVE 3 – COLLECT GENETIC SAMPLES FROM *RANA YAVAPAIENSIS* AND *BUFO ALVARIUS*

Methods

Tissues were collected from captured adult individuals using sterilized scissors. We followed the AGFD's non-destructive protocol for collecting genetic samples from amphibians, which incorporates safeguards to prevent the transmission of potentially deadly pathogens. The anuran was first rinsed with fresh water to remove any mud or debris. Using sterilized scissors, toes were clipped between the first and second phalange and collected in 1.5-milliliter vials with a 95-percent ethanol solution. The wounds were disinfected, and all animals were successfully released after being monitored for several minutes. All equipment was sterilized after each use.

Results

We successfully collected tissue samples from all six captured *Bufo alvarius* adults. Samples were collected from a single digit on the front limbs corresponding with the individual's identification number (i.e., TC1). Each adult was monitored and released the same night. Three of the six individuals were subsequently seen and the wounds checked at later dates.

OBJECTIVE 4 – DETERMINE HABITAT SELECTION FOR *RANA YAVAPAIENSIS* AND *BUFO ALVARIUS* ALONG THE LOWER COLORADO RIVER

Methods

Within 3 days of encountering a target species, we returned to the site to quantify the habitat within a 10-meter radius and an equal number of randomly selected non-sites where target species were not initially encountered. For aquatic habitats, minimum and maximum water depth, substrate type (e.g., gravel, sand), water temperature, pH, turbidity, and stream discharge (lotic habitats only) within the 10-meter radius habitat plot were recorded. We measured vegetation composition and density using the line-intercept method (Canfield 1941). Terrestrial plants were categorized as grasses, forbs, shrubs, or trees, while aquatic plants were categorized as trees, emergent vegetation, submergent vegetation, or floating vegetation. We recorded any coarse woody debris that was ≥ 3 meters in length and ≥ 10 centimeters in diameter. We also recorded the distance to the nearest water source and the type of that water source (e.g., pond, stream).

Results

We identified only one habitat location for either of the two target species. This location on Planet Ranch was highly impacted by human activities and atypical of much of the habitat found within the study area. The vegetation at the site consisted of grass with patches of bare soil. There was not a natural source of water nearby, only runoff from various human activities (sprinkler head). The non-site also consisted of bare soil and grass without a prominent natural water source nearby.

Future Plans

Primarily spring surveys and funnel trap deployment should continue along the Bill Williams River in the spring of 2012. While this area was extensively surveyed during the 2011 field season, very few surveys were conducted during the height of *Rana yavapaiensis* breeding season (Sartorius and Rosen 2000). The Bill Williams River is without a doubt the most suitable habitat for *Rana yavapaiensis* within our study area, and with sightings of the species in the last couple of years, this is an area that still warrants some attention. In addition, since logistical and resource constraints limited surveys in and around Topock Gorge during the 2011 field season, this area should also be a focus of 2012 surveys and funnel trap deployment. We will also continue to try to gain access to the Colorado River Indian Tribe's Reservation to evaluate the habitat and potentially conduct surveys within its boundaries.

One area of analysis that has not been considered to this point in the project is historic localities from museum specimens. Museums and collections at various universities and institutions will be consulted to identify locations where we can be certain populations of the target species did occur at one point. These locations will also be considered for future survey and funnel trap deployment. We will continue to monitor monsoon rainfall within the area in preparation for potential *Bufo alvarius* breeding events at previously and newly identified sites. Additional GIS and map analysis for any isolated springs and streams not surveyed in 2011 should be considered a special priority since, with increasing habitat alteration, these areas may be the last refuge for native Ranids (Degenhardt et al. 1996; Sredl 2005). We will also further consult with AGFD biologists and other interested parties to try to identify potential habitat locations that were overlooked during the first field season. Should a breeding population of *Rana yavapaiensis* be observed anywhere within the study area, I would suggest the deployment of auditory recording devices designed to record vocalizations throughout the night. These devices have been used successfully to determine species composition and phenology and are excellent passive monitoring tools enabling data collection year round (Saenz et al. 2006). I would also encourage an analysis of habitat use through radio telemetry techniques should a stable population of either target species be encountered.

We would like to visit similar occupied habitat outside of the study area in an effort to quantify critical habitat and habitat use for each species. While habitat analysis for *Rana yavapaiensis* has been studied in the mountain canyons of southeastern Arizona, there is very little research regarding the species in riverine habitat or elsewhere throughout its range (Wallace et al. 2010). By gaining a better understanding of what habitat variables are required by each species and how they are using these variables, we can better identify sites that are highly favorable for the presence and persistence of these species. Critical habitat characteristics and habitat use data will also be valuable in the development of any restoration program designed with these species in mind.

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APPENDIX A

List of Species Code and Scientific Name for Each Amphibian Species Identified in This Report Along With Accepted Common Name and Current Taxonomic Synonym According to the Center for North American Herpetology

Species code	Scientific name	Common name	Synonym
BUAL	*Bufo alvarius*	Colorado River toad	*Incilius alvarius*
RAYA	*Rana yavapaiensis*	Lowland leopard frog	*Lithobates yavapaiensis*
RABE	*Rana berlandieri*	Rio Grande leopard frog	*Lithobates berlandieri*
RACA	*Rana catesbeiana*	American bullfrog	*Lithobates catesbeianus*
BUMI	*Bufo microscahpus*	Arizona toad	*Anaxyrus microscaphus*
BUPU	*Bufo punctatus*	Red spotted toad	*Anaxyrus punctatus*
BUCO	*Bufo cognatus*	Great Plains toad	*Anaxyrus cognatus*
BUWO	*Bufo woodhousii*	Woodhouse's toad	*Anaxyrus woodhousii*
SCCO	*Scaphiopus couchi*	Couch’s spadefoot	NA
HYRE	*Hyla regilla*	Pacific treefrog	*Pseudacris regilla*