Horseshoe and Bartlett Reservoirs Habitat Conservation Plan
ANNUAL REPORT

2012

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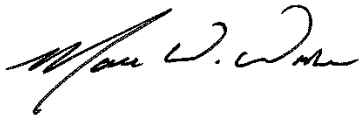
[1]Locations of endangered species are sensitive data considered confidential by U.S. Fish and Wildlife Service and have been removed from this report.

CERTIFICATION

Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of this report, the information submitted is true, accurate, and complete.



January 24, 2013

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Date

1. Introduction

On May 30, 2008, the U.S. Fish and Wildlife Service (FWS) issued an Incidental Take Permit (ITP) pursuant to Section 10(a)(1)(B) of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, to Salt River Project (SRP) for southwestern willow flycatcher *(Empidonax traillii extimus)* ("flycatcher"), yellow-billed cuckoo *(Coccyzus americanus)* ("cuckoo"), bald eagle *(Haliaeetus leucocephalus)*, razorback sucker (*Xyrauchen texanus*), Colorado pikeminnow (*Ptychocheilus lucius*), Gila topminnow (*Peociliopsis occidentalis occidentalis*), spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), roundtail chub (*Gila robusta*), longfin dace (*Agosia chrysogaster*), Sonora sucker (*Catostomus insignis*), desert sucker (*Catostomus clarki*), speckled dace (*Rhinichthys osculus*), lowland leopard frog (*Lithobates yavapaiensis*), Northern Mexican garter snake (*Thamnophis eques megalops*), and narrow-headed garter snake (*Thamnophis rufipunctatus*). The activity covered by the ITP is the continued operation by SRP of Horseshoe and Bartlett dams and reservoirs. The ITP is conditioned upon SRP's implementation of the Horseshoe and Bartlett Reservoirs Habitat Conservation Plan ("H-B HCP") (Salt River Project 2008).

The H-B HCP provides measures to minimize and mitigate incidental take of the 16 species listed above "to the maximum extent practicable and ensures that incidental take will not appreciably reduce the likelihood of the survival and recovery of these species in the wild" (FWS 2008). Flycatcher and cuckoo (covered bird) mitigation efforts include operation of Horseshoe Reservoir to support tall dense vegetation at the upper end of the reservoir, and off-site acquisition and management of suitable nesting habitat. Minimization and mitigation efforts for covered native fish, frog, and garter snake (aquatic species) includes operation of Horseshoe Reservoir to minimize non-native fish production, stocking of covered native fish, and supporting stream and water supply protection projects in the Verde River watershed.

2. Annual Reporting Requirements

Obligation: SRP is required to submit an annual report to FWS, City of Phoenix, Arizona Game and Fish Department (AGFD), and U.S. Forest Service (USFS) describing all H-B HCP activities occurring during the past year. A draft report must be sent to FWS prior to the annual meeting in October/November of each year. The report is to be finalized by February 1st of the following year.

Actions: SRP submits this report to the FWS, City of Phoenix, AGFD, and USFS to fulfill the annual reporting requirement. The report covers all activities relating to the H-B HCP from November 1, 2011 through October 31, 2012, including a summary of reservoir operations, management activities, monitoring results, status reports and planned future activities.

3. Horseshoe Lake Operation ITP Compliance

a. Horseshoe and Bartlett Operation Summary

Obligation: SRP is required in this annual report to provide a summary of reservoir operations.

Action: Below is a summary of reservoir operations from SRP hydrologists of the 2012 water year (October 2011 – September 2012).

Summary: The strongest weather indicator, El Niño Southern Oscillation (ENSO), remained in La Niña conditions for a second consecutive year. The La Niña (cooler than normal sea surface temperatures along the equator in the Eastern Pacific Ocean) had the greatest influence on Salt and Verde reservoir operations this past water year. These conditions brought another dry winter to the Salt and Verde watershed. Since 1950, there have been nineteen La Niña winters. The majority of those nineteen winters have been dry with six being normal and four being above normal on the SRP watershed. Forecasts from the National Weather Service and the Climate Prediction Center, which called for a greater likelihood in 2012 of a dry winter and early summer, came to fruition. The runoff this winter was only 37% of median. The precipitation this monsoon season on the Salt and Verde watersheds was 109% of normal but runoff volumes from the monsoon season typically do not impact operations. Overall, the watershed received an average of 14.72 inches (81 % of normal) during Water Year 2012.

Winter Precipitation: La Niña conditions (cooler than normal sea surface temperatures along the equator in the Eastern Pacific Ocean) returned for a second winter after fading away during the early summer of 2011. Historically, the cooler equatorial waters and associated atmospheric response lead to dry winters in Arizona. The Water Year 2011 La Niña began in June 2010 and reached moderate to strong intensity during the Water Year 2011 winter before fading during May 2011. Often after a strong La Niña, the ocean surface will cool again after a short summer break and La Niña will return for a second winter. This time La Niña began again in August 2011 and lasted into March 2012. Its intensity was less this time (generally weak) during the Water Year 2012 winter.

A dry fall preceded a very wet December that was in turn followed by an extremely dry January which is more typical of a La Niña winter. The combined December-January precipitation resulted in a slightly dry (80% of normal) early winter followed by sparse late winter precipitation (February-March). February was very dry (22% of normal) while March was wetter yet dry (63% of normal). Winter precipitation totaled 4.75 inches on the Salt and Verde Watershed which is 62% of normal.

Summer Precipitation: Spring is historically a dry season as the winter storm track retreats to the north and is replaced by a dry and hot sub-tropical high-pressure system aloft. This high will eventually become the “monsoon” high-pressure cell that often sits near Four Corners and allows moist tropical air to flow into Arizona from the south primarily during July and August. Spring 2012 (April –June) was very dry as only 0.60 inches or 39% of normal precipitation fell on the watershed.

Fortunately, the moist monsoon wind circulation began to set up in late June and the first rains of the 2012 monsoon fell just before the Fourth of July. Watershed rainfall was ample with an inch more than normal falling in July and slightly above normal rainfall in August. Rainfall was only 62% of normal in September as the monsoon circulation faded at mid-month. Overall the monsoon season (July through September) rainfall was 6.91 inches which was 109% of normal.

Water Year 2012: In spite of a wet November and December, a dry January through March kept the first half of water year 2012 dry; about 62% of normal

precipitation fell. A dry spring (39% of normal precipitation) added to the water year deficit that could not be offset by the wet summer (109% of normal rainfall). In all, water year 2012 precipitation of 14.92 inches was 81% of normal. This is slightly more than the 13.91 inches that fell during water year 2011 but reflects the similarity in La Niña-influenced weather patterns during both water years (Figure 1).

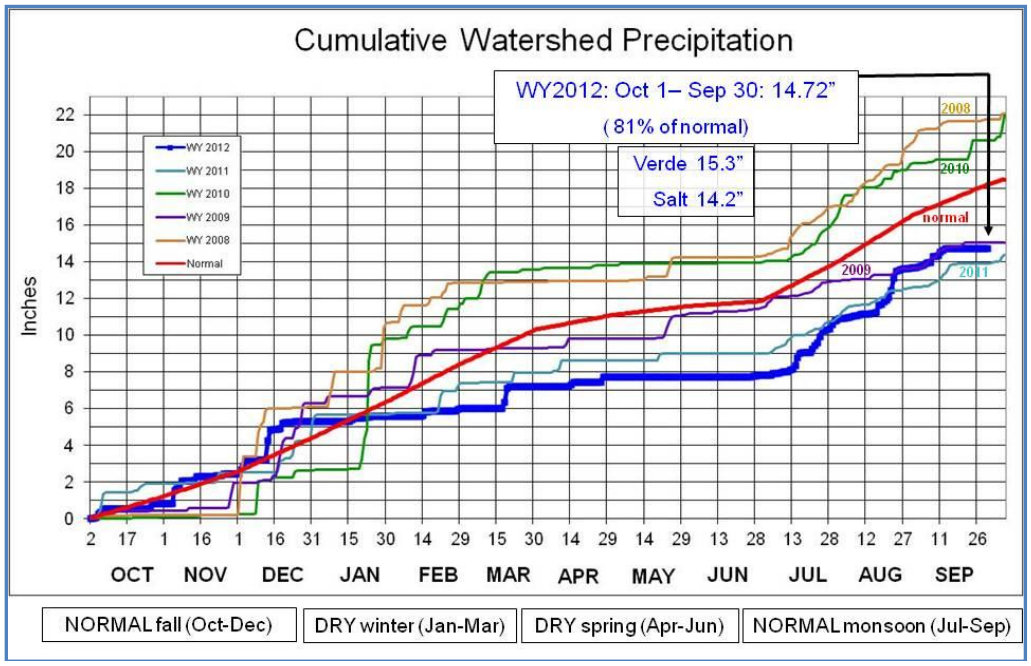


Figure 1. Water Year Precipitation for 2011-2012 for the Salt-Verde Watershed.

Reservoir Status: The reservoir system was 68% of capacity heading into water year 2012 due to well below median runoff from the 2011 winter season and below normal precipitation from the 2011 monsoon season. The winter season began favorably with November and December precipitation being 150% and 180% of normal respectively. However, the wet November and December were an anomaly given the moderate La Niña. Runoff this winter (January-May) was approximately 196,000 acre-feet which is 37% of median and ranked as the 16th driest winter on record. Runoff from the monsoon (July-September) produced about 70,500 acre feet. Total runoff for water year 2012 was approximately 367,000 acre-feet (Figure 2). Total storage decreased from 68% capacity to 52% capacity during water year 2012.

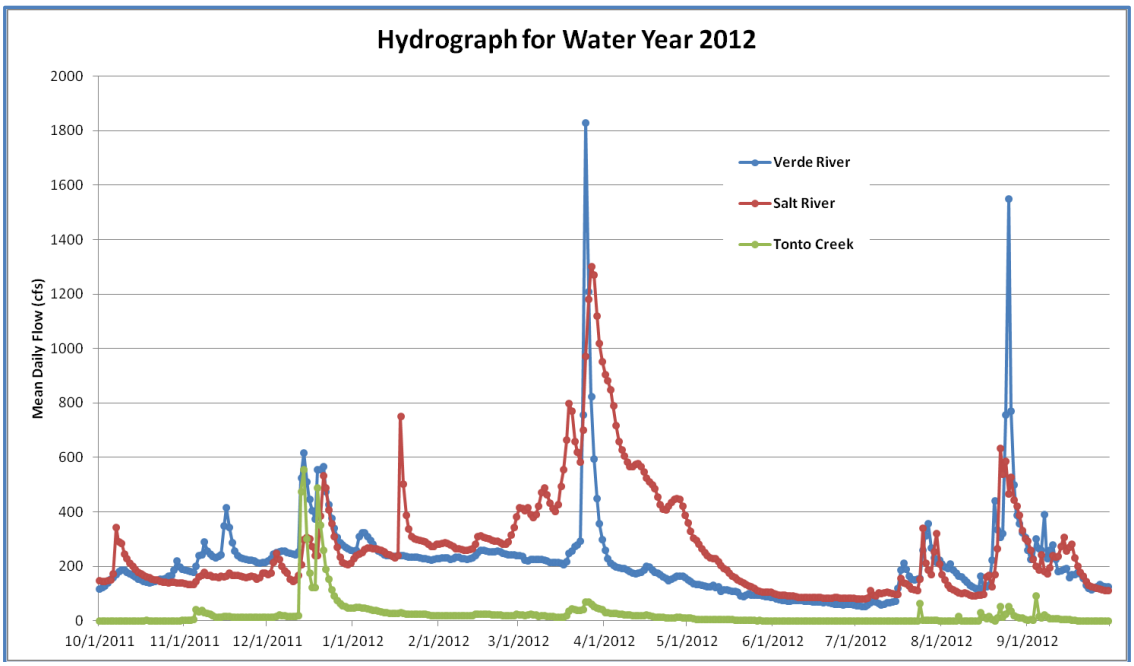


Figure 2. Data from USGS and are preliminary

Verde Operations: The lack of winter runoff had the most influence on operations at Horseshoe. Typical operations call for the water order to be switched from the Verde system to the Salt system in May leaving Bartlett release at minimum. Water stored behind Horseshoe Dam is also typically moved as soon as possible downstream to Bartlett Reservoir to reduce the amount of loss from seepage and evaporation, and meet H-B HCP objectives. The water order may be switched sooner depending on the winter runoff which was the case this year. The dry watershed conditions and bleak winter runoff forecasts added to the certainty of a meager runoff season on the Verde watershed. In response, the transition from the Verde system to the Salt system began on February 20, 2012. The winter runoff produced approximately 77,000 acre feet which is 40% of median. The peak mean daily flow into Horseshoe Reservoir was only 1,830 cubic feet per second (cfs) therefore inflows were easily passed downstream to Bartlett Reservoir with very little volume being stored leaving Horseshoe Reservoir essentially empty for Water Year 2012. The lake levels for Horseshoe and Bartlett reservoirs are shown below (Figures 3 and 4).

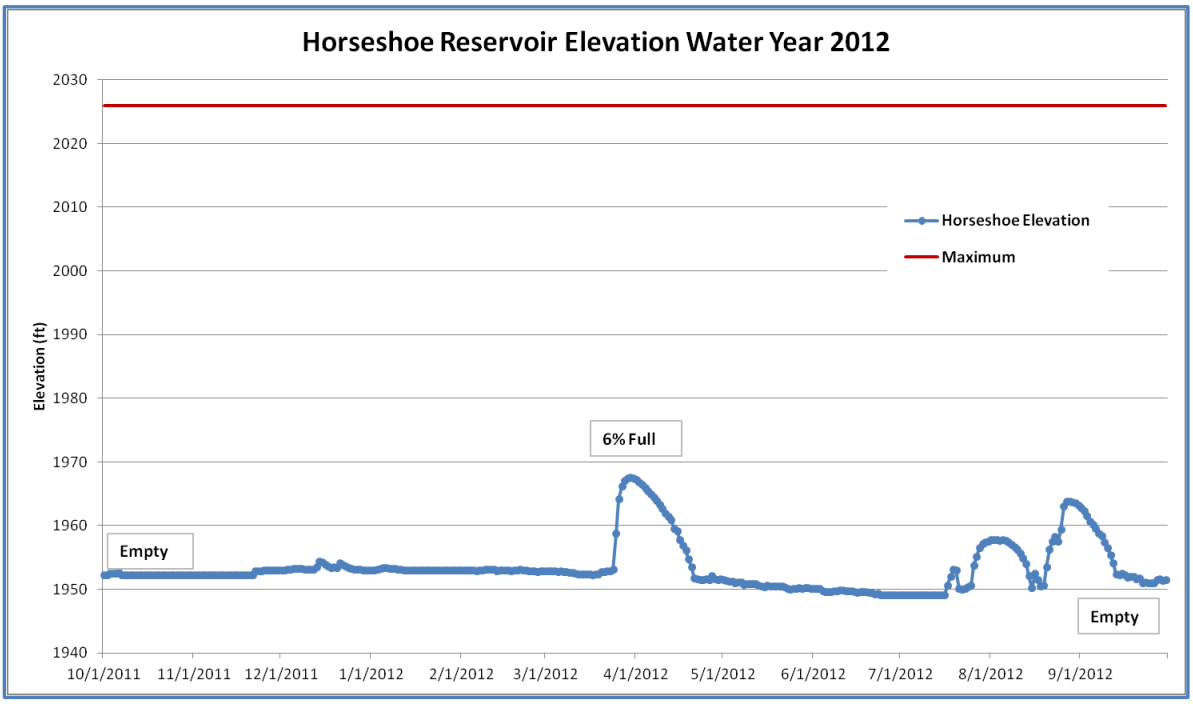


Figure 3. Horseshoe Reservoir Elevations

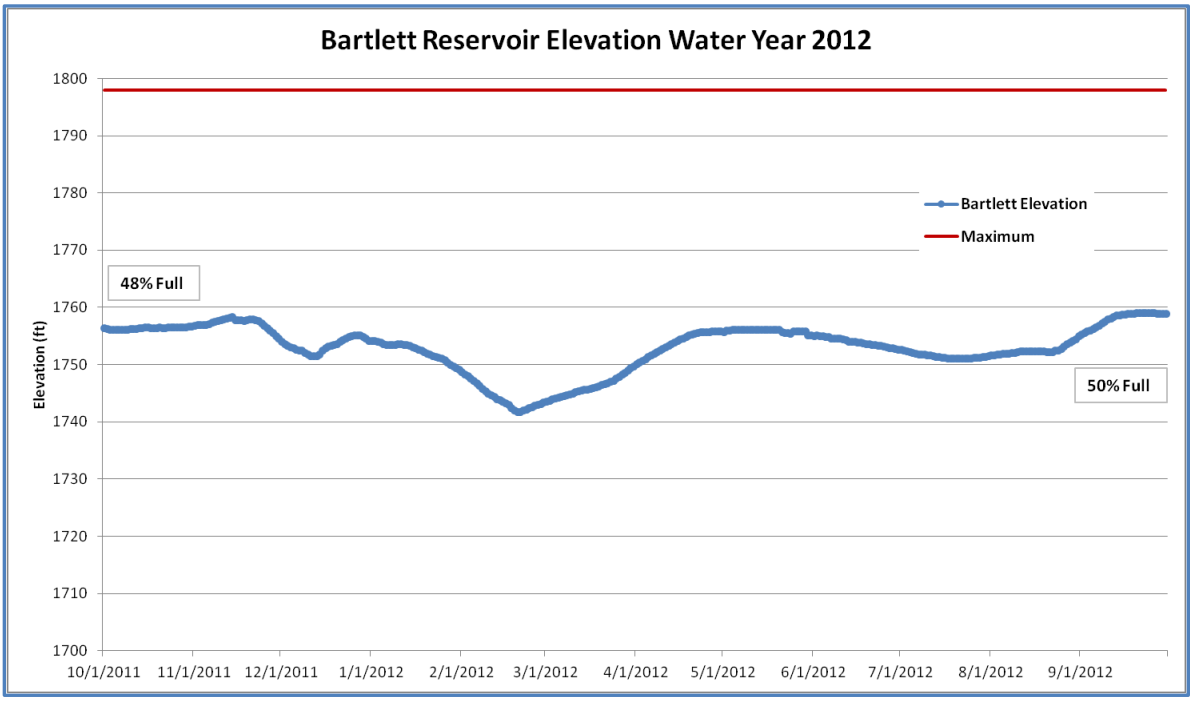


Figure 4. Bartlett Reservoir Elevations

b. Flycatcher and Cuckoo Operation Objective

Obligation: SRP will manage water levels at Horseshoe, conditional on other operation goals, to make riparian habitat available earlier in the nesting season and to maintain riparian vegetation at upper end of the reservoir. After two successive years of low water levels due to drought, Horseshoe will be filled ahead of Bartlett, if feasible, to provide water to tall dense vegetation at upper end of Horseshoe.

Action: Horseshoe storage reached a maximum of 6% full (elevation 1968') the first week of April and then rapidly dropped to <1% of storage until the first week of September in response to monsoon rains.

2013 Action: Due to low storage levels of <50% in 2011 and 6% in 2012, SRP would, if feasible, fill Horseshoe prior to Bartlett to benefit flycatcher habitat in the upper end of the reservoir in 2013.

c. Covered Aquatic Species Operation Objective

Obligation: SRP will manage water levels at Horseshoe, conditional on other operation goals, to minimize the reproduction, recruitment, and survival of nonnative fish by rapidly drawing down the reservoir and minimizing carry-over storage. In years when the reservoir is held high for flycatchers, this will provide opportunities for razorback sucker reproduction and recruitment.

Action: As explained in Sections 3.a. and 3.b. above Horseshoe reservoir remained essentially empty though October 31, 2012.

2012 Action: Due to low storage levels in 2011 and 2012, the reservoir may be held higher in the spring of 2013, if feasible, since there has been two successive years of low water.

d. Covered Bird Monitoring

i. Vegetation Monitoring

Obligation: SRP will use vegetation monitoring at Horseshoe to identify trends in the amount and height of tall dense vegetation to assist in the evaluation of whether adaptive management thresholds or ITP limits may be exceeded. Vegetation will be monitored once every three years.

Action: We estimate that of the 82 acres of potentially suitable flycatcher breeding habitat (GIS model classes 3-5) that occurred in the reservoir in 2011, 0 acres would have been unavailable on May 1, 2012 (Table 1). The average amount of potentially suitable habitat that may have been unavailable at the beginning of the 2009-2012 breeding seasons was 32 acres, which is below the 200 acre average long-term permit threshold.

Because the methods to map and forecast breeding habitat has not been finalized, we continued to estimate the amount of potential breeding habitat in 2012 that may be unavailable in 2013. For the first time, LIDAR (Light Detection

and Ranging) data has been integrated with the GIS breeding habitat model (Hatten and Paradzick 2003) results. The LIDAR flight in January 2012 introduces an alternative method to delineate and forecast suitable breeding habitat within Horseshoe Reservoir. The data provided via LIDAR was used to generate a CHM (Canopy Height Model), where the location of tree canopy heights within a modeled "cell" below the threshold of 6 meters were removed post GIS breeding habitat modeling. Due to Landsat 5's catastrophic failure in November of 2011, scenes for a 2012 NDVI (Normalized Difference Vegetation Index) were unobtainable. Landsat 7 could not provide accurate enough images for analysis with severe gaps in the data within the Horseshoe Reservoir area. Therefore, the original model results were used from June 2011 in combination with the new LIDAR application to develop the new 2012 flycatcher breeding habitat analysis. We estimated that there was approximately 76 acres of higher-probability (Classes 3 – 5) breeding habitat within the reservoir in 2012 (Figure 5). For 2013, assuming the reservoir is at full pool on May 1, approximately 54 acres of potentially suitable habitat (classes 3-5) could be unavailable at or below elevation 2015'[1], and approximately 23 acres of potentially suitable habitat is located between elevations 2015' and 2026' and would be available as breeding habitat.

[1] Elevation 2015' was used instead of 2010' as a conservative estimate for inundation impacts based on analysis and assumptions outlined in the H – B HCP.

Table 1. Acres of occupied and predicted flycatcher habitat based on GIS breeding habitat model in Horseshoe Reservoir, 2008-2013

		Occupied Habitat (acres)		Predicted Habitat Probability class 3-5 (acres)	
Year	May 1 Reservoir Elevation	Occupied Habitat[1]	Occupied Habitat Unavailable May 1	Total within Reservoir	Estimated Habitat Unavailable May 1[3]
2008	-	52	-	95	-
2009	2000	-	0	141	42
2010	2026	-	52	28	87
2011	1981	80	0 [2]	82	0
2012	1950	-	0	76	0
Annual Avg.	-	-	-	84	32
2013 predicted[4]					54

[1]Flycatcher surveys preformed every three years within the reservoir (see Section 3.d.ii).
[2]The lowest elevation of occupied habitat in 2008 (the most recent year occupancy data was available prior to May 1, 2011) was 1990 ft. Water level on May 1, 2011 was 1981 ft. Therefore, no occupied habitat was unavailable (see assumptions outlined in the H-B HCP page 109).
[3] Estimated amount of habitat unavailable on May 1 is based on the elevation of classes 3-5 of the previous year's model results, the reservoir elevation on May 1, and the assumption that the vegetation is 25 ft. tall. If less than 15 ft. of vegetation was not above water on May 1 the habitat was considered unavailable (see assumptions outlined in the H-B HCP page 109).
[4]Assumes reservoir at full pool on May 1; habitat assumed unavailable if located at elevations ≤2015' (see assumptions in note #3 above and the H-B HCP page 109).

2013 Action: For 2013, SRP will acquire the new 2013 Landsat 7 ETM (Enhanced Thematic Mapper) satellite images that contained gaps in 2012 and integrate the LIDAR data that was collected in 2012 for determination of potential habitat in Horseshoe Reservoir.

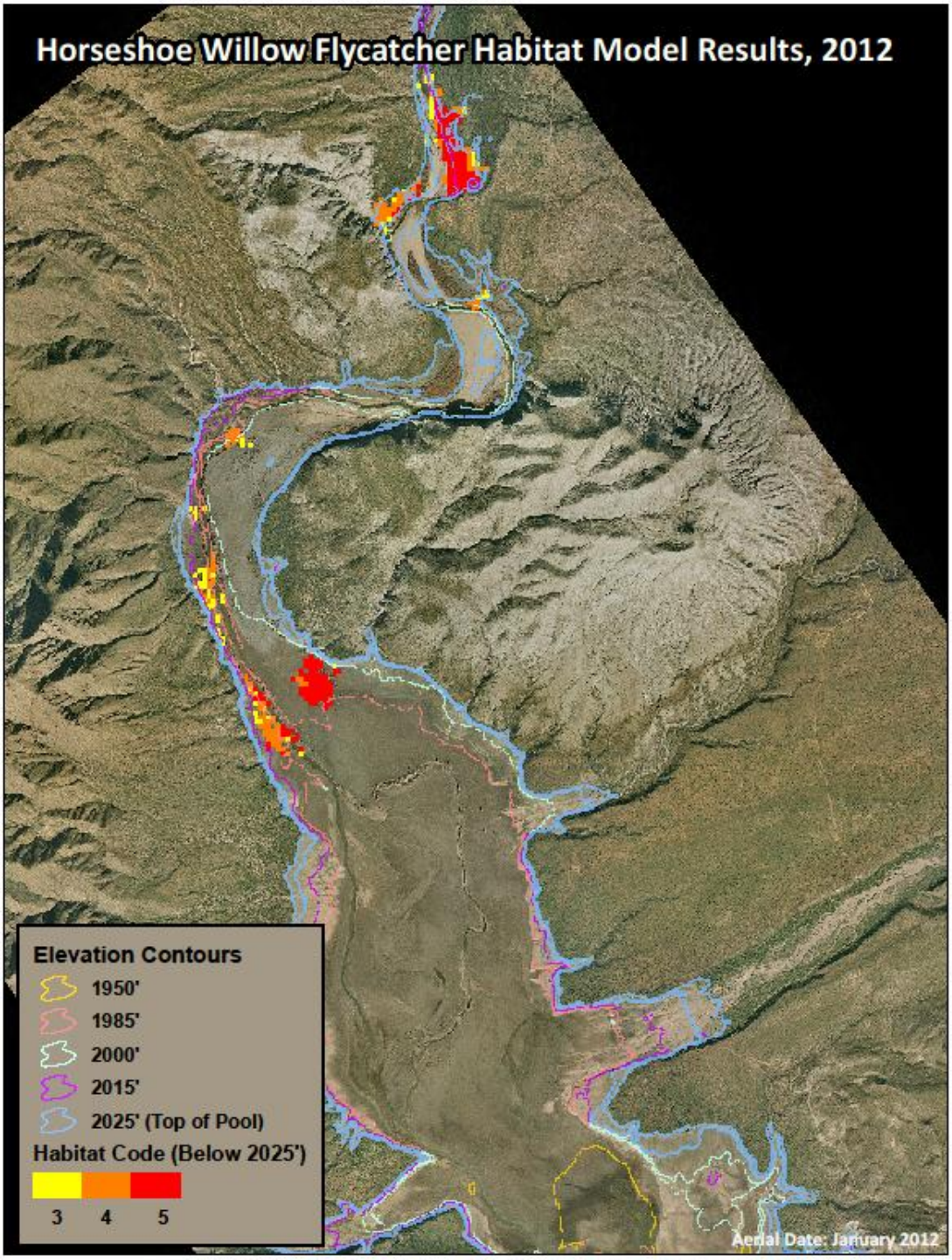


Figure 5. Willow flycatcher potential breeding habitat in Horseshoe Reservoir based on GIS satellite model results using June 2011 imagery and January 2012 LIDAR data.
[note: model grid code scale: 3 – 5 breeding probability based on Hatten and Paradzick (2003); sediment contour interval 1950' ≈ 0% storage; 1985' ≈ 25% storage; 2000≈ 50% storage; 2015' ≈ 75% storage; 2025' ≈ 98% storage.]

ii. Flycatcher Monitoring

Obligation: SRP will monitor the flycatcher population to assist in the evaluation of ITP compliance relative to thresholds for adaptive management and the cap on harm of occupied habitat. The method used to determine occupied habitat is explained in Section IV.B.1.B of the H-B HCP. The adaptive management threshold is an annual average of 200 acres of potentially impacted occupied habitat and the cap is 400 acres. Flycatcher surveys will be conducted every three years.

Action: Flycatcher surveys were not conducted in 2012 but will be repeated in 2014. LIDAR data collected during the winter of 2012 was used in conjunction with aerial photography to identify potential flycatcher habitat and compare with occupied areas located during the 2011 surveys. The intent of this exercise was to verify habitat prediction accuracy.

2013 Action: No flycatcher surveys will be conducted at Horseshoe in 2013. The next flycatcher survey will be conducted in 2014.

iii. Yellow-billed Cuckoo Monitoring

Obligation: SRP will monitor cuckoo at Horseshoe to identify the long-term trend in the population. The reservoir will be surveyed every three years.

Action: SRP contracted with EcoPlan Associates to conduct cuckoo surveys in 2011. These surveys will be repeated in 2014.

2013 Action: No surveys will be conducted for cuckoos in 2013.

iv. Bald Eagle Monitoring and Emergency Rescue Protocol

Obligation: SRP will develop a coordinated plan with FWS and AGFD to identify when rescue actions would be required and the process to rescue bald eagle, bald eagle eggs, or nestlings at Horseshoe or Bartlett. The plan will include triggers for winter monitoring at appropriate effort and frequency to determine if a nest has been built in the conservation space of the reservoir and the likelihood that the nest could be impacted by spring runoff. The Plan will be completed within one year of permit issuance, and the implementation will begin within two years of ITP issuance.

Action: In 2009, SRP completed the Monitoring and Rescue Plan (see 2009 H-B HCP annual report).

Eagles did not nest within the reservoir pool during the 2012 nesting season.

2013 Action: SRP will continue to implement the monitoring and rescue plan in 2013.

e. Covered Aquatic Species Monitoring

Obligation: SRP will monitor covered aquatic species populations and the effectiveness of minimization and mitigation measures. Periodic surveys in Horseshoe and several other locations in the Verde River will be conducted. Native fish composition and age class information will be recorded, and fish will be tagged in Horseshoe to assess movements from the reservoirs. In the first five years of implementation surveys will be focused near Horseshoe Reservoir.

Action: SRP conducted fish surveys May 21 – 25, 2012 in the Verde River from Childs to Sheep Bridge, and Lime Creek. As required in the H-B HCP, the sampling effort typically focuses on Horseshoe to assess fish composition, population structure and tagging fish to study fish movements during future survey efforts. However due to dry conditions, Horseshoe Reservoir was not filled during the winter of 2011-12 and therefore not sampled. SRP contracted with the AGFD Region 6 fisheries program to complete a survey of the Verde River (Appendix B). SRP also provided support to the AGFD for herpetological monitoring of Wet Bottom Creek (Appendix C).

Summary of Verde River Sampling Results

During the 5-day survey the electrofishing crew sampled 40 sites over 53 km of river and shocked and physically captured 989 fish. Throughout the survey fish appeared to be adequately affected by the electrofishing equipment. Attempts were made to capture all species observed although high turbidity contributed to poor netting conditions. Ten fish species were collected during the survey, of which two were native. Common carp was the most common species collected and comprised 52.9% of the relative abundance of fish collected (Figure 6). Red shiner (*Cyprinella lutrensis*) had the second highest relative abundance at 24.7%, followed by smallmouth bass (*Micropterus dolomieu*) at 12.2%, flathead catfish (*Pylodictis olivaris*) at 4.4%, and Sonora sucker (*Catostomus insignis*) at 2.6 %. Desert sucker (*Catostomus clarki*), largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) each comprised less than 2% of the relative abundance by species.

Length frequency analysis was conducted for all measured fish. Native Sonora sucker and desert sucker were collected in multiple length categories. Non-native predators such as smallmouth bass, largemouth bass, channel catfish, and flathead catfish collected were comprised mostly of smaller (<250 mm) individuals.

Flows for the Verde River varied little throughout the week, with flows at Camp Verde being 65 cfs on Monday, May 21th and dropping slightly to 61 cfs on Friday, May 25th. The low flows encountered made several areas of the river difficult to get support rafts through.

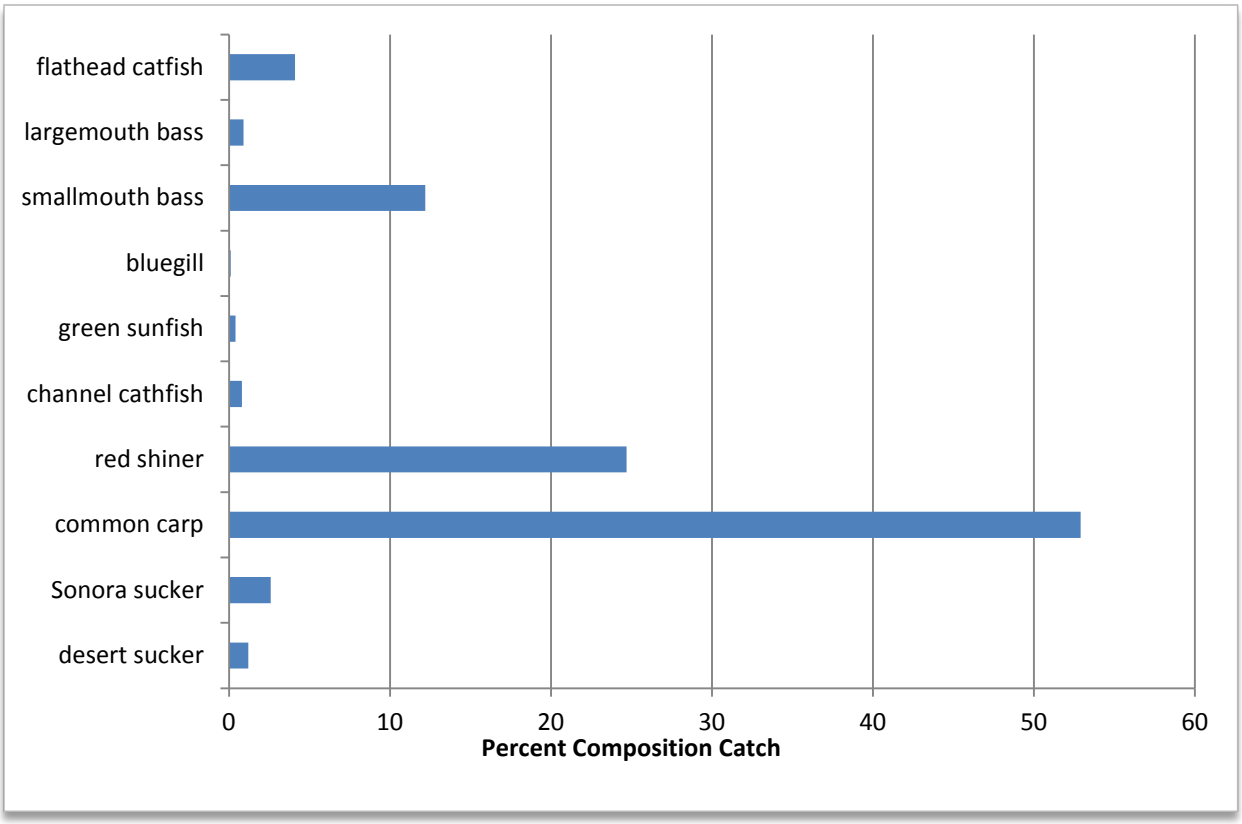


Figure 6. Composition of fish species captured in 2012 by AGFD using electrofishing equipment in the Verde River May 21 - 25 from Childs to Sheep Bridge. Values suggest relative fish species abundance.

Data were compared to past surveys that have been conducted since 2006, when we first began collecting common carp. Catch per unit effort (CPUE) for all species combined was highest this year compared to any other year for the period of sampling. This can mostly be attributed to common carp CPUE being more than double of any previous year. Non-native smallmouth bass showed a slight decrease in CPUE, but a slight increase in actual numbers collected over 2010. The increase in total number collected can most likely be attributed to this trip being the first time all 40 sites have been sample over the period. Native Sonora sucker decreased in number collected and CPUE and was the lowest recorded for both over the period, with the exception of number collected in 2006. Native desert sucker CPUE and number collected also decreased and were lowest recorded for both over the period, with the exception of number collected in 2006. Non-native flathead catfish showed a significant increase in both CPUE and numbers collected over the 2010 survey but were similar to all other years.

Other non-native species collected in the past (green sunfish, bluegill, and channel catfish) remained low in numbers collected, relative abundance, and CPUE.

This marked the third time since 2006 that no razorback suckers or Colorado pike minnow were collected, we also did not collect any roundtail chub. Additionally, native Sonora sucker and desert sucker catch rates have declined since previous surveys. Although low numbers of Sonora and desert sucker were encountered, multiple age classes of both were collected. This suggests recruitment of these species is occurring.

Although thousands of non-native fish have been tagged in Horseshoe Reservoir since 2009, none were collected during our survey. This suggests that fish migrations may not be occurring this far up river when the lake is drained, at least not to a large degree. However, not knowing the tag retention rate for fish in the reservoir makes make any real inference difficult.

Summary of Lime Creek Sampling:

SRP staff performed a post-stocking survey of Lime Creek on May 25, 2012. The vicinity of the Lime Creek Barrier upstream to Lime Springs were surveyed for the presence of Gila topminnow which were last stocked by the AGFD in May of 2011. Chuck Paradzick and Nate Turner surveyed immediately downstream of the barrier and then upstream from the barrier until surface water was no longer present. Marc Wicke, Nicole Coggins, and Neil Swearingen surveyed Lime Springs and then downstream from the Lime Springs confluence for approximately one kilometer. Other than Lime Springs proper, this survey reach was dry. In general, Gila topminnow were abundant downstream of the barrier and longfin dace were very abundant both above and below the barrier. No non-native fish were encountered during this survey effort.

- The pool immediately downstream of the barrier, Gila topminnow (n=25) and longfin dace (n=61) were captured in two seine hauls. Leopard frog tadpoles and aquatic invertebrates were also abundant (Figure 7).
- Immediately upstream of the barrier only one Gila topminnow was captured. However, over 500 longfin dace were sampled in a single seine haul at this location.
- In Lime Springs, six individual pools were sampled and only one Gila topminnow was captured. No water was observed within one kilometer downstream of the Lime Springs confluence.

Figure 7. Photo of Lime Creek at the barrier site, looking upstream. Photo taken May 25, 2012 during the post-stocking survey.

Summary of Herpetological Monitoring

During the Childs to Sheep's Bridge Survey, May 21 - 25, 2012, twenty "Gee" brand metal minnow traps were set upon arrival at camp each evening and pulled the next morning. Traps were targeting garter snakes and were generally set 10 per side, and spaced within approximately 200 m upstream and down from camp. They were set along the river's edge, with their funnel openings just submerged and airspace left in the top. Traps were baited with fish food in hopes of attracting fish, which then might attract snakes. No garter snakes were caught in the traps, nor were any seen along the Verde or in tributaries or backwaters despite active searching efforts.

SRP provided support to the AGFD to sample fish and herpetofauna populations in Wet Bottom Creek during the week of April 9, 2012 (Appendix C). Wet Bottom Creek is a tributary of the Verde River upstream of Horseshoe Reservoir. Sampling efforts were focused in the lowest 6.5-km of the roughly 27.5-km drainage length. The primary objective of this survey was to document the continued presence and characteristics of the chub population (*Gila* sp.) in the

creek. Emphasis was also placed on observing and documenting riparian herpetofauna.

Hoop and trap nets were utilized to survey the fish assemblage and riparian herpetofauna of the lower portions of the stream. All fish captured in the hoop and trap nets were identified to species, measured to the nearest millimeter total length (TL), and released near their original site of capture. Captured *Gila* species were weighed to the nearest gram (g). A total of 6 caudal fin clips were taken from captured *Gila* species and preserved in ethanol. Additionally, a total of 10 whole *Gila* species specimens were incidentally collected during survey efforts and also preserved in ethanol. Both the caudal fin clips and whole specimens were collected for future age/growth and genetic analyses. A total of 443 fish comprising five species were captured during hoop net surveys in 2012.

A primary objective of the herpetofauna survey effort was detecting either Mexican garter snakes or Narrow-headed garter snakes, since both are known from the Verde River main stem (though neither from Wet Bottom Creek). Various portions of the creek appeared suitable for either species and a sufficient prey base of native fish exists within, but neither species was detected during survey efforts.

SRP provided funding to Northern Arizona University (NAU) and AGFD to perform Mexican garter snake surveys on the Camp Verde Riparian Preserve on the Verde River. Two 5-day/4-night trapping surveys occurred between May and August 2012. During the first trapping session, May 7-11, 50 Gee minnow traps were set along the banks of the river and in backwaters to trap garter snakes, resulting in 200 trap-nights. One 1-hour walking survey was also conducted through riparian habitats to detect snakes outside of traps. During that trip, two Northern Mexican garter snakes were found; one adult female and one juvenile male. On the second trapping session, August 6-10, 80 traps were set for a total of 320 trap-nights. During that trip at least 26 individual garter snakes were found, including: nine adult females, eight adult males, two juvenile females, one juvenile male, and six neonates. These numbers appear to indicate a healthy population, and are by far the densest population detected among the five Verde Valley sites NAU surveyed this summer, representing 57% of the individual garter snakes detected.

SRP provided monetary support to AGFD and NAU's three-day garter snake training in June of 2012. This training provided volunteers an opportunity to learn survey and trapping techniques for garter snakes as well as identification of narrow-headed and Mexican garter snakes.

2013 Action: SRP will, as feasible (depending on water levels, boat/foot access, and helicopter availability), investigate the stranding of fish during and/or after rapid drawdown. Fish surveys and tagging are scheduled for Horseshoe Reservoir in March of 2013 and Lime Creek topminnow surveys in April of 2013.

4. Status of Mitigation Property Acquisitions

Obligation: SRP must acquire and manage in perpetuity 200 acres of riparian habitat by fee title or conservation easements. Within one year of the permit issuance date, at least 150 acres of mitigation will be in place, and within ten years an additional 50 acres will be protected.

Action: On August 11, 2009 SRP and Freeport McMoran executed a conservation agreement to secure the protection of the 150 acre preserve near Fort Thomas (SRPCE4; Figure 8). No additional action is needed until 2023 when the property will be purchased in fee.

Protection of Additional 50 acres:

Following the 2010 annual meeting and discussion with FWS, SRP assessed suitable mitigation lands near Safford and the existing Fort Thomas Preserve. SRP identified a 55 acre parcel (Indian Springs or SRP2), which contained suitable floodplain habitat (Figure 8). SRP contacted Wesley Prophet, President and owner of Indian Springs Ranch Inc. and learned that they were interested in selling the parcel. SRP sent a letter (dated April 15, 2011) to FWS explaining SRP's intent to pursue the purchase of Indian Springs Ranch (Appendix E). The letter was to assure that we met the coordination obligation in the H-B HCP, and it also documented the evaluation process, rationale (habitat suitability) for selecting that property, and its value to the conservation of flycatchers and cuckoos. FWS expressed no questions or concerns with moving forward with the acquisition.

SRP completed the purchase of the parcel in December of 2011. Flycatcher and yellow-billed cuckoo surveys were conducted on the property along with the other parcels comprising the Fort Thomas Preserve. The Fort Thomas baseline inventory report and management plans were updated to include both the 150 Freeport - McMoran parcel and the 55 acre Indian Springs parcel.

2013 Action: SRP is in the process of developing a fire management plan for the entire Fort Thomas Preserve and is anticipated to have it completed by the spring of 2013.

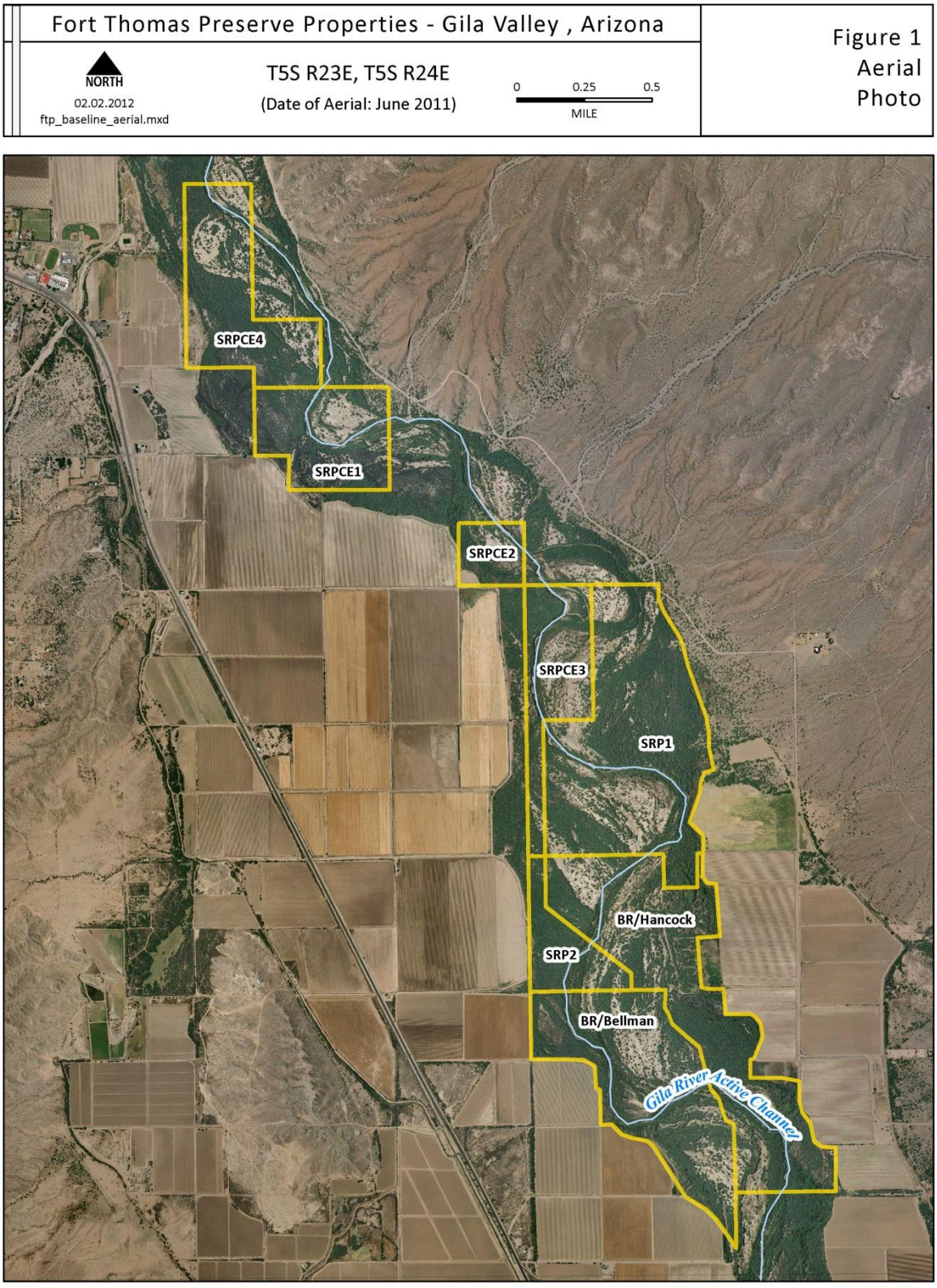


Figure 8. Map of Fort Thomas Preserve area and the 55 acre SRP2 (Indian Springs) parcel that SRP acquired as mitigation for the H-B HCP.

5. Mitigation Property Monitoring and Management

a. Fort Thomas H-B Preserve (SRPCE4 and SRP2)

i. Flycatcher and Cuckoo Monitoring

Obligation: SRP will conduct flycatcher and cuckoo surveys the first spring and summer following land acquisition. If flycatchers are found, SRP will conduct a second year of surveys to establish a baseline. Once baseline surveys are complete, SRP will survey for flycatchers and cuckoos every other year on average but not less than every third year.

Action: Surveys were conducted by EcoPlan in 2012 and are summarized in Table 2. Baseline surveys were conducted in 2008 and 2009 for the SRPCE4 parcel. 2012 was the first official survey of the SRP2 (Indian Springs) parcel. The complete survey report is contained in Appendix A

Table 1. Southwestern willow flycatcher and yellow-billed cuckoo survey results for the Fort Thomas H-B Preserve, 2008 – 2012.

	Willow flycatcher				Yellow-billed cuckoo	
Year	Resident Adults	Territories	Pairs	Nests	Detections	Incidental
2008	10	6	4	0	2	0
2009	14	8	6	5	0	0
2010	No Survey	-	-	-	-	-
2011	No Survey	-	-	-	-	-
2012	12	10	9	4	2	1

Nest parasitism rates were evaluated during flycatcher surveys in 2012. Of the 33 nests that were identified, seven nests exhibited parasitism (21.2%). This percentage is at the lower end of the threshold values established in the H-B HCP. If parasitism values in the scheduled 2014 surveys are again above 20%, SRP will discuss with the FWS whether initiating preventative measures are warranted.

2013 Action: Since flycatchers were identified in 2012 on theSRP2 (Indian Springs) parcel, surveys will be repeated there in the spring and summer of 2013 to establish a baseline for future years. No other surveys will be conducted on the Fort Thomas conservation properties until 2014.

ii. Vegetation and Habitat Monitoring

Obligation: SRP will conduct field observations assessment of habitat type, structure, and density of riparian and other vegetation. On-the-ground photo documentation from fixed points will be collected during the bird surveys.

Action: Vegetation information was collected during the 2012 flycatcher and cuckoo surveys. Photo points were established for the SRP2 (Indian Springs) parcel (Appendix A). Patrols and site visits to the property indicated that no significant vegetation changes occurred in 2012.

2013 Action: Photo points will be revisited in conjunction with the 2014 bird surveys.

iii. *Management Obligations*

Obligation: SRP's primary goal for management of these properties is to provide ecological and conservation benefits to the flycatcher and cuckoo. Management activities are focused primarily on minimizing or eliminating identified threats to riparian habitat, such as wildfire, groundwater pumping, surface water depletion, trespass livestock grazing, cowbird parasitism and vandalism. Actions to enhance the quality of habitat on a property or reverse past damage may also be conducted.

General management activities required for each property are listed below:

1. SRP will identify a manager for all acquired properties.
2. A management plan will be developed for each property within two years of acquisition in coordination with FWS and will be updated annually.
3. Management activities identified in the management plan will be implemented.
4. Cowbird management will occur on properties that are agreed to by SRP and FWS during the annual H-B HCP meeting.
5. Conservation easements shall be placed on all appropriate mitigation lands and will be held by an agency or organization acceptable to FWS.

Actions: SRP completed the following major management actions on the Fort Thomas H-B Preserve in 2012:

- The Nature Conservancy (TNC) conducted patrols (which may include inspection and maintenance of access and signage, work and coordination with adjacent landowners and local law enforcement officials, and assistance with biological monitoring).
- SRP completed the revisions to the Fort Thomas Management Plan and Baseline report. These revisions included incorporation of the newly acquired SRP2 (Indian Springs) parcel.
- SRP is in the process of completing a wildfire management plan for the Fort Thomas Preserve. This plan is being completed in conjunction with the Bureau of Reclamation.
- Following the wildfire that occurred at the Fort Thomas Preserve in 2011, SRP has been working with its contractors to establish test plots and experiment with post-fire tamarisk control and establishment of native vegetation.

<u>Post-Fire Test Plot Summary:</u>

SRP and the TNC established four test plots to experiment with tamarisk cutting and herbicide treatment, and native woody plant re-establishment. Tamarisk treatment in test plots 2, 3, and 4 included cutting of burnt and re-sprouting tamarisk stems and application of herbicide (Figures 9-12). All tamarisk re-sprout was cut to roughly 6-inch stubs. These stubs were then sprayed with a 50-50 mixture of Garlon 3A and water, making sure to soak all cuts and bark down to the soil line. In addition, some trees received basal-bark treatment, in which all

stems are sprayed, using the same mixture, from a height of 36-inches down to the soil line, making sure to soak the entire circumference of the stem.

In March 2012, 100 of the following grasses, shrubs, and small trees were planted near the large return ditch in the middle of the burn area: *Acacia constricta* (whitethorn acacia), *Atriplex canescens* (saltbush), *Bouteloua gracilis* (blue gramma)*, Chilopsis linearis* (desert willow)*, Lyceum andersonii* (Wolfberry)*,* and *Prosopis pubescens* (mesquite). DriWater (a gel based plant watering product) was utilized to provide moisture to the plants. Plant survival rates were assessed in August of 2012 and resulted in approximately 15%. Saltbush and acacia were the predominant species that persisted.

Figure 9. Photo of native planting along an irrigation return ditch at the Fort. Thomas Preserve.

Figure 10. Photo of replanted test plot utilizing DriWater remote site irrigation cartons.

Figure 11. Test plot 3, from northwest corner, taken on 9 May, 2012. Trees in mid-frame were subsequently cut and the stumps sprayed with a 50-50 mixture of Garlon 3A and water. Trees to the left of the frame were subjected to basal bark treatment using the same mixture.

Figure 12: Same location as Figure 11, taken on 28 June 2012. Browned trees to the left of the frame were those receiving basal-bark treatments.

2013 Actions: SRP plans to conduct the following management actions in 2013 on the Fort Thomas Preserve:

- Finalize the fire management plan.
- Continue to monitor test plots while controlling tamarisk re-sprout.
- Continue to coordinate with BLM regarding fencing of the riparian area.
- Continue on-the-ground management activities in coordination with the Roosevelt HCP project manager.

b. Special Water Supply Protection Projects

Obligation: SRP will use its best efforts to protect future water supplies for mitigation lands.

Action: SRP provided funding to the U.S. Geological Survey (USGS) to conduct field work related to a 2-year Ecoflows project, which is a partnership among the USGS (Arizona and Utah offices), AZ Department of Water Resources, and the TNC, to investigate the connection between stream flow in the Verde River and habitat along the riparian corridor (Appendix D). The USGS is currently completing the two-year phase 1 of the two-phased project.

The original agreement between the USGS and the TNC did not include funds to support additional field work in Phase 1. The additional support from SRP provided crucial support for field efforts, macroinvertebrate identification, data analysis, and geospatial interpretation of habitat characteristics. The results

obtained with the SRP funding are included in the phase 1 report which is being developed.

In addition to completing the first phase, USGS installed a Continuous Slope Area (CSA) gage below the low flow SRP gage at Campbell Ranch (AGFD issued a permit for the installation). The gage installation was supported by the USGS WaterSMART program. During the first phase of the Ecoflows project, a biotic sampling site was established at Campbell Ranch. The CSA gage, which consists of three recording stage sensors from which discharge can be computed, is intended to complement the SRP gage by allowing for the estimation of discharges higher than the rating curve at the low-flow gage. The combined low-flow and CSA discharges should provide complete discharge records at Campbell Ranch.

Continued SRP funding support for FY2013 will provide valuable support for ongoing maintenance of the Campbell Ranch gage, analysis and publication of fish survey data, and partial coverage of the publication costs for the Ecological Flows phase 1 report.

2013 Action: SRP will continue to fund the operation of the CSA Gage on the Verde River, development of the Ecoflows Phase 1 analysis and report.

6. Aquatic Species Mitigation

The overall goal of the minimization and mitigation measures for covered aquatic species is to offset the direct impacts caused from stranding and passage through the outlet works, and the indirect impacts (predation and competition) caused by the increase of nonnative fish produced in the reservoirs. Minimization and mitigation obligations under the H-B HCP include: rapid draw down of Horseshoe Reservoir; stocking adult and sub-adult razorback sucker in Horseshoe or elsewhere; installation of a fish barrier on Lime Creek; funding and supporting improvements to Bubbling Ponds Hatchery; stocking covered native fish in the Verde watershed; and watershed management activities that conserve in-stream flow, species, and habitats. The following implementation actions were taken:

a. Rapid Draw Down of Horseshoe Reservoir

Obligation: See Section 3.c.

Action: See Section 3.c.

2013 Action: See Section 3.c.

b. Stocking of Razorback Sucker at Horseshoe and Other Covered Species in Verde River.

Obligation: SRP will provide support for AGFD to stock razorback sucker during Horseshoe fills when conditions may be favorable. Other river segments may be stocked with razorback sucker upon mutual agreement among AGFD, FWS, and SRP. SRP will provide support to increase stocking of other covered native fish species in the Verde watershed.

Action: On April 23, 2009, SRP and AGFD executed a collection agreement to fund the operation and maintenance of Bubbling Ponds Hatchery (BPH) to support culture of covered native fish, and support transport and stocking of covered fish to meet this obligation. The collection agreement provides for SRP to annually transfer funds ($40,000) to AGFD to be utilized for Operations & Maintenance (O&M) and stocking actions throughout the year. In August 2009, AGFD, FWS, and SRP met and identified species culture targets and stocking locations for the first two - three years of implementation (Table 3). In some instances, H-B HCP funded efforts were anticipated to be part of a multiagency effort (e.g., Fossil Creek).

In 2012, SRP continued funding AGFD O&M and stocking actions at BPH under the collection agreement. As of June 30, 2012, 13,250 native fish were stocked into the Verde River watershed (Table 4).

In June of 2012, SRP met with AGFD and the U.S. Bureau of Reclamation (Reclamation) to discuss the status of fish on station at Bubbling Ponds and anticipated needs for stocking.

Table 2. Proposed H-B HCP Bubbling Ponds Hatchery Culture and Stocking Summary, 2009 ~2012.

Species	Proposed Stocking Locations[1,2]	Approximate quantity
Razorback	Upper Verde Middle Verde (Beasley-Childs)	1000 2000
Gila Topminnow	Fossil Creek Dutchman Grave Spring Lime Creek Other tanks/locations in Verde watershed	1000s (for sites as approved)
Roundtail chub	Middle Verde (Beasley-Childs) Lower Verde (Bartlett-Salt River confluence) Other locations in Verde watershed	500 (Stillman) 3000 (for other sites as approved)
Spikedace	Fossil Creek Other locations in Verde watershed	as available
Loach Minnow	Fossil Creek Other locations in Verde watershed	as available

[1]Pending AGFD, FWS, and USFS coordination as necessary.
[2]Other locations may be considered and added with SRP, AGFD, and FWS concurrence.

Table 3. Native fish stocked by AGFD in support of H-B HCP though June 30, 2012.

Stocking Date	Species	Number stocked	Pounds stocked	Location
10/12/2011	Gila Topminnow	2,981	5	Fossil Creek
1/10/2012	Roundtail chub	150	9	Roundtree Creek
1/10/2012	Roundtail chub	851	1,165	Verde – Childs
2/3/2012	Roundtail chub	3,808	98	Verde – Perkinsville
2/3/2012	Roundtail chub	3,808	98	Verde – Beasley Flat
2/15/2012	Roundtail chub	300	0.74	Verde – Roundtree Creek
4/10/2012	Razorback sucker	450	833	Verde – Beasley Flat
4/18/2012	Razorback sucker	902	1,074	Verde – Beasley Flat
Total		**13,250**	**2,169**	

2013 Action: Coordinate a meeting among AGFD, FWS, and SRP in the spring of 2013 to discuss the status of implementation, changes to the species priorities or locations, and plans for future culture and stocking effort. Continue to fund BPH O&M and stocking activities.

c. Bubbling Ponds Hatchery Improvements

Obligation: SRP will provide $500,000 in funding or in-kind support for planning, design, engineering, and fund raising to improve and expand AGFD's BPH.

Action: In 2012, SRP met AGFD and Reclamation to discuss the BPH remodel plan and the lack of funds to implement the plan as written. However, funds currently available from Reclamation and SRP could be utilized to leverage additional Reclamation funds to upgrade and repair facility components crucial to facilitating existing programs. AGFD will work to identify crucial infrastructure needs and prioritize repair and replacement work in the coming year.
Activities completed in 2012:

- Building materials were acquired for the Basshouse Office.
- Sportfish "Bass Pond" was stocked-out to Pena Blanca Lake, thus creating pond space for more native fish culture.
- Installed a new 12 inch water supply line to the lower ponds.

2013 Actions: Continue to support AGFD BPH upgrade plan development and coordinate its planning and implementation.

d. Installation of a Fish Barrier in Lime Creek

Obligation: SRP will construct and maintain a fish barrier in Lime Creek to benefit resident, covered aquatic species such as Gila topminnow, longfin dace, and lowland leopard frogs.

Action: The barrier was completed on November 4, 2010 (Figure 3). The construction of the barrier was described in detail in the 2010 H-B HCP annual report. SRP visited and inspected the barrier during a May 2012 site visit. The barrier was structurally sound and functional, and, as anticipated, sediment had filled in most of the pool above the barrier.

2013 Actions: SRP will monitor barrier condition and conduct maintenance, as necessary. SRP, in coordination with AGFD and USFS, will also monitor the fish populations in Lime Creek.

e. Watershed Management Efforts

Obligation: SRP will continue, and expand where feasible; its substantial watershed management efforts to maintain and/or improve stream flows, which benefit all main-stem species.

Actions: SRP took the following actions in 2011 to protect watershed in-stream flow:

- Public outreach and education
- Funding research and monitoring
- Administrative and legal efforts to protect in-stream flows

A detailed list of Watershed Management and Protection projects that occurred in 2012 is provided in Table 5.

2013 Action: SRP will continue supporting watershed protection efforts in 2013.

Table 4. SRP watershed protection efforts accomplished in 2012.						
Project Name	**Date Initiated**	**Date Completed**	**SRP Contribution**	**Description and Comments**	**In-kind**	**Cash**
Public Presentations	Ongoing	Ongoing	NA	10 public presentations to community groups and various agencies (e.g., Citizen Water Advocacy Group, TNC, Verde Watershed Association, Project CENTRL, Prescott Water Issues Subcommittee, 9th Grade Class Northpoint Academy in Prescott, and others)	X	
Agreement in Principle re Big Chino Groundwater withdrawals	Ongoing	Ongoing	$351,550	Executed Comprehensive Agreement #1 between SRP, the City of Prescott and the Town of Prescott Valley to implement monitoring and modeling of groundwater conditions in the Big Chino sub-basin to ensure appropriate protections against impacts to the Upper Verde River. Includes long-term funding commitment.		X
Legal efforts to curtail illegal groundwater pumping and surface water diversions – Verde Valley	Ongoing	Ongoing	NA	SRP continued its litigation against several groundwater pumpers in the Verde Valley who appear to be illegally diverting surface water.	x	
NAU Watershed Research and Education program (WREP)	May-12	May-13	$50,000	Program and Project specific funding for NAU WREP program. Three research projects funded (Predicting groundwater yield following landscape-scale forest restoration along the Mogollon Rim, Prioritization of spring-remediation projects through statistical analysis of spring assessments in the Coconino & Kaibab National Forests, Endocrine Disruption Compounds in the Verde River: Androgenic or Estrogenic?).		X
USGS/SRP cost share of stream gage maintenance	Jan-11	Dec-12	~$130,000	SRP's contribution to the USGS Joint Funding Agreement for the operation and maintenance of stream and reservoir gages in the Verde watershed (amount does not		X

Table 4. SRP watershed protection efforts accomplished in 2012.						
Project Name	**Date Initiated**	**Date Completed**	**SRP Contribution**	**Description and Comments**	**In-kind**	**Cash**
				include reservoir gauge operations).		
WatershedMonitor.com	Sep-07	Ongoing	NA	Maintain the website (www.watershedmonitor.com) which displays real time data for river flows and precipitation across the Salt and Verde Watersheds.	x	
Verde River Canoe Challenge	Mar-12	Mar-13	$0	Corporate sponsor of the Verde River Canoe Challenge. Note: 2012 Challenge was cancelled. March 2013 is expected to be resurrected by Town of Camp Verde. SRP has expressed interest in resuming corporate sponsorship.		x
Low Flow gages (Black Bridge, Verde Falls, Campbell Ranch, Bubbling Ponds Hatchery, Sterling Springs)	Jan-11	Jan-12	$57,477	2012 O&M and telemetry support for gages.	x	
Verde River Days	Sep-12	Sep-12	$500	SRP donation for event. SRP was also an Exhibitor		x
Yavapai College Foundation	Nov-12	Nov-12	$5,000	SRP Donation/Table sponsorship for event. Theme re sustainable economic development in the Verde Valley.		x
The Verde Valley Regional Economic Organization (VVREO)	Nov-12	Nov-12	$1,000	Membership to VVREO and corporate sponsorship for 'speakers series' featuring Grady Gammage, Jr.	x	x
Verde River Basin Partnership map support	Sep-11	Sep-11	$500	SRP provided GIS support for maps for Verde River Day	x	
Sustainable Waterways: A Community Conversation	May-12	May-13	NA	A series of conversations by the Verde Valley Regional Economic Organization about economic development and a healthy Verde River.	x	

Table 4. SRP watershed protection efforts accomplished in 2012.						
Project Name	**Date Initiated**	**Date Completed**	**SRP Contribution**	**Description and Comments**	**In-kind**	**Cash**
Arizona Water Story – Production of companion video	Jan-10	Ongoing	In-Kind roughly worth $50,000	SRP has produced this water education video as part of the Arizona Water Story to assist 4th grade teachers throughout the state in teaching water science and Arizona history to their students. Copies will be distributed in the Verde Valley during any of this year's teacher workshops to be done by Alison or partner – AZ Project WET.	x	
Water Education Grants	Oct-07	Ongoing	$4,750	SRP collaborated with the towns of Prescott and Prescott Valley as well as the Yavapai County Water Advisory Committee and Arizona Department of Water Resources to provide Water Education Grants to outstanding water education programs taking place in Yavapai County.		X
Yavapai County Cooperative Extension Office /Project WET	Aug-08	Ongoing	$15,000	SRP supported Edessa Carr with programming related to water education in Yavapai County. She has conducted numerous trainings on the Arizona Conserve Water curriculum guide, and worked with teachers from Prescott, Prescott Valley, Chino Valley, and Verde Valley towns.		X
Verde Valley Youth Outreach Committee	Aug-11	Ongoing	In-Kind leadership support	SRP serves on this committee to share and leverage partnerships in the Verde Valley related to youth education. Other partners on the committee include the parks, forest service, AZ Project WET, and V-Bar-V.	X	
Verde River Educator's Guide	June-11	Ongoing	Partnership – In kind development worth roughly $40,000	SRP has collaborated with local entities to develop a Verde River Educator's Guide for use in the watershed. While based off of the Arizona Water Story, the Verde River Educator's Guide will be a joint project with Arizona Project WET rather than CAP and	X	

Table 4. SRP watershed protection efforts accomplished in 2012.						
Project Name	**Date Initiated**	**Date Completed**	**SRP Contribution**	**Description and Comments**	**In-kind**	**Cash**
				focuses specifically on the Verde Watershed. Hosted on www.srpnet.com/teachingabouttheverde		
Verde River Teacher Academy	Aug-11	Summer 2012	roughly $10,000 (cash) $15,000 in-kind	SRP worked with members of the Verde Valley Youth Outreach Committee to sponsor and host a four-day teacher workshop during the summer of 2012. The workshop was held in Camp Verde and educated approximately 35 teachers regarding Verde River issues.	x	x
Four Forest Restoration Initiative and Research Study Agreement with NAU/Ecological Restoration Institute	Jan-12	Ongoing	$120,000	SRP is supporting landscape level efforts to restore ponderosa pine forests, which includes the Salt and Verde watersheds to allow for increased ecologic function and decrease risk of catastrophic wildfire. We are also partnering with NAU to evaluate hydrologic effects of various forest treatment types. This study includes the design of a Paired Watershed Study that will evaluate impacts of forest restoration on variable such as run-off, groundwater infiltration, sedimentation, soil moisture, etc.	x	x
Oak Creek Watershed Council	Ongoing	Ongoing	$350	The Oak Creek Watershed Council works to protect and improve water quality of Oak Creek and preservation of flows. SRP	x	x

7. Funding Methods and Assurances for HCP Implementation

Obligation: No later than five years after the Permit is issued, SRP shall insure that permanent funding is available to meet continuing obligations under the H-B HCP.

Action: On March 24, 2009, SRP provided a letter to FWS indicating that we were proposing to establish an irrevocable trust to fund the H-B HCP. On November 2, 2009, the SRP Board approved an amendment to the Roosevelt Lake HCP trust, which allows for the creation and funding of a subaccount to meet the obligation of the H-B HCP. The subaccounts allow for each HCP trust fund to be managed (and reported) independently under a larger umbrella trust agreement. The H-B HCP subaccount was funded in January 2011 with approximately $6.0M to support the estimated $300,000 on average annual expenditures over the life of the permit and *in perpetuity* costs for some of the mitigation obligations.

2013 Action: Completed - no action needed in 2013.

8. HCP Implementation, Survey, and Monitoring 10-year Schedule

Obligation	Completed /Ongoing	Year									
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 +
Horseshoe Reservoir											
Flycatcher and Cuckoo Reservoir Ops	**Ongoing**	RD[1]	RD	RD	RD	RD	Hold?[2]	X	X	X	X
Aquatic Species Reservoir Ops	**Ongoing**	RD	RD	RD	RD	RD	Hold?	X	X	X	X
Vegetation Monitoring	**Ongoing**	X	X	X			X	X			X
Flycatcher and Cuckoo Surveys	**Ongoing**	X			X			X			X
Bald Eagle Monitoring and Rescue Plan	**Completed**	X	X								
Bald Eagle Monitoring	**Ongoing**			X	X	X	X	X	X	X	X
Fish Surveys:	**Ongoing**		X	X	X	X	X	X	X	X	X
Horseshoe			X	X	X[4]	SRP[5]	X		X		X
Verde (upstream Horseshoe)				X	X	X	-	X	?	X	?
Verde (downstream Bartlett)							-	X	?	?	?
Lime Creek		x	x	x	x	x				x	
Frog and Garter Snake Survey	**Ongoing**					x					X
Horseshoe/Verde River Aquatic Species Mitigation											
Bubbling Ponds Hatchery (BPH) Improvements		X	X	X	X	X	X	X			
BPH O & M	**Ongoing**	-	X	X	X	X	X	X	X	X	X
Stocking RBS & other covered native fish	**Ongoing**	-	-	X	X	X	X	X	X	X	X
Lime Creek Barrier Construction	**Completed**	X	X	X							
Watershed Protection Projects	**Ongoing**	X	X	X	X	X	X	X	X	X	X
Fort Thomas Mitigation Property (150 acres)											
Execute Conservation Easement	**Completed**	X	X								
Management	**Ongoing**		X	X	X	X	X	X	X	X	X
Purchase											2023 -
Flycatcher and cuckoo monitoring[3]	**Ongoing**	X	X			X		X			X

Habitat Monitoring	**Ongoing**	X	X			X		X			X
Indian Springs Ranch – Fort Thomas Preserve (55 acres)											
Identify suitable property		X	X	X	X						
Secure protection and manage						X	X	X	X	X	X
Special water supply protection projects	**Ongoing**	X	X	X	X	X	X	X	X	X	X

[1] Rapid drawdown and minimize pool
[2] Hold reservoir high if two successive years of low storage.
[3]Monitoring frequency dependent upon management needs and cowbird parasitism rate.
[4] Sampling for tagged fish also conducted downstream of Horseshoe dam
[5] SRP will, as feasible, investigate fish stranding in Horseshoe during and after rapid drawdown.

9. Literature Cited

Fish and Wildlife Service. 2008. Final environmental impact statement for the incidental take permit for operations of Horseshoe and Bartlett Reservoirs. March 2008. Arizona Ecological Services Office, Phoenix, Arizona.

Hatten, J. R. and C. E. Paradzick. 2003. A multiscaled model of southwestern willow flycatcher breeding habitat. Journal of Wildlife Management 67(4): 774-778.

Salt River Project. 2008. Habitat Conservation Plan Horseshoe and Bartlett Reservoirs. Submitted to the U.S. Fish and Wildlife Service Pursuant to Section 10(A)(1)(B) of the Endangered Species Act. Salt River Project, Tempe Arizona.

APPENDIX A

SOUTHWESTERN WILLOW FLYCATCHER AND YELLOW-BILLED CUCKOO SURVEYS ON THE FORT THOMAS PRESERVED, GILA RIVER STUDY AREA, ARIZONA, 2012

EcoPlan Associates, Inc.

This report contains sensitive data, which is considered confidential by the U.S. Fish and Wildlife Service. Therefore, it has been removed from this version of the report. The full version was sent to the USFWS Ecological Field Services Office in Phoenix, AZ.

APPENDIX B

H-B HCP 2012 FISH MONITORING SURVEYS

Arizona Game and Fish Department

Trip Report for the Verde River Fisheries Survey, Childs to Sheep Bridge, May 21 – 25, 2012

Since 1994, the Arizona Game & Fish Department (Department) has stocked razorback sucker (*Xyrauchen texanus*) and Colorado pikeminnow (*Ptychocheilus lucius*) (Appendix 1). The exception to this was in 2006, when only Colorado pikeminnow were stocked, in 2008 when neither species was stocked, and in 2011 and 2012 when only razorback sucker were stocked (Appendix 1). Beginning in 2009, the Department began stocking roundtail chub (*Gila robusta*) into this section of the Verde River. Additionally, over the last four years, the Department has intensively tagged and monitored individual fish within Horseshoe Reservoir to determine fish movements. Much of this recent work was funded and supported as part of a mitigation program funded by the Salt River Project for the operation of Horseshoe and Bartlett Lake.

The objectives of this study was to continue the monitoring of the razorback sucker, roundtail chub, and Colorado pikeminnow reintroductions as well as determine fish movement upstream into the Verde River from nonnative fish greater than 150 mm TL that were marked with either a Floy tag or by clipping the dorsal spine in Horseshoe Reservoir. The data collected will also allow the fish populations within the sample area to be evaluated and compared to previous sampling efforts over time.

Methods

On May 21 – 25, 2012 Arizona Game and Fish biologists from Region VI conducted a comprehensive fish survey of the Verde River from Childs power plant to Sheep Bridge, a distance of roughly 53 km (Figure 1). The crew on this survey consisted of Curt Gill, Jacob Jaeger, Jeff Sorensen, Kent Mosher, and interns Grant Pearce and Kyle Overton. The survey was conducted using a Smith-Root 2.5 GPP electrofishing unit mounted in a canoe. Two biologists staffed the canoe; one to net fish and the second to monitor the generator and electrical output equipment and to navigate the canoe. Electrofishing unit settings were placed at low voltage of 0-500 volts, pulsed DC at 60 pulses per second, and a 40 percent of range setting. These settings were utilized throughout the trip and resulted in an average of 4 amps of output. A second canoe was used as a chase/processing craft to collect fish that were missed by the electrofishing canoe and to weigh and measure fish at the end of each site. Three other inflatable boats were used to carry equipment and provide general trip support.

Survey sites were chosen in advance based on a river map divided into 106 sites, each 500 meters long. A total of 40 sites were chosen for sampling. Eight sites were fixed sites that were chosen in 2006. The additional 32 sites were randomly chosen and adhere to the Department's Standard Fish Sampling Protocol (80% random/20% fixed). A Garmin handheld GPS unit was used to determine the beginning and end of the predetermined sample sites. At the end of each site the processing canoe identified, weighed (nearest 2g), and measured (nearest mm) the fish. Fish less than 100 mm total length were only

measured. Common carp and red shiner were only counted. All native and sport fish were then released back into the river.

Results

During the 5-day survey the electrofishing crew sampled all 40 sites and shocked for a total of 18,646 seconds and physically captured 989 fish (Table 2). Throughout the survey fish appeared to be adequately affected by the electrofishing equipment. Attempts were made to capture all species observed although high turbidity contributed to poor netting conditions. Ten fish species were collected during the survey, of which two were native (Table 2). Common carp (*Cyprinus carpio*) was the most common species collected and comprised 52.9% of the relative abundance of fish collected (Table 3). Red shiner (*Cyprinella lutrensis*) had the second highest relative abundance at 24.7%, followed by smallmouth bass (*Micropterus dolomieu*) at 12.2%, flathead catfish (*Pylodictis olivaris*) at 4.4%, and Sonora sucker (*Catostomus insignis*) at 2.6 % (Table 3). Desert sucker (*Catostomus clarki*) largemouth bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), green sunfish (*Lepomis cyanellus*), and bluegill (*Lepomis macrochirus*) each comprised less than 2% of the relative abundance by species (Table 3).

Length and weight data were collected for all species except common carp and red shiner. The largest fish collected throughout the survey was a 528 mm Sonora sucker (Table 4). Sonora sucker collected during the survey ranged from 285 – 528 mm long and weighed an average of 1,145 g (Table 4). Native desert sucker ranged from 187 – 418 mm long and weighed an average of 424 g. Smallmouth bass ranged from 106 – 636 mm and weighed an average of 100 g while largemouth bass ranged from 120 – 410 mm and weighed an average of 288 g.

Length frequency analysis was conducted for all measured fish. Native Sonora sucker and desert sucker were collected in multiple length categories (Table 5). Non-native predators such as smallmouth bass, largemouth bass, channel catfish, and flathead catfish collected were comprised mostly of smaller (<250 mm) individuals (Table 5).

Comparison and Discussion

The weather remained clear and hot during the survey, although the crew typically experienced upstream winds from late morning throughout the remainder of the afternoon. Flows for the Verde River varied little throughout the week, with flows at Camp Verde being 65 cfs on Monday, May 21th and dropping slightly to 61 cfs on Friday, May 25th. The low flows encountered made several areas of the river difficult to get support rafts through.

Data were compared to past surveys that have been conducted since 2006, when we first began collecting common carp. Catch per unit effort (CPUE) for all species was highest this year compared to any other year for the period of sampling (Table 7). This can mostly be attributed to common carp CPUE being more than double of any previous year. Non-native smallmouth bass showed a slight decrease in CPUE, but a slight increase in actual numbers collected over 2010 (Table 7). The increase in total number collected can most likely be attributed to this trip being the first time all 40 sites have been sample over the

period. The smallmouth bass CPUE was the third highest noted from 2006-2010. Largemouth bass CPUE stayed constant similar to 2007 – 2010 but was still about half of the peak for the species in 2006 (Table 7). Native Sonora sucker decreased in number collected and CPUE and was the lowest recorded for both over the period, with the exception of number collected in 2006 (Table 7). Native desert sucker CPUE and number collected also decreased and were lowest recorded for both over the period, with the exception of number collected in 2006 (Table 7). Non-native flathead catfish showed a significant increase in both CPUE and numbers collected over the 2010 survey but were similar to all other years. Other non-native species collected in the past (green sunfish, bluegill, and channel catfish) remained low in numbers collected, relative abundance, and CPUE (Table 7).

This marked the third time during the period that no razorback sucker or Colorado pikeminnow were collected, we also did not collect any roundtail chub. Additionally, native Sonora sucker and desert sucker catch rates have declined since the previous survey. This may be attributed to an actual decline in the population or may be related to the high turbidity encountered during the survey. Anecdotally, the turbidity seemed higher than past surveys. Although low numbers of Sonora and desert sucker were encountered, multiple age classes of both were collected. This suggests recruitment of these species is occurring.

Although thousands of non-native fish have been tagged in Horseshoe Reservoir since 2009, none were collected during our survey. This suggests that fish migrations are not occurring this far up river when the lake is drained, at least not to a large degree. However, not knowing the tag retention rate for fish in the reservoir makes make any real inference difficult.

Recommendations

- Continue to survey this section of the Verde River biennially to assess the stocking success of razorback sucker, roundtail chub, and Colorado pikeminnow. Although no razorback sucker, roundtail chub, and Colorado pikeminnow were collected in 2012 between Childs and Sheeps Bridge, Colorado pikeminnow have been collected in recent surveys at Horseshoe Reservoir and Bartlett Reservoir suggesting that the fish do move and persist for some time after initial stocking. Additionally, the trip will also be beneficial in identifying whether fish that are tagged in Horseshoe Reservoir move upstream into the Verde River as the reservoir empties.
- Consider moving up the timing of the survey following dry winters to take advantage of the higher flows and hopefully lower turbidity to increase catch rates of native, as well as non-native, fish species. If flows are low, it is recommended to not take support rafts.

Submitted by: Curt Gill
Region VI Fish Specialist
May 31, 2012

Table 1. Summary statistics for each site sampled on the Verde River between Childs and Sheeps Bridge May 21 – 25, 2012.

Site ID	Shock Time (seconds)	Effort (/15 min)	Number of fish collected	CPUE (Fish/15 min)
1F	364	0.40	19	47.0
2F	536	0.60	23	38.6
3F	612	0.68	20	29.4
4R	489	0.54	19	35.0
6R	590	0.66	47	71.7
10R	719	0.80	40	50.1
12R	448	0.50	13	26.1
13R	605	0.67	44	65.5
14R	442	0.49	28	57.0
17R	418	0.46	21	45.2
19R	421	0.47	14	29.9
30R	410	0.46	16	35.1
32R	475	0.53	21	39.8
34R	449	0.50	12	24.1
35F	556	0.62	29	46.9
36R	525	0.58	24	41.1
38F	500	0.56	18	32.4
40R	452	0.50	32	63.7
43R	319	0.35	22	62.1
45F	504	0.56	35	62.5
47R	643	0.71	32	44.8
55R	434	0.48	6	12.4
62R	477	0.53	16	30.2
65R	551	0.61	11	18.0
71R	512	0.57	15	26.4
72R	351	0.39	34	87.2
74R	542	0.60	40	66.4
76R	358	0.40	15	37.7
77R	343	0.38	13	34.1
78R	420	0.47	25	53.6
80R	377	0.42	20	47.7
84R	399	0.44	23	51.9
85F	317	0.35	32	90.9
86R	515	0.57	25	43.7
88F	392	0.44	32	73.5
92R	578	0.64	27	42.0
93R	359	0.40	20	50.1
95R	528	0.59	30	51.1
97R	338	0.38	28	74.6
105R	378	0.42	48	114.3
Overall	18646	20.72	989	47.7
Mean	447.4	0.52	24.7	48.8
St. Dev.	96.7	0.11	10.1	20.8
SE	15.3	0.02	1.6	3.3
95% CI	31	0.03	3.2	6.7

Table 2. Species codes, common and scientific names, and status of species collected from the Verde River, Childs to Sheep Bridge, May 21 – 25, 2012. The lower two species have been collected in the past but were not collected in 2012.

Species Code	Common Name	Scientific Name	Status*
CACL	desert sucker	*Catostomus clarki*	N
CAIN	Sonora sucker	*Catostomus insignis*	N
CYCA	common carp	*Cyprinus carpio*	I
CYLU	red shiner	*Cyprinella lutrensis*	I
ICPU	channel catfish	*Ictalurus punctatus*	I
LECY	green sunfish	*Lepomis cyanellus*	I
LEMA	bluegill	*Lepomis macrochirus*	I
MIDO	smallmouth bass	*Micropterus dolomieu*	I
MISA	largemouth bass	*Micropterus salmoides*	I
PYOL	flathead catfish	*Pylodictis olivaris*	I
PTLU	Colorado pikeminnow	*Ptychocheilus lucius*	N
XYTE	razorback sucker	*Xyrauchen texanus*	N

* N = native, I = introduced

Table 3. Summary data of species collected among all sites sampled on the Verde River May 21 – 25, 2012. Catch per unit effort (CPUE) is reported as the number of fish per 15 minutes of electrofishing.

Species	Number Collected	% composition	Effort (/15 min)	CPUE (fish/15min)
CACL	12	1.2	20.7	0.6
CAIN	26	2.6	20.7	1.3
CYCA	523	52.9	20.7	25.2
CYLU	244	24.7	20.7	11.8
ICPU	8	0.8	20.7	0.4
LECY	4	0.4	20.7	0.2
LEMA	1	0.1	20.7	0.0
MIDO	121	12.2	20.7	5.8
MISA	9	0.9	20.7	0.4
PYOL	41	4.1	20.7	2.0
Total	989	100	20.7	47.7

Table 4. Length and weight summary data for collected species that were measured and weighed from the Verde River, Childs to Sheep Bridge, May 21 – 25, 2012.

	Number	Length (mm)			Mean
Species	**Collected**	**Mean**	**Minimum**	**Maximum**	**Weight (g)**
CACL	12	308	187	418	424
CAIN	26	451	285	528	1145
ICPU	8	379	245	494	610
LECY	4	128	120	142	49
LEMA	1	98	98	98	-
MIDO	121	189	106	363	100
MISA	9	255	120	410	288
PYOL	41	208	75	355	128

Table 5. Length-frequency data for species collected and measured among the forty 500-m reaches sampled on the Verde River, Childs to Sheep Bridge, May 21 – 25, 2012.

Length Range (mm)	**CACL**	**CAIN**	**ICPU**	**LECY**	**LEMA**	**MIDO**	**MISA**	**PYOL**
0-99	0	0	0	0	1	0	0	3
100-149	0	0	0	4	0	17	1	4
150-199	1	0	0	0	0	58	2	12
200-249	1	0	1	0	0	38	2	14
250-299	3	1	0	0	0	5	1	5
300-349	4	1	1	0	0	2	1	2
350-399	0	2	3	0	0	1	1	1
400-449	3	6	2	0	0	0	1	0
450-499	0	8	1	0	0	0	0	0
500-549	0	8	0	0	0	0	0	0
550-599	0	0	0	0	0	0	0	0
>600	0	0	0	0	0	0	0	0
Total	**12**	**26**	**8**	**4**	**1**	**121**	**9**	**41**

Table 6. Summarized comparison of Verde River fisheries survey data, excluding red shiner, collected between 2006 and 2012. Relative abundance is reported for each year with actual number collected below in parentheses. Catch per unit effort (CPUE) is reported as the number of fish per 15 minutes. The total electrofishing effort per 15 minutes (E/15) is below the year in parentheses.

	Relative Abundance (%)					**CPUE (fish/15 minutes)**				
Year→	2006	2007	2008	2010	2012	2006	2007	2008	2010	2012
Species	(N)	(N)	(N)	(N)	(N)	(E/15=11.8)	(E/15=16.1)	(E/15=17.4)	(E/15=15.5)	(E/15=20.7)
CACL	6.6	18.3	8.4	7.8	1.6	0.85	2.05	1.90	1.81	0.58
	10	33	33	28	12					
CAIN	12.5	32.2	14.8	17.5	3.5	1.61	3.60	3.33	4.06	1.25
	19	58	58	63	26					
CYCA	62.9	53.9	54.1	24.1	70.2	8.05	0.37	12.18	5.61	25.24
	95	212	212	87	523					
ICPU	2.6	3.3	1.5	0.8	1.1	0.34	0.37	0.34	0.19	0.39
	4	6	6	3	8					
LECY	2.6	2.2	1.0	1.9	0.5	0.34	0.25	0.23	0.45	0.19
	4	4	4	7	4					
LEMA	0.0	0.6	0.3	0.3	0.1	0.00	0.06	0.06	0.06	0.05
	0	1	1	1	1					
MIDO	52.6	11.7	5.4	28.3	16.2	6.78	1.30	1.21	6.58	5.84
	80	21	21	102	121					
MISA	6.6	3.3	1.5	1.7	1.2	0.85	0.37	0.34	0.39	0.43
	10	6	6	6	9					
PYOL	15.1	28.3	13.0	1.4	4.1	1.95	3.17	2.93	0.32	1.98
	23	51	51	5	41					
PTLU	0.0	0.0	0.0	0.3	0.0	0.00	0.00	0.00	0.06	0.00
	0	0	0	1	0					
XYTE	1.3	0.0	0.0	0.0	0.0	0.17	0.00	0.00	0.00	0.00
	2	0	0	0	0					
Overall	**152**	**180**	**392**	**361**	**745**	**20.08**	**11.54**	**22.53**	**19.55**	**35.96**

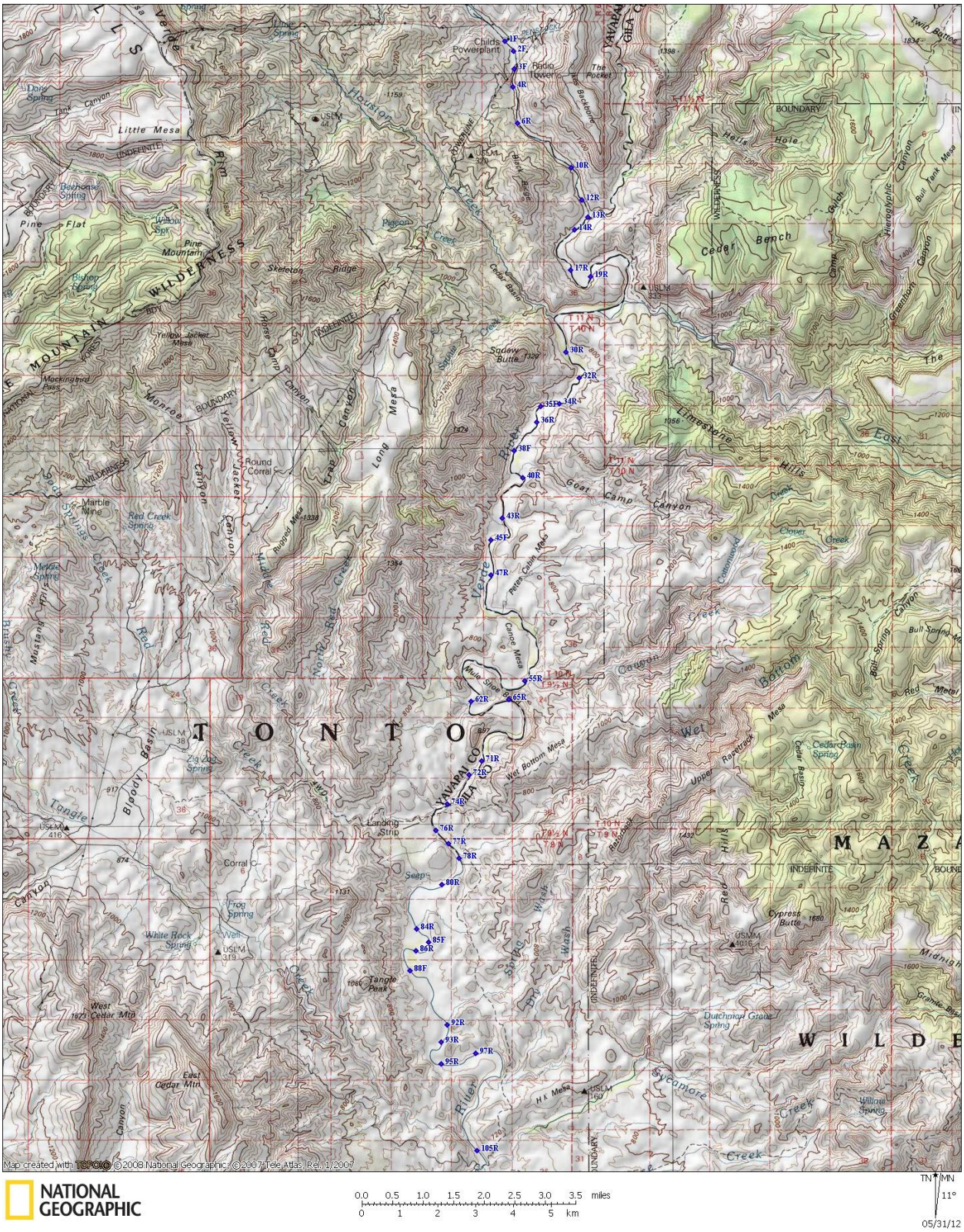


Figure 1. Map of the forty 500-m sites sampled on the Verde River, between Childs and Sheep Bridge, from May 21 – 25, 2012.

Appendix 1. Stocking data for razorback sucker (XYTE), roundtail chun (GIRO), and Colorado pikeminnow (PTLU) stocked in the Verde River from 2000 – 2012.

Date (YYYYMMDD)	Species	Stocking location	Number stocked	Mean length (mm)	Origin[a]	Tag location[b]
19941013	**XYTE**	Childs	1935	386	BPSH	CWT nose
19941121	**XYTE**	Childs	269	324	DNFH	PIT
19950202	**XYTE**	Childs	3000		BPSH	CWT nose
19950323	**XYTE**	Childs	63	442	BPSH	CWT right cheek
19950329	**XYTE**	Childs	93	432	BPSH	CWT right cheek
19951211	PTLU	Beasley Flats	1000	305	BPSH	CWT nose
19951211	PTLU	Childs	1033	305	BPSH	CWT nose
19951221	PTLU	Beasley Flats	329	381	DNFH	CWT right opercle
19951222	PTLU	Childs	309	381	DNFH	CWT right opercle
19960207	**XYTE**	Childs	480	254	BPSH	CWT nose
19961121	PTLU	Beasley Flats	999	362	BPSH	CWT left opercle
19961125	PTLU	Childs	1045	362	BPSH	CWT left opercle
19961211	**XYTE**	Childs	927	325	BPSH	CWT right dorsal
19961212	**XYTE**	Childs	980	325	BPSH	CWT right dorsal
19961213	**XYTE**	Childs	1530	325	BPSH	CWT right dorsal
19970711	PTLU	Childs	33	477	DNFH	CWT right dorsal
19970711	**XYTE**	Childs	765	287	DNFH	CWT left dorsal
19971022	**XYTE**	Childs	320	392	BPSH	CWT left dorsal
19971023	**XYTE**	Childs	556	394	BPSH	CWT left dorsal
19971106	PTLU	Beasley Flats	500	445	BPSH	CWT right dorsal
19971106	PTLU	Childs	1000	432	BPSH	CWT right dorsal
19971110	PTLU	Beasley Flats	644	430	BPSH	CWT right dorsal
19980223	**XYTE**	Childs	351	330	BPSH	CWT left dorsal
19981125	**XYTE**	Childs	2040	305	BPSH	CWT left caudal
19981217	PTLU	Childs	980	318	BPSH	CWT left caudal
19981218	PTLU	Beasley Flats	665	330	BPSH	CWT left caudal
19990909	**XYTE**	Childs	2000	381	BPSH	UNKNOWN
18990914	PTLU	Beasley Flats	364	406	BPSH	UNKNOWN
20000907	**XYTE**	Childs	10	580	Stehr Lake	PIT
20001130	**XYTE**	Childs	968	328	BPSH	CWT nose
20001204	**XYTE**	Childs	896	305	BPSH	CWT nose
20001207	**XYTE**	Childs	257	328	BPSH	CWT nose
20011109	**XYTE**	Childs	74	440	San Pedro	CWT right caudal peduncle
20011212	**XYTE**	Childs	1500	300	BPSH	CWT right caudal peduncle
20020315	PTLU	Beasley Flats	266	300	BPSH	CWT right pectoral base
20020925	**XYTE**	Childs	412	350	BPSH	CWT right cheek
20021030	**XYTE**	Childs	1610		BPSH	CWT right cheek

[a] BPSH = Bubbling Ponds State Hatchery, DNFH = Dexter National Fish Hatchery
[b] CWT = Coded Wire Tag, PIT = Passive Integrated Transponder Tag

Appendix 1. Continued

Date (YYYYMMDD)	Species	Stocking location	Number stocked	Mean length (mm)	Origin[a]	Tag location[b]
20030129	PTLU	Beasley Flats	2049	400	BPSH	CWT left pectoral base
20030130	**XYTE**	Childs	378	330	BPSH	CWT left pectoral base
20040128	**XYTE**	Beasley Flats	461	424	BPSH	CWT left caudal
20040205	**XYTE**	Beasley Flats	973	360	BPSH	CWT left caudal
20040206	**XYTE**	Beasley Flats	891	361	BPSH	CWT left caudal
20040129	PTLU	Beasley Flats	833	440	BPSH	CWT left caudal
20040130	PTLU	Beasley Flats	711	440	BPSH	CWT left caudal
20050202	**XYTE**	Beasley Flats	1024	310	BPSH	CWT right cheek
20050419	**XYTE**	Beasley Flats	980	386	BPSH	CWT right cheek
20050420	PTLU	Beasley Flats	1550	385	BPSH	CWT right cheek
20060802	PTLU	Beasley Flats	506	412	BPSH	CWT left dorsal
20070710	PTLU	Beasley Flats	550	432	BPSH	CWT right pectoral
20070711	PTLU	Beasley Flats	1025	432	BPSH	CWT right pectoral
20070711	**XYTE**	Beasley Flats	45	475	BPSH	CWT right pectoral
20090319	PTLU	Beasley Flats	575	480	BPSH	CWT Right caudal peduncle
20090319	PTLU	Beasley Flats	512	480	BPSH	CWT Right caudal peduncle
20090320	PTLU	Beasley Flats	575	480	BPSH	CWT Right caudal peduncle
20090819	GIRO	Childs	1987	150	BPSH	PIT
20100107	PTLU	Beasley Flats	980	410	BPSH	CWT left dorsal
20100310	**XYTE**	Beasley Flats	994	285	BPSH	CWT dorsal
20100422	**XYTE**	Beasley Flats	1088	288	BPSH	CWT dorsal
20100520	GIRO	Childs	505	170	BPSH	PIT
20110323	**XYTE**	Beasley Flats	896	326	BPSH	CWT right pectoral
20110406	**XYTE**	Beasley Flats	900	373	BPSH	CWT right pectoral
20120110	**GIRO**	Childs	851	152	BPSH	CWT right dorsal
20120203	**GIRO**	Beasley Flats	3808	75	BPSH	CWT right dorsal
20120410	**XYTE**	Beasley Flats	450	440	BPSH	CWT right dorsal
20120418	**XYTE**	Beasley Flats	902	385	BPSH	CWT right dorsal

[a] BPSH = Bubbling Ponds State Hatchery, DNFH = Dexter National Fish Hatchery
[b] CWT = Coded Wire Tag, PIT = Passive Integrated Transponder Tag

Appendix 2. Riparain Herpetofauna survey report for Verde River, Childs to Sheep's Bridge, May 21-25, 2012 compiled by Bill Burger, AGFD R6.

Upstream end: ~435978/3800987 (WGS84)
Description: Child's put-in

Downstream end: ~434746/3779078
Description: Sheep's Bridge take-out

Elevation: 2100 – 2600

Dates/Time: 21-25 May 2012

Search Person-hours & Times: ~225 hrs (7 people, 8 hrs/day, 4 days)

Trapping: yes, 20 Gee minnow traps set at each camp for ~1020 trap-hours total (mostly at night)

Riparian Herps: bullfrogs (RACA), canyon treefrog (HYAR), spiny softshell (TRSP), Sonoran mud turtle (KISO), lowland leopard frog (along Tangle Creek, but not mainstem Verde)

Fish:
Native: Sonoran sucker (CAIN, caught in river), long-fin dace (AGCH, in Squaw Creek, Wet Bottom, and Tangle Creek), chub (*Gila* sp. in lower Fossil Creek)

Non-native soft ray: mosquito fish (GAAF)

Non-native spiny ray: largemouth bass (MISA), smallmouth bass (MIDO), channel catfish (ICPU), flathead catfish (PYOL), common carp (CYCA), Green sunfish (LECY), red shiner (CYLU)

Crayfish: yes, abundant in river; also in Squaw Creek and Wet Bottom Creek

Personnel: Bill Burger, Curt Gill, Jake Jaeger, Kent Mosher, Kyle Overton, Grant Pearce, Jeff Sorenson

Trip and Survey Notes:
This was a Monday – Friday trip with primary survey emphasis on fisheries survey using electro-shocking at defined locations, and a secondary emphasis on riparian herpetofauna surveys. Curt Gill provided a separate report on the fisheries work, which was primarily conducted by Curt, Jake, Grant, Kent, and Kyle. Bill emphasized looking for riparian herpetofauna, and others also were vigilant for at least gartersnakes. Jeff primarily served the role of cook. We put on the river about 16:20 on 21 May; camped near Baby

Snaggletooth Rapid (435878/3799205), SE of Squaw Butte (437382/3791941), east of Table Mountain (434967/3782345), and at Tangle Creek (434395/3771848); then took off the river about 1000 on 25 May at Sheep's Bridge. A map of the survey area is included.

Herpetofauna:

Twenty "Gee" brand metal minnow traps were set upon arrival at camp each evening and pulled the next morning (~240-270 trap hours/night for ~1020 hours total). Trapping results are provided in Table 1. Traps were targeting gartersnakes and were generally set 10 per side, and spaced within ~200 m upstream and down from camp. They were set along the river's edge, with their funnel openings just submerged and airspace left in the top. Traps were baited with fish food in hopes of attracting fish, which then might attract snakes. No gartersnakes were caught in the traps, nor were any seen along the Verde or in tributaries or backwaters despite Bill actively looking the entire trip and others also alert for their presence. Three diamondback rattlesnakes were seen, all right along the river's edge, 2 while setting/checking traps and the 3rd near camp at Tangle Creek.

Bullfrogs were seen and/or heard daily. Although I have consistently detected bullfrogs along the Verde main-stem on prior trips, they seemed perhaps more common this trip. Although this list is not complete they were seen or heard in a backwater just upstream of Fossil Creek, at the East Verde confluence, a side channel upstream of Houston/Squaw Creek, a backwater east of Squaw Peak, at our Squaw Peak camp, another backwater between Canyon Creek and Cow Flop Spring, a large backwater below Wet Bottom Creek (at 433259/3778506), a backwater above Spring Creek, and at our Tangle Creek Camp.

A dead softshell turtle was seen at our camp near Squaw Butte, and other live ones were subsequently seen in the river downstream. A few Sonoran mud turtles were also seen basking along the Verde.

Table 1: Gee Minnow Trap Results from the Verde River, May 21-25, 2012 (20 traps set per night).

Location (WGS84)	Set time	Pull time	Trap Hrs.	Catch
435878/3799205	1800-1830	0730-0800	270	Crayfish (32)
434967/3782345	1800-1830	0700-0730	260	Crayfish (25), GAAF (3), LECY (1), CYLU (4), RACA tadpole (1)
434967/3782345	1900-1930	0700-0730	240	Crayfish (13), spiders (3)
434395/3771848	1700-1730	0730-0800	250	Crayfish (9), LECY (1)

Notes on tributaries:

Fossil Creek was flowing nicely at confluence. Bill walked upstream in the creek ~200 m and noted largemouth bass, smallmouth bass, chub, and crayfish. It would be interesting to survey this lowest portion of Fossil for gartersnakes someday. A narrow-headed gartersnake was found in the Verde slightly below Fossil Creek during a fish survey in 2005, and although there are no records of the species from Fossil itself despite extensive studies and recreation in the area, probably relatively few people access the lowest portions of the creek.

The **East Verde River** was dry at the Verde confluence. A backwater just upstream contained bullfrogs, mosquito fish, and what appeared to be green sunfish.

Houston/Squaw Creek was dry at the Verde confluence with the first water about 0.4 mile up drainage, just downstream of the Squaw Creek and Houston Creek confluence. As it has been every time I have been to this spot, Houston Creek was dry upstream and all water flowed from the Squaw Creek drainage. I continued up Squaw Creek to a fence line about 0.3 mile from the Houston confluence. Longfin dace were abundant for about the 300 m or so but then their numbers seemed to decline further upstream. Crayfish were abundant starting about 100 m up the drainage to the end of my survey. Although I have previously seen lowland leopard frogs in this portion of Squaw Creek (prior to seeing crayfish there), I have not seen them my last 2 visits. A canyon treefrog was seen in Squaw Creek.

Canyon Creek was dry at its confluence with the Verde and for at least about 200 m upstream with no indication of recent flows or likely water nearby upstream.

Red Creek was dry at its confluence with the Verde. I had intended to walk upstream to look for water and survey, but did not because people who had driven in and camped at the confluence indicated it was 1-1.5 miles upstream before flow surfaced. This was further upstream than normal based on their experience and mine, but as they indicated it has been a dry year.

Wet Bottom Creek, as normal, had water at the Verde confluence. I walked upstream about ¼ mile to where surface water ended. Species noted included longfin dace, green sunfish, crayfish, and canyon treefrog tadpoles. (Based on prior surveys, including one in March 2012, there is a lot more surface water further upstream, with chub and other fish species; but flow is subsurface for an extended length of the lower streambed.)

Spring Wash was dry for at least its lowest 200 m, with no sign of water or riparian-specific vegetation.

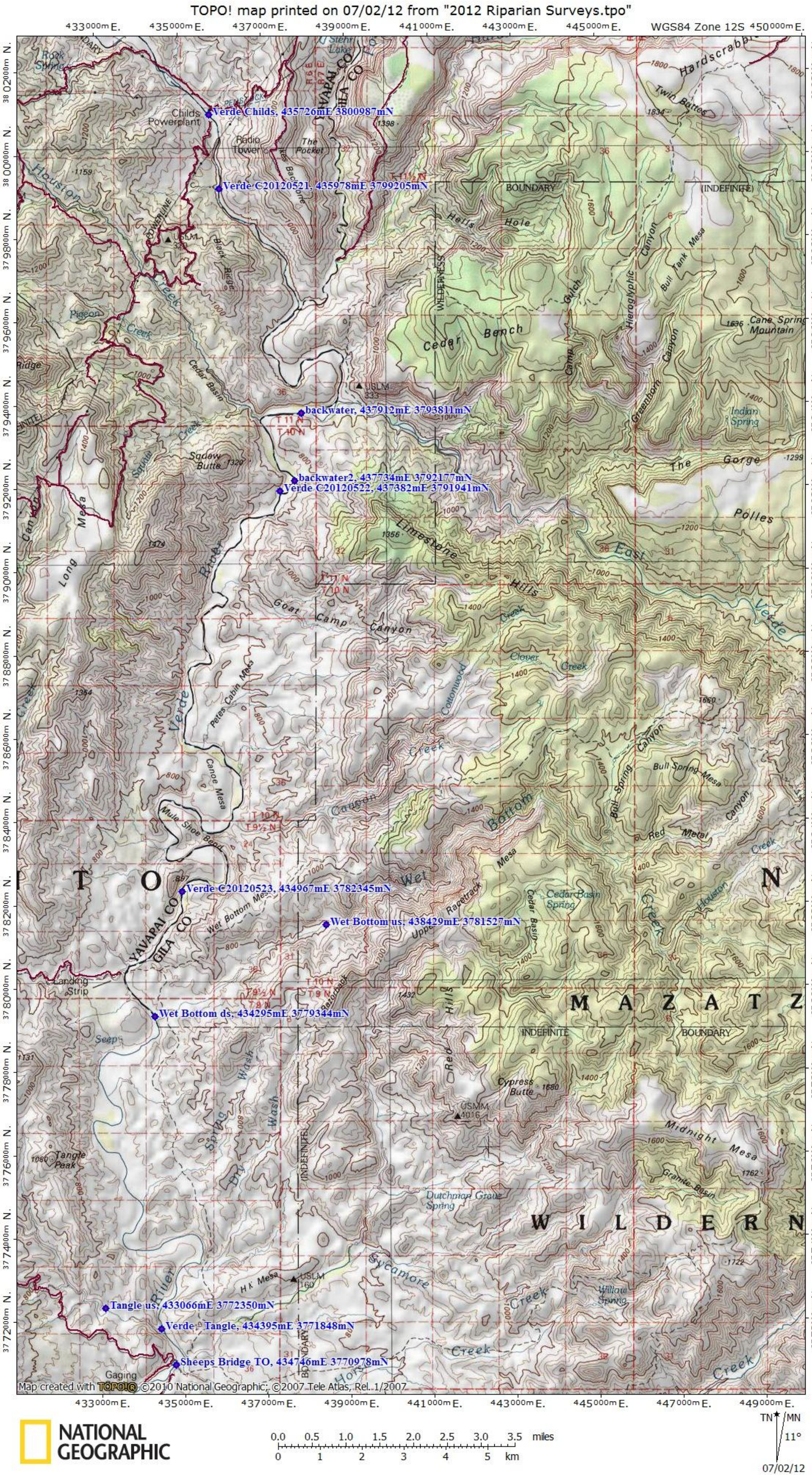
Tangle Creek was dry at the Verde confluence, but I did a night survey about 1 mile upstream to 433066/3772350. Surface water was intermittent in this stretch, occurring perhaps 20-25% of the way. Longfin dace were abundant in the lower pools and occurred through most of the watered areas surveyed. I heard one lowland leopard frog call. I saw 2 Gila monsters, a grey fox, and a great horned owl along the creek.

Mammals:
No specific surveys were conducted, nor emphasis placed on mammals on this trip, but at least a few observations are worth note. Otter sign was seen daily, and although no otters were seen it is obvious they continue to occupy this portion of the Verde in good numbers and distribution. Beaver sign was also noted at multiple locations, as were raccoon tracks. A bighorn sheep ewe (and possibly also a yearling) was seen several times between 0700-0800 on the morning of 23 May on a rocky ridge protruding from the south side of Table Mountain (~4346718/3782345). I had not previously seen a bighorn right along the Verde so this information was reported to other AGFD personnel. It is likely the sheep was from the Clear Creek release, with others apparently from that release having been seen in Fossil Creek and the East Verde. We also saw 2 mule deer, 3 white-tailed deer, a group of javelina, elk scat, and cattle tracks and crap along the river. Bats were seen and heard flying overhead nightly, with those heard likely *Nyctinomops* sp. A grey fox was seen in Tangle Creek and it followed me for about 100 yards.

Birds:
Birds were not an emphasis on this trip but birds seen or heard were noted daily and are listed in Table 2. We saw nesting cliff swallows at multiple locations along the river. Other evidence of local nesting included recently fledged and flight-less common mergansers, and what was an apparent nest of a zone-tailed hawk based on very agitated behavior of an adult near Cow Flop Spring (434573/3783141).

Table 2: Bird Species Noted along Verde River, Childs to Sheep Bridge May 21-25, 2012

Species	**Trip Days seen/heard**
Great blue heron	1,2,3,4,5
Green heron	3,4
Black-crowned night heron	2,3
Mallard	2,3,4
Common merganser	2,3,4
Turkey vulture	2,3,4,5
Bald eagle	3
Common black hawk	2,3
Zone-tailed hawk	3
Red-tailed hawk	3
Gambel's quail	1,2,3,4
Killdeer	2
Spotted sandpiper	2,3
White-winged dove	2,3,4,5
Mourning dove	1,2,3,4,5
Great horned owl	4
White-throated swift	2,3
Black phoebe	1,2,3,4,5
Say's phoebe	3
Ash-throated flycatcher	1,2
Western kingbird	4
Cliff swallow	2,3,4,5
Common Raven	1,2,3,4,5
Canyon wren	2
Phainopepla	1,3
Bell's vireo	1,2,3,4,5
Lucy's warbler	2,3,4,5
Yellow warbler	1,2,3,4,5
Common yellowthroat	1,2,3,4,5
Wilson's warbler	4
Yellow-breasted chat	2,3,4,5
Summer tanager	1,2
Northern cardinal	2,3
Blue grosbeak	4
Black-headed Grosbeak	1
Abert's towhee	4,5
Song sparrow	2,3,4,5
Red-winged blackbird	4,5
Great-tailed grackle	1,4
Brown-headed cowbird	2
Hooded oriole	2


TOPO! map printed on 07/02/12 from "2012 Riparian Surveys.tpo"
WGS84 Zone 12S
Verde Childs, 435726mE 3800987mN
Verde C20120521, 435978mE 3799205mN
backwater, 437912mE 3793811mN
backwater2, 437734mE 3792177mN
Verde C20120522, 437382mE 3791941mN
Verde C20120523, 434967mE 3782345mN
Wet Bottom us, 438429mE 3781527mN
Wet Bottom ds, 434295mE 3779344mN
Tangle us, 433066mE 3772350mN
Verde - Tangle, 434395mE 3771848mN
Sheeps Bridge TO, 434746mE 3770978mN
Map created with TOPO!® ©2010 National Geographic; ©2007 Tele Atlas, Rel. 1/2007
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APPENDIX C

FISH AND HERPETOFAUNA SURVEYS OF WET BOTTOM CREEK, 2012

Arizona Game and Fish Department
Wet Bottom Creek
Fish and Riparian Herpetofauna Survey
April 9-12, 2012

K. Mosher[1], A. Makinster[1], and W. Burger[2]

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Photo courtesy of C. Gill, 2012

Introduction and Methods

Research Branch and Region 6 personnel sampled Wet Bottom Creek during the week of April 9, 2012. Wet Bottom Creek is a tributary of the Verde River upstream of Horseshoe Reservoir. Sampling efforts were focused in the lowest 6.5-km of the roughly 27.5-km drainage length. The primary objective of this survey was to document the continued presence and characteristics of the chub population (*Gila* sp.) in the creek. Emphasis was also placed on observing and documenting riparian herpetofauna. Previous surveys conducted within Wet Bottom Creek was limited. Bagley (2002) noted much of the lower 3-km extending to the Verde River confluence area was dry; however, he documented *Gila* species roughly 5.6-km upstream of the Verde River as well as numerous green sunfish (*Lepomis cyanellus*). Burger (2009) surveyed upstream in Wet Bottom Creek from the Verde River and first observed *Gila* species roughly 2.7-km upstream of the confluence, with multiple visual observations of *Gila* species upstream from that point. Other fish and riparian herpetofauna reported by Burger (2009) were green sunfish (*Lepomis cyanellus*), desert sucker (*Catostomus clarkii*), longfin dace (*Agosia chrysogaster*), smallmouth bass (*Micropterus dolomieu*), red shiner (*Cyprinella lutrensis*), lowland leopard frog (*Lithobates yavapaiensis*), Sonoran mud turtles (*Kinosternon sonoriense*), and black-necked gartersnake (*Thamnophis cyrtopsis*). Burger (2000, 2001) also reported on brief stops of the lower roughly 0.8 km portion of Wet Bottom Creek near the Verde River confluence. No native fish were observed during those surveys; however, green sunfish, smallmouth bass, bullfrog, Sonoran mud turtle, and crayfish were observed in 2000. These species, excluding the mud turtle but including mosquitofish (*Gambusia affinis*) and channel catfish (*Ictalurus punctatus*) were observed in 2001.

A total of 70 hoop nets of four different types were used during the present study to survey the fish assemblage (i.e., multiple size classes and species) of the lower portions of the stream (Figure 1). Total effort (i.e., amount of time hoop nets were in the water) equaled 1,359.53 hours. Hoop nets were comprised of large hoop nets (HL) consisting of three hoops measuring 2-m in length, 61-cm in diameter, 0.6-cm mesh of heavy delta 44 test, and a 10-cm throat tide to the front hoop; small hoop nets (HS) consisting of three hoops measuring 2-m in length, 61-cm in diameter, 0.6-cm mesh of heavy delta 44 test, and a 10-cm throat tied to the middle hoop; collapsible hoop nets (HC) measuring 84-cm in length, 30-cm in diameter, 1.8-cm mesh, and a 15-cm throat; and HT nets that were similar to HC nets but were not baited. All hoop nets excluding the HT nets were baited with Aquamax™. Hoop nets were deployed in randomly selected pool habitats that varied in size between roughly 10- and 100-m in length, 3- and 15-m in width, and 1- and 2-m in depth.

A total of 38 trap nets of two different types were used to survey riparian herpetofauna, which were randomly set in similar areas as the hoop nets. Total effort equaled roughly 1,824 hours. Trap nets were comprised of square collapsible nets (HQ) consisting of three square hoops, measuring 80-cm in length, 25-cm in diameter, 0.3-cm mesh, and a 15-cm throat; and metal Gee minnow traps measuring 46-cm in length and 15-cm in diameter with a 2.5-cm opening and 0.64-cm steel mesh. All trap nets were unbaited; however, if fish were found in the traps, they were left to serve as bait for predatory herpetofauna. All fish

captured in the hoop and trap nets were identified to species, measured to the nearest millimeter total length (TL), and released near their original site of capture. Captured *Gila* species were weighed to the nearest gram (g). A total of 6 caudal fin clips were taken from captured *Gila* species and preserved in ethanol. Additionally, a total of 10 whole *Gila* species specimens were incidentally collected during survey efforts and also preserved in ethanol. Both the caudal fin clips and whole specimens were collected for future age/growth and genetic analyses.

Results and Discussion

Species captured

A total of 443 fish comprising 5 species were captured during hoop net surveys in 2012 (Table 1). HC nets captured all 5 species, whereas the HL, HS, and HT nets captured green sunfish only. *Gila* species dominated the catch of HC nets (213 fish) followed by green sunfish (65), desert sucker (48), longfin dace (8), and smallmouth bass (4).

No significant barriers (i.e. > 3-m in height) were found throughout the survey area. However, several barriers < 2-m in height exist within the stream, which may limit the upstream invasion of green sunfish but not smallmouth bass. Smallmouth bass and crayfish were sporadically captured during survey efforts.

Nine Sonoran mud turtles were captured in the hoop nets. Other riparian herpetofauna either hand-captured or visually observed included 2 black-necked gartersnakes, several canyon treefrogs (*Hyla arenicolor*), and one dead lowland leopard frog. A primary objective of the herpetofauna survey efforts was detecting either Mexican gartersnakes (*T. eques*) or Narrow-headed gartersnakes (*T. rufipunctatus*), since both are known from the Verde River mainstem (though neither from Wet Bottom Creek). Various portions of the creek appeared suitable for either species and a sufficient prey base of native fish exists within, but neither species was detected during survey efforts. Timing of this survey may have been earlier than optimal for gartersnakes; however, in addition to the herpetofauna mentioned above, we encountered 2 Gila monsters (*Heloderma suspectum*), 2 diamondback rattlesnakes (*Crotalus atrox*), 1 black-tailed rattlesnake (*C. molossus*), 1 chuckawalla (*Sauromalas ater*), 2 unidentified snakes (most likely whipsnakes, *Masticophis* sp.), a whip-tail lizard (*Aspidoscelis* sp.), and abundant tree lizards (*Urosaurus ornatus*), indicating herpetofauna were generally active.

CPUE

Hoop net catch-per-unit effort (CPUE) was calculated as the number of fish captured per hour. HL, HS, and HT CPUE was highest for green sunfish (0.21, 0.62, and 0.06 fish/hour, respectively). HC CPUE was highest for *Gila* species (0.19 fish/hour). Total CPUE was highest for the HS nets (0.62 fish/hour) while HT nets had the lowest CPUE (0.06 fish/hour; Table 2).

Gila species were first captured roughly 3.2 km upstream of the Verde River confluence (WB01-09) and were commonly captured from this point upstream within the survey area

(Figure 2). Desert sucker and longfin dace CPUEs followed a similar trend, with the highest CPUEs observed in upstream portions of the stream. Conversely, green sunfish CPUE was highest in the lower portions of the stream and were not captured upstream of a series of 1- to 1.5-m natural barriers. It is likely green sunfish may limit the occurrence of *Gila* species downstream of the natural barriers due to their predatory impacts on larval fish (Dudley and Matter 2000). However, instream vegetation throughout the lower portion of the creek was sparse, suggesting perennial water is lacking during much of the year. Thus, it is unlikely *Gila* species would survive in lower portions of the creek absent of green sunfish. Smallmouth bass CPUE remained low throughout the survey area; however, these fish were captured upstream of the natural barriers (Figure 2).

Length Frequency Analysis

Length frequency analysis of *Gila* species captured during hoop net surveys suggested a robust population consisting of multiple year classes exists in Wet Bottom Creek (Figure 3). Length frequency analyses of desert suckers also suggested a population consisting of multiple year classes exists, but is mostly comprised of individuals ≥ 125mm (Figure 4). All size classes of *Gila* species and desert suckers were captured in HC nets. However, smaller young-of-year fish may have not been captured due to the timing of the survey (i.e., young-of-year fish are likely most susceptible to these gear types during the fall). Length frequency analysis of green sunfish suggested a population consisting of multiple year classes exists, with the majority of fish between 100 and 150 mm TL (Figure 5). Too few longfin dace and smallmouth bass were captured to conduct similar analyses.

Future Recommendations

The population of *Gila* species within Wet Bottom Creek appears to be robust with evidence of multiple size classes present. Future surveys within the creek should be conducted in areas upstream of our survey area to determine if similar conditions exist throughout the drainage. Such surveys could also document the presence/absence of smallmouth bass, which may limit future recruitment of *Gila* species. We suggest future surveys exclusively utilize the HC nets used during our study. The HC nets are compact and lightweight, which make sampling in upstream areas safe and effective through the very remote and rugged terrain of the creek.

Conservation Opportunities

Predatory non-native species (i.e., green sunfish, smallmouth bass) appear to be the biggest threat to *Gila* species within Wet Bottom Creek. However, despite the presence of non-natives (particularly in lower portions of the creek), the population of *Gila* species continues to persist. Natural barriers appear to limit the upstream migration of green sunfish suggesting potential negative impacts are minimal. However, should conservation actions be implemented (i.e., mechanical removal), thoughtful consideration must be given to estimated costs of such actions. The remoteness of the creek would likely require helicopter assistance to transport personnel and gear.

Literature Cited

Bagley, B. 2002. Survey of the Verde River drainage, Arizona, for loach minnow (*Tiaroga cobitis*). Final Report submitted to the U. S. Fish and Wildlife Service, Arizona Ecological Services Office, Phoenix, Arizona. Federal Contract # 22410-0-M525.

Burger, W. P. 2000. Verde River Survey, Childs to Sheep's Bridge, 15-21 August 2000. Trip Report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Burger, W. P. 2001. Verde River Survey, Childs to Sheep's Bridge, 23-27 July 2001. Trip Report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Burger, W. P. 2009. Verde River and tributaries, Childs to Horseshoe Dam. Trip report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Table 1. Species composition of fish captured during large hoop net (HL), small hoop net (HS), circular collapsible hoop net (HC), and non-baited circular collapsible hoop bet (HT) surveys in Wet Bottom Creek, April 2012. Numbers of each net type used are given under each net type heading.

Species	**HL** N = 6	**HS** N = 6	**HC** N = 55	**HT** N = 3	**Total Species**
Longfin dace (*Agosia chrysogastor*)			8 (*2%*)		8 (*2%*)
Desert sucker (*Catostomus clarki*)			48 (*14%*)		48 (*11%*)
Chub species (*Gila spp.*)			213 (*63%*)		213 (*48%*)
Green sunfish (*Lepomis cyanellus*)	25 (*100%*)	77 (*100%*)	65 (*19%*)	3 (*100%*)	170 (*38%*)
Smallmouth bass (*Micropterus dolomieu*)			4 (*1%*)		4 (*1%*)
Total	**25**	**77**	**338**	**3**	**443**

Table 2. Large hoop net (HL), small hoop net (HS), circular collapsible hoop net (HC), and circular collapsible hoop net without bait (HT) catch-per-unit effort (mean and standard error of the mean [S.E.]) for species encountered during Wet Bottom Creek fish surveys, April 2012.

	HL		HS		HC		HT	
Species	**Mean**	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**	**Mean**	**S.E.**
Longfin dace					0.01	0.01		
Desert sucker					0.04	0.01		
Chub species					0.19	0.06		
Green sunfish	0.21	0.11	0.62	0.16	0.06	0.02	0.06	0.06
Smallmouth bass					<0.01	<0.01		
Total	0.21	0.11	0.62	0.16	0.31	0.07	0.06	0.06

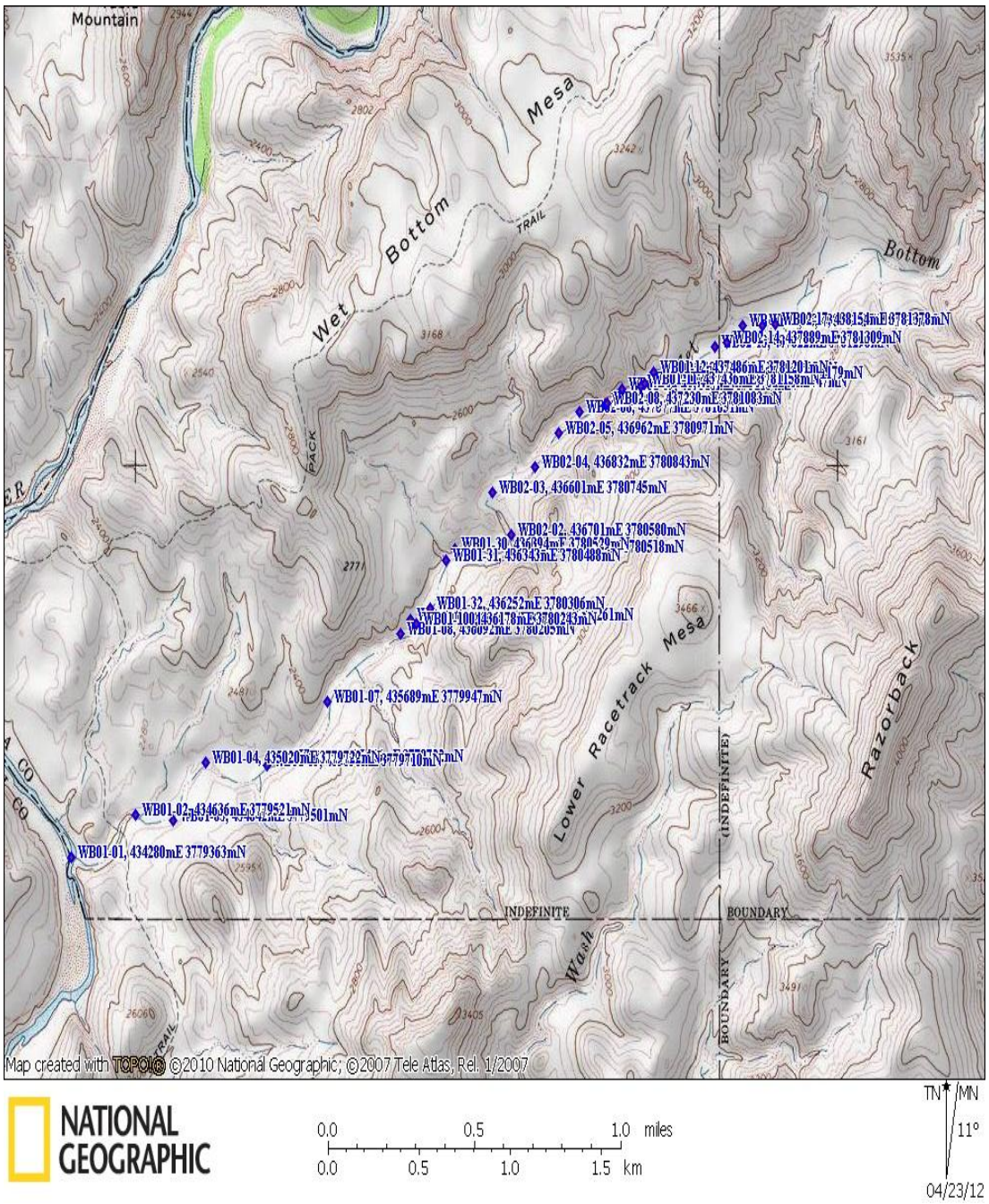


Figure 1. Map of the Wet Bottom Creek study area beginning at the Verde River Confluence and ending roughly 6.5 km upstream of the confluence. Individual waypoints indicate locations of hoop net sites sampled during April 2012.

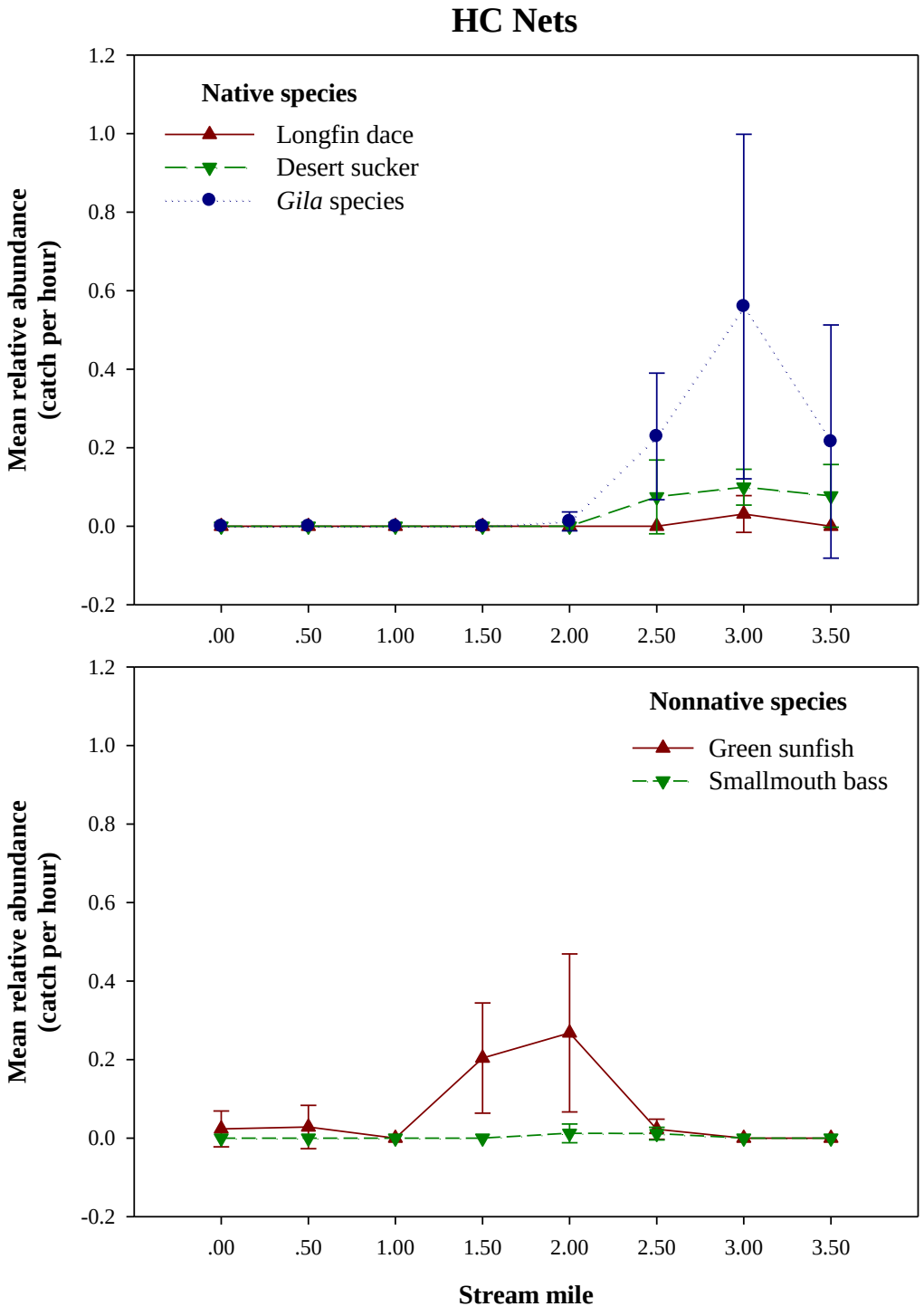


Figure 2. Mean relative abundance (catch per hour) of native species (i.e., longfin dace, desert sucker, and *Gila* species; top panel) and nonnative species (i.e., green sunfish and smallmouth bass; bottom panel) by stream mile beginning at the Verde River confluence captured during collapsible hoop net (HC net) sampling in Wet Bottom Creek, April 9-12, 2012. Bars represent ± 2 standard errors of the mean.

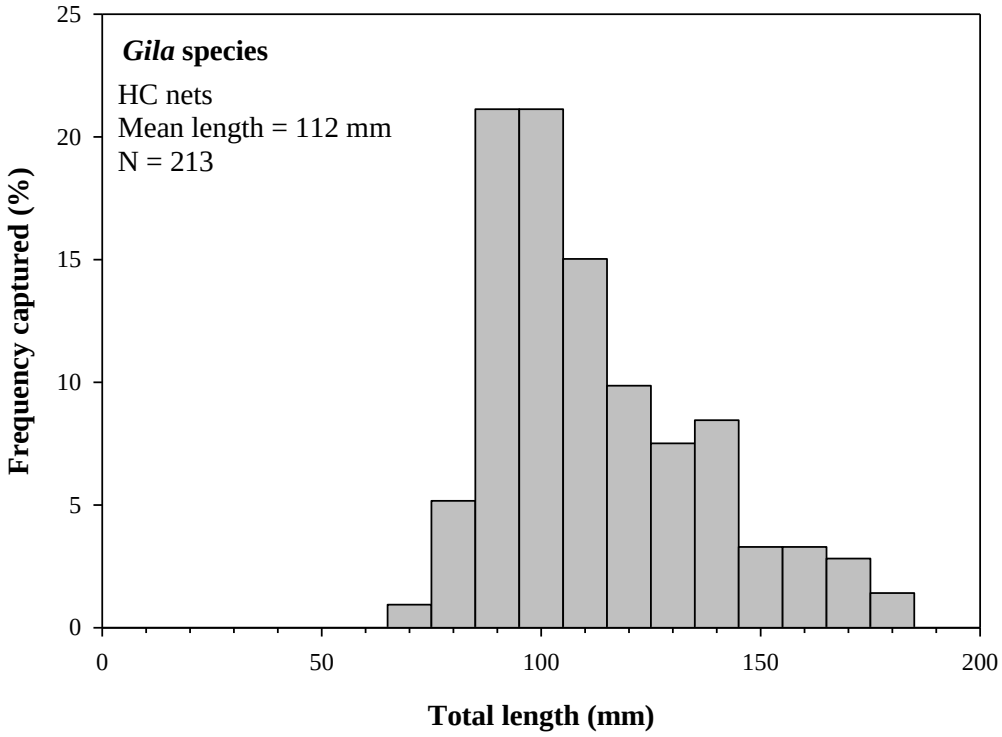


Figure 3. Length frequency distribution of chub species captured in circular collapsible hoop nets (HC) during sampling efforts at Wet Bottom Creek, April 2012.

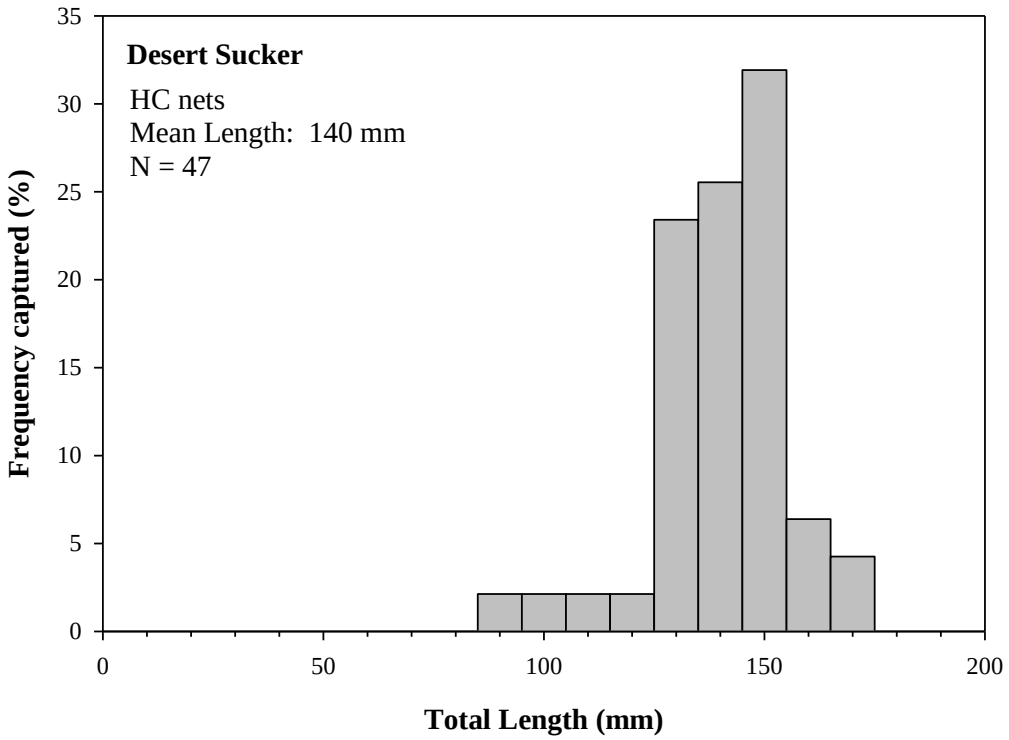


Figure 4. Length frequency distribution of desert sucker captured in circular collapsible hoop nets (HC) during sampling efforts at Wet Bottom Creek, April 2012.

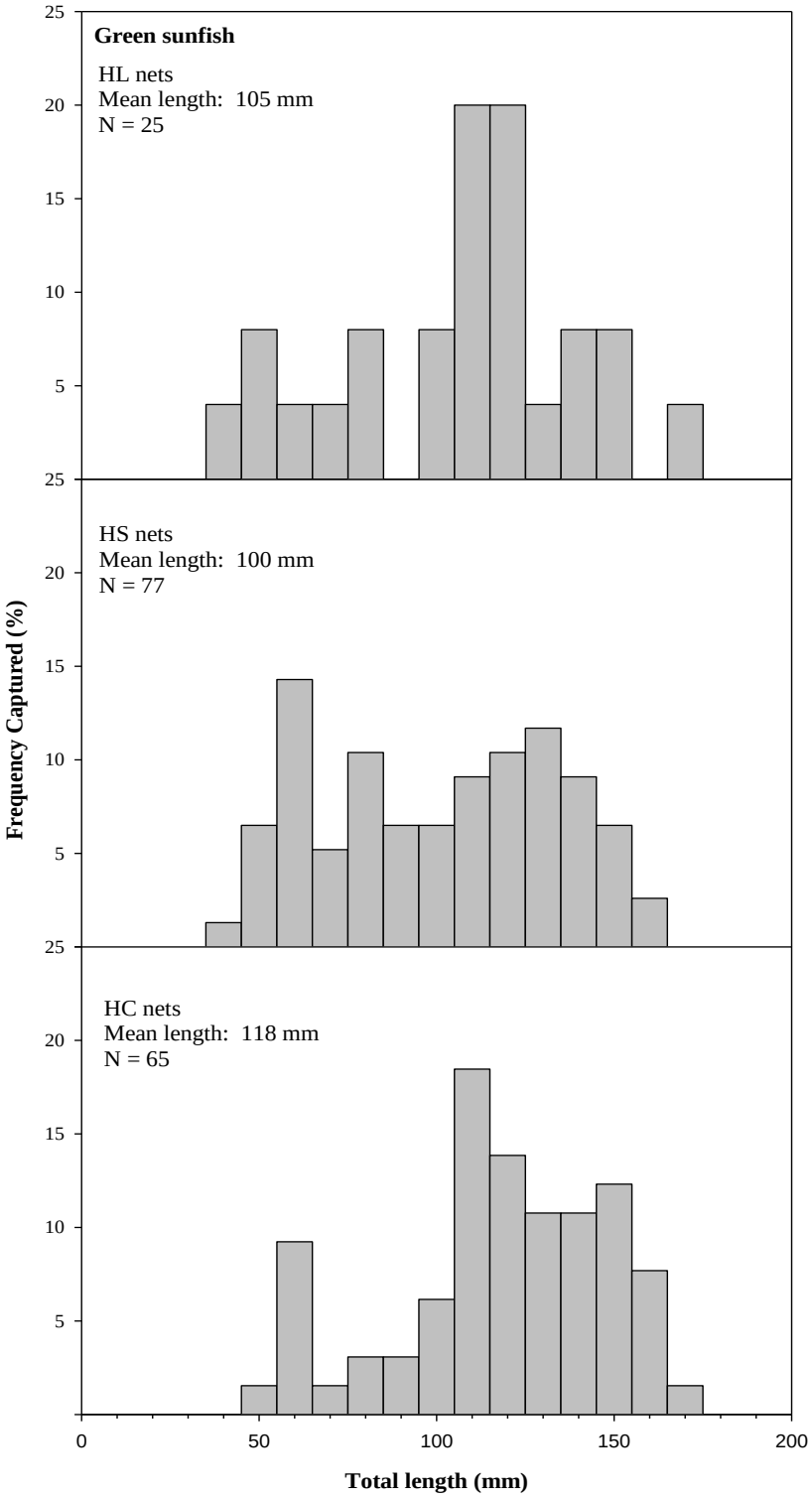


Figure 5. Length frequency distribution of green sunfish captured in large hoop nets (HL; top panel), small hoops nets (HS; middle panel), and circular collapsible hoop nets (HC; bottom panel) during sampling efforts at Wet Bottom Creek, April 2012.

Arizona Game and Fish Department
Wet Bottom Creek Riparian Herpetofauna and Fish Surveys
10-13 September 2012

Bill Burger and Curt Gill
Arizona Game and Fish Department, Region VI, 7200 E. University Drive, Mesa, AZ 85207

"Datasheet" Summary of 10-13 September 2012 Wet Bottom Survey

Upstream end of survey: 441254E, 3782528N (all UTMs WGS84, zone 12S)
Description: above a series of barrier falls

Downstream end of survey: 436192E, 3780248N
Description: SRP gauge and helicopter landing site

Elevation: 2350 - 3250

Dates/Time: 10-13 September 2012

Active Search Person-hours & Times: ~107 person-hours between ~07:30 – 18:00 daily.

Trapping:
~1250 trap-hours with Promar TR-501 traps
~128 trap-hours with Promar TR-502 traps

Riparian Herps:
black-necked gartersnake (*Thamnophis cyrtopsis*)
lowland leopard frog (*Rana yavapaiensis*)
canyon treefrog (*Hyla arenicolor*)
red-spotted toad (*Bufo punctatus*)
Sonoran mud turtle (*Kinosternon sonoriense*)

Fish:
Native: chub (*Gila* sp.), desert sucker (*Catostomus clarki*), longfin dace (*Agosia chrysogaster*)
Non-native: green sunfish (*Lepomis cyanellus*), smallmouth bass (*Micropterus dolomieui*) – all non-natives below 437489E, 3781197N.

Crayfish: yes, low numbers detected in lower portions of survey (downstream from 437489E, 3781197N)

Personnel:
Bill Burger, Curt Gill, and Jake Jaeger (AGFD); Iain Emmons (NAU)

(Cover photos show representative habitat in upper and lower portions of survey area.)

Detailed Trip Report

Introduction & Summary:

Wet Bottom Creek is located within the Mazatzal Wilderness area on Tonto National Forest, and it flows into the Verde River ~20 air-km upstream of Horseshoe Dam (Figure 1). Four of us from Arizona Game and Fish (AGFD) Region 6 and Northern Arizona University (NAU) based our 10-13 September 2012 surveys out of a small camp (438152E, 3781358N; all UTMs WGS84, zone 12S) on stream left ~4.3 air-km upstream from the Verde confluence, and during the survey we covered ~7.2 km of stream from the Salt River Project (SRP) gauge and helicopter landing pad (436192E, 2780248N) upstream to above a series of barrier falls and ending at 441254E, 3782528N. The primary purpose of this survey was to look for gartersnakes, particularly either Mexican or narrow-headed gartersnakes (*Thamnophis eques* and *T. rufipunctatus*); but also to document the upstream extent of chub (*Gila* sp., taxonomy still in question, so no specific species noted). Both of the target gartersnake species are known from the Verde, but neither had been documented in Wet Bottom Creek. Surveys were conducted using trapping and visual searching. Neither of the target gartersnake species was found during the survey, but we did document good populations of native fish [chub, desert sucker (*Catostomus clarki*), longfin dace (*Agosia chrysogaster*)], lowland leopard frogs (*Rana yavapaiensis*), and Sonoran mud turtles (*Kinosternon sonoriense*). We captured one black-necked gartersnake (*Thamnophis cyrtopsis*), and also saw canyon treefrogs (*Hyla arenicolor*). In the lower portion of the survey stretch (downstream from 437489E, 3781197N) we also documented smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomis cyanellus*), and crayfish. Chub were detected upstream to 440776E, 3782416N.

Prior Surveys:

This survey was planned following an April 2012 of Wet Bottom Creek survey by AGFD Research Branch and Region 6 personnel. During that survey (Mosher et al. 2012) we surveyed from the Verde confluence upstream to near our camp site for this survey. We documented non-native green sunfish and smallmouth bass within the lowest ~4 km of creek, but with a transition to chub, longfin dace and desert suckers above. Chub were common at ~437077E, 3781031 and upstream; and the most upstream green sunfish was captured at that same location. The most upstream smallmouth bass was captured at 437220E, 3781083N in April. We caught 9 Sonoran mud turtles in hoop nets during the April survey, and hand-captured or observed 2 black-necked gartersnakes, several canyon treefrogs, and one dead lowland leopard frog. Although we thought at the time of the April survey that it may have been earlier than optimal for gartersnakes; in addition to the herpetofauna mentioned above, we encountered 2 Gila monsters (*Heloderma suspectum*), 2 diamondback rattlesnakes (*Crotalus atrox*), 1 black-tailed rattlesnake (*C. molossus*), 1 chuckawalla (*Sauromalas ater*), 2 unidentified snakes (most likely whipsnakes, *Masticophis* sp.), a whip-tail lizard (*Aspidoscelis* sp.), and abundant tree lizards (*Urosaurus ornatus*), indicating herpetofauna were generally active. Based on the appearance of the habitat and the results of the April survey we thought that it would be worthwhile to return to Wet Bottom Creek later in the year and survey areas further

upstream where it seemed the creek had exclusively native fish and herpetofauna, and no crayfish.

Likely because of its remote location other prior surveys of Wet Bottom Creek were limited. Bagley (2002) noted much of the lower 3-km extending up from the Verde River confluence area was dry; however, he documented chub ~5.6-km upstream of the Verde River as well as numerous green sunfish. Burger (2009) surveyed upstream in Wet Bottom Creek from the Verde River and first observed chub ~2.7-km upstream of the confluence. Other fish and riparian herpetofauna reported by Burger (2009) were green sunfish, desert sucker, longfin dace, smallmouth bass, red shiner (*Cyprinella lutrensis*), lowland leopard frog, Sonoran mud turtles, and black-necked gartersnake. Burger (2000, 2001) also reported on brief stops of the lower roughly 0.8 km portion of Wet Bottom Creek near the Verde River confluence. No native fish were observed during those surveys; however, green sunfish, smallmouth bass, bullfrog, Sonoran mud turtle, and crayfish were observed in 2000. These species, excluding the mud turtle but including mosquitofish (*Gambusia affinis*) and channel catfish (*Ictalurus punctatus*) were observed in 2001.

Methods:
Surveys for gartersnakes, other riparian herpetofauna, and fish were conducted through a combination of trapping and visual observation. Visual observation surveys involved walking in or along the stream, with occasional dip netting, and snorkel surveys in a few areas. Water clarity was very good throughout the survey with visibility to the stream bottom in almost all areas. Visual observation surveys were conducted throughout the overall survey area, from the SRP gauge at 436192E, 2780248N upstream to above a series of barrier falls and ending at 441254E, 3782528N; however, most surveys were conducted within a more limited area nearer camp and within the area that we also set traps.

Traps used were of two styles: Promar TR-501 traps (10” square X 18” long, 2.5” funnel openings on each end, ~1/16” mesh), and Promar TR-502 traps (12” diameter X 36” long, 5” funnel opening on each end, ~3/8” mesh). Both types of traps were baited with pelletized fish food at the start of trapping, and once fish were caught at least 1 was typically left in the trap as a possible attractant to a snake.

Eighteen TR-501 traps were set between 10:30-11:30 on 10 September up and downstream of our camp (from 437830E, 3781272N; upstream to ~438429E, 3781527N). All these traps were set targeting gartersnakes, with traps placed along the bank, a rock, or other natural feature that could help funnel snakes or other species into the trap. Traps were placed with the funnel entrances at or just below water level such that snakes, fish or other could swim into the trap, and with the upper portion of the trap out of the water to allow air space for any snakes, turtles or frogs trapped. The seven traps upstream of camp were moved downstream following the morning trap check on 12 September (~0800) with the new downstream endpoint of 437573E, 3781120N. The TR-

501 traps were checked at least twice a day, morning and late afternoon, and then were pulled between 8:00-10:00 on 13 September for a total trap effort of ~1250 trap-hours.

We had 7 TR-502 traps which we used primarily to target fish, but also other species, and which were moved around during the survey period. These were originally set upstream of camp between ~12:50 – 15:30 on 10 September (between 438480E, 3781587N and 439960E, 3782319N) and left until the next morning between 09:30-11:00 (~140 trap-hours). The 7 traps were moved further upstream on 11 September and left for 2-4 hours between 11:30-15:20 (~21 trap-hours). Finally, 7 of these traps were placed downstream of camp (down to the pool where bass were seen @ 437489E, 3781197) on 12 September and left for ~24 hours (~168 trap-hours). Thus, overall trap effort with the TR-502 traps was ~328 trap-hours.

Results & Discussion:

Survey conditions were good throughout the 4-day period. We had light rain the night of 10 September and into 11 September, but it did not seem to increase stream flow, turbidity, or our survey effort. Daytime air temperatures were between ~70-90F, and relative humidity ~40-80%. Water clarity was very good with visibility to the stream bottom in almost all areas except as blocked by vegetation. Dense stands of phragmites made accessing some portions of the stream difficult to almost impossible, and we probably would have been very lucky to see or capture a snake in such areas. However, probably 80% of the stream length we covered could seemingly be well surveyed.

There was nearly continual water and flow from ~439180E, 3781780N, about 1 km upstream of camp, downstream to the end of our survey near the SRP gauge. In areas further upstream much of the streambed was dry with intermittent pools and areas of flow.

Both types of traps used had limitations. The 2.5" funnel opening coupled with the short length of the TR-501 traps resulted in fish and frogs seemingly fairly easily escaping from the traps. On at least a couple occasions we noted 10-20 fish in trap while doing an intermittent check, then had many fewer during the subsequent morning or afternoon check when we would record captures and release most individuals. It seemed that if a snake entered these traps it could probably also find its way out. (Of course, it is also possible a snake did enter the traps, eat the fish, and then leave – but this seemed unlikely given that we only saw 1 gartersnake the entire survey.) The TR-502 traps had a larger funnel, but it had a collapsible inner sleeve so escapes via the funnel seemed unlikely. However, those traps had a larger mesh, which resulted in no captures of dace and no fish smaller than 55 mm, and seemingly also would have been permeable to neonate gartersnakes.

Riparian herpetofauna:

Lowland leopard frogs were present throughout the survey area. They were abundant in areas near camp and upstream, but considerably less so in areas downstream where we began encountering non-native fish and crayfish. I noted ~60 leopard frogs during the

first afternoon of surveys upstream from camp, and noted them as being seen "continually through the day" when surveying the same area and further upstream on 11 September. In contrast on 12 September, surveying downstream from camp to the gauge I noted only 7 "plops" which I thought to leopard frogs with only 2 of those confirmed. We also trapped 9 leopard frogs (6 in TR-501 traps and 3 in TR-502 traps).

Other anurans noted were canyon treefrogs and red-spotted toads. The treefrogs were seemingly much less common than the leopard frogs, with only up to about 4 adults seen per day. However, we did see numerous treefrog tadpoles in the upper reaches of the survey where the stream was intermittent and where the pools where generally in bedrock or cobble streambed with little vegetation. Most of the toads we saw were recent metamorphs and hard to positively identify, but a few were confirmed as red-spotted toads.

We only saw one gartersnake during the survey, a black-necked gartersnake hand-captured slightly downstream of camp on the afternoon of 12 September. This was surprising since the habitat looked good for potentially either Mexican or narrow-headed gartersnakes, but certainly gartersnakes in general. There was abundant native prey including fish and frogs, and seemingly no non-native fish or crayfish in most of the area surveyed. Although conditions seemed favorable for the survey, we only saw one other snake during the entire 4-day survey – it was not able to be captured or positively identified but was probably a whip snake. This was in considerable contrast to our April 2012 survey in downstream portions of the creek, when we saw 7 snakes of at least 3 species and 2 Gila monsters, as noted in the "prior surveys" section of this report. This seemingly suggests random luck and variation between surveys, and perhaps that neither of the target gartersnakes exists in Wet Bottom Creek. However, detection rates for both Mexican and narrow-headed gartersnakes can be quite low, even with relatively healthy populations, and additional surveys are probably appropriate before concluding either target species does not exist in the Wet Bottom drainage. Increased trapping, including additional use of the larger TR-502 traps (particularly if such could be obtained with a smaller mesh) and/or "Gee" minnow traps, the type of metal trap that has proven to trap and retain gartersnakes, would be important to include on additional surveys.

Mud turtles were common mostly as evidenced by the 12 we caught in traps (4 in TR-501 and 8 in TR-502 traps); along with several visually observed.

Crayfish:
Low numbers of crayfish were seen; all within ~1.6 stream-km upstream from the gauge (all at 437209E, 3781046N and downstream).

Fish:
Longfin dace, desert sucker, chub, green sunfish, and smallmouth bass were all identified by visual survey. The non-native sunfish and bass were only seen in the downstream portion of the survey area, from the gauge upstream ~2 stream-km to a pool below a small fall at 437489E, 3781197. The small fall at the head of this pool might have been acting as a temporary barrier, but it seemed unlikely to prevent further upstream

movement given time and a variety of flows. Low numbers of suckers and chub were also seen below this pool, but the non-natives certainly dominated. Non-native fish may have moved further upstream between our April and September surveys. In April, chub were common at ~437077E, 3781031 and upstream; and the most upstream green sunfish was captured at that same location. The most upstream smallmouth bass was captured at 437220E, 3781083N in April. In September we documented bass up to 437489E, 3781197, about another 0.5 km upstream. Upstream of the pool and small fall mentioned above, we detected only native fish, with dace and suckers visually common, and chub visually abundant.

A total of 313 chub, representing multiple age classes, were collected in the traps throughout the survey (Figure 2). In general, smaller chub were collected in the TR-501 traps and larger individuals were collected in the TR-502 traps (Figure 2).

Trap results by trap type and day (trap locations are provided in the methods section):

18 TR-501 traps, ~11:00 10 Sep to 08:30 11 Sep:
Chub: 95 individuals, 50-126mm length
Longfin dace: 5 individuals, 55-80 mm length
Desert sucker: 1 fish, 109 mm
Mud turtle: 2 (one was 55mm)
Lowland leopard frog: 3

18 TR-501 traps, 08:30 11 Sep to 08:30 12 Sep:
Chub: 30 individuals, 32-111 mm length
Longfin dace: 3 individuals, 45-69 mm length
Mud turtle: 2 (58mm, 105mm)
Lowland leopard frog: 1

TR-501 & TR-502 traps, 08:30 12 Sep to 10:00 13 Sep:

17 TR-501 traps
Chub: 66 individuals, 30-150 mm length
Longfin dace: 10 individuals, 53-85 mm length
Desert sucker: 1 fish, 132 mm length
Lowland leopard frog: 2

7 TR-502 traps;
Chub: 72 individuals, 78-165 mm length
Desert sucker: 1 fish, 158 mm length
Mud turtle: 7 (82, 85, 91, 125, 127, 128, 135 mm)
Lowland leopard frog: 2

7 TR-502 traps, ~12:50 10 Sep to 11:00 11 Sep:
Chub: 43 individuals, 80-193 mm length
Mud turtle: 1 (138mm)
Lowland leopard frog: 1

7 TR-502 traps, ~11:30 – 15:30 11 Sep:
Chub: 7 individuals, 55-197 mm length

References Cited:

Bagley, B. 2002. Survey of the Verde River drainage, Arizona, for loach minnow (*Tiaroga cobitis*). Final Report submitted to the U. S. Fish and Wildlife Service, Arizona Ecological Services Office, Phoenix, Arizona. Federal Contract # 22410-0-M525.

Burger, W. P. 2000. Verde River Survey, Childs to Sheep's Bridge, 15-21 August 2000. Trip Report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Burger, W. P. 2001. Verde River Survey, Childs to Sheep's Bridge, 23-27 July 2001. Trip Report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Burger, W. P. 2009. Verde River and tributaries, Childs to Horseshoe Dam. Trip report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

Mosher, K., A. Makinster, and W. Burger. 2012. Arizona Game and Fish Department Wet Bottom Creek Fish and Riparian Herpetofauna Survey, April 9-12, 2012. Trip report submitted to the Arizona Game and Fish Department. Phoenix, Arizona.

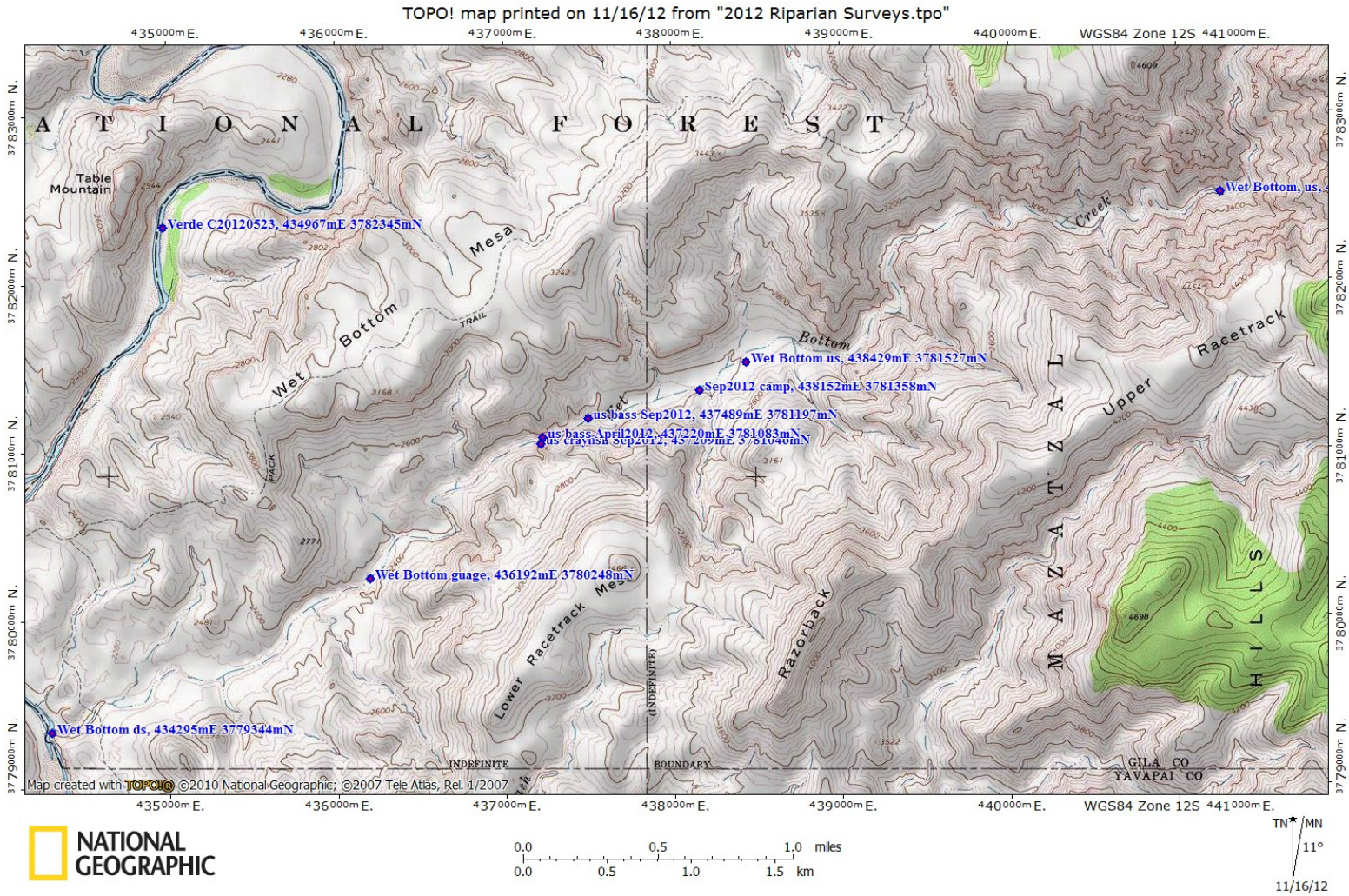


Figure 1: Map of Wet Bottom Creek showing survey area for April and September 2012 surveys mentioned in this report. Areas from "Wet Bottom gauge" and upstream were surveyed in September 2012, and from the "Sep2012 camp" and downstream in April 2012.

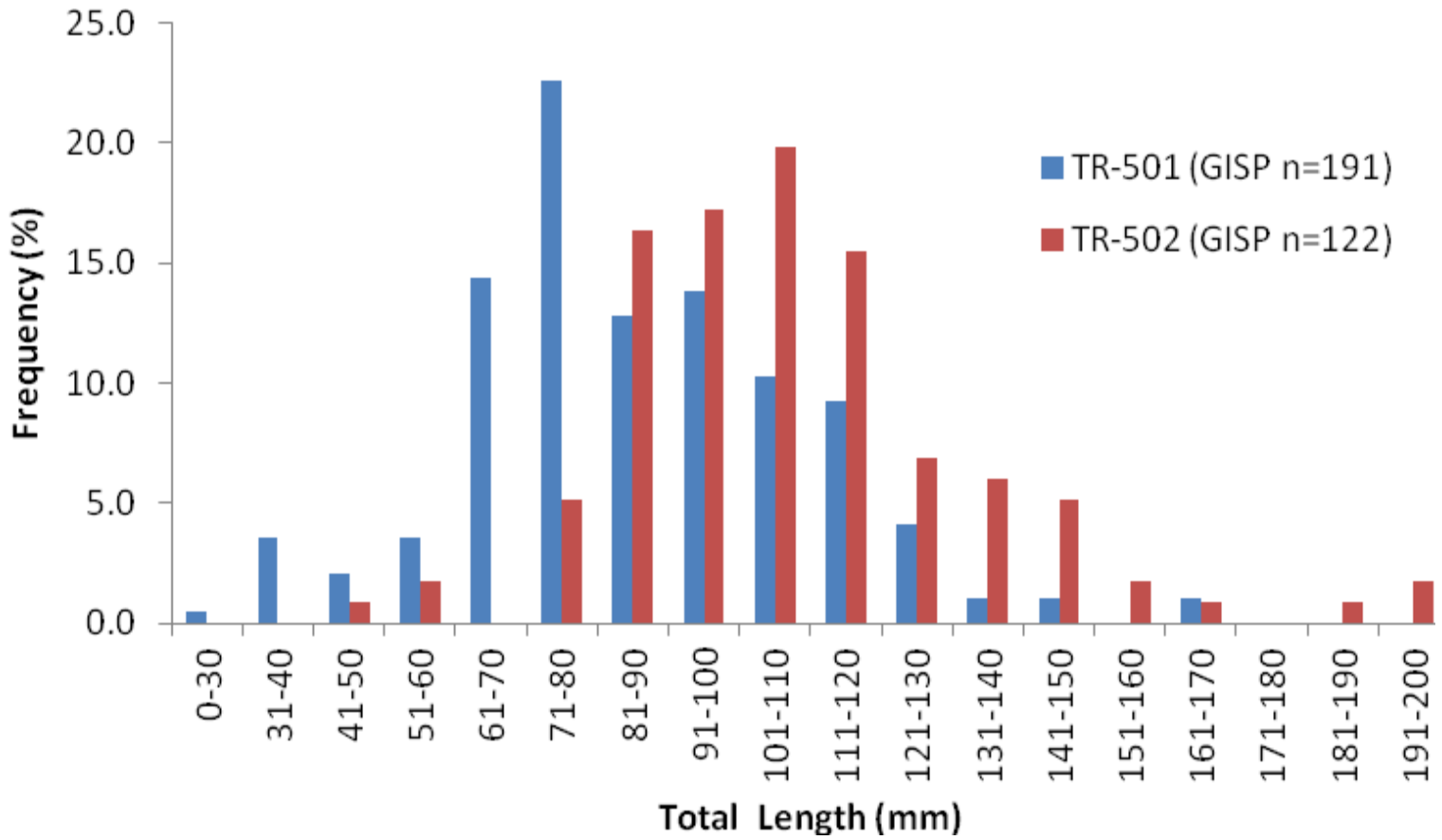
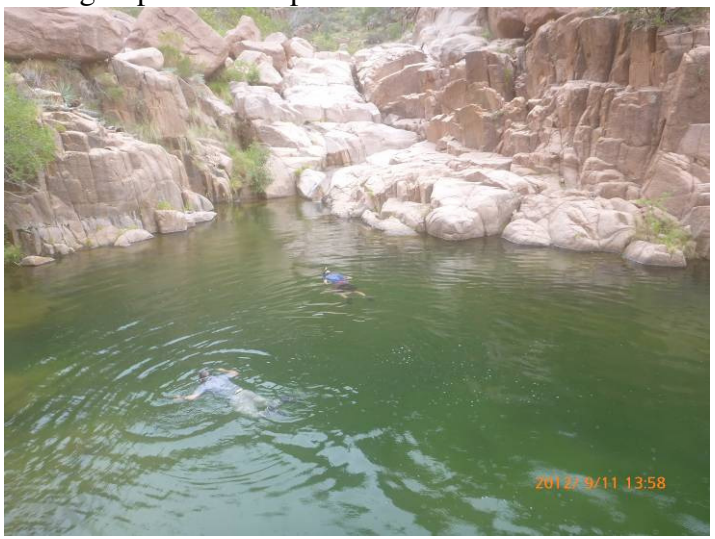


Figure 2. Length-frequency histogram for all chub (GISP) collected in both TR-501 (rectangular) and TR-502 (cylindrical) minnow traps in Wet Bottom Creek, September 10 – 13, 2012.

Setting traps near camp

Upper section of survey area



Snorkeling a pool in the upper survey area

Another representative portion of the survey

Chub

Lowland leopard frog

Black-necked gartersnake

Sonoran mud turtle

APPENDIX D

PROGRESS UPDATE TO SALT RIVER PROJECT FOR FISCAL YEAR 2012 USGS VERDE ECOLOGICAL FLOWS STUDY

2012 WORKPLAN FOR USGS PILOT MICROHABITAT STUDIES SUPPORTING THE VERDE RIVER ECOFLOWS PROJECT WITH FUNDING FROM SRP

Progress update to Salt River Project for Fiscal Year 2012
USGS Verde Ecological Flows Study

Jim Leenhouts, USGS

The USGS is currently completing the two-year phase 1of the Verde River Ecoflows project investigating the connection between streamflow in the Verde River and habitat characteristics. This is the first phase of a planned two-phase project, and consisted largely of obtaining biology and hydrology data from a variety of sources relevant to an evaluation and understanding of the ecological conditions in the Verde River. We also conducted pilot fieldwork, and initial statistical analyses of existing and newly collected data. Additional related components are the evaluation of the Northern Arizona Groundwater Flow Model (NARGFM) as an aid in ecological studies and the estimation of monthly streamflow budgets in the Verde River and its major tributaries. Phase 1 will be documented in a USGS Science Investigation Report titled *Preliminary synthesis and assessment of environmental flows in the upper and middle Verde watersheds, Arizona* byAnne Brasher, Stephen Wiele, Nick Paretti, Susanna Pearlstein, Dena Skow, Brad Garner, Marilyn Flynn, and Megan Klaar. The report is in its final stages of assembly and will be submitted for peer review by the end of October.

Using compiled data from 334 macroinvertebrate samples collected by the USGS (NAWQA), AzDEQ, and the EPA (EMAP) invertebrate monitoring programs between 1992 and 2010, as well as the six additional sites, associations between macroinvertebrate community structure and hydrologic metrics derived from continuously recording stream gages were analyzed in the second year of the project. Discharge metrics representing magnitude, frequency, timing, duration, and variation were computed for five time periods prior to sampling dates using average daily discharge. The metrics were computed for 10, 30, 90, 365, and 1095 day periods prior to the invertebrate and fish sampling dates.The link between streamflow, as represented by the metrics, and macroinvertebrate assemblages with a series of nonparametric statistical tests is examined in the report.

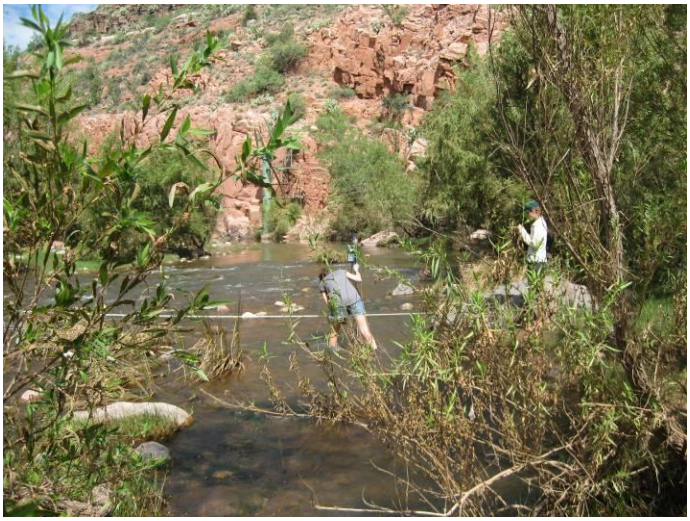
Our original agreement with The Nature Conservancy did not include funds to support additional field work in Phase 1. The additional support from SRP provided crucial support for field efforts, macroinvertebrate identification, data analysis, and geospatial interpretation of habitat characteristics. The results obtained with the SRP funding are included in our phase 1 report.

In addition to completing the first phase, we have installed a Continuous Slope Area gage below the low flow SRP gage at Campbell Ranch (AGFD issued a permit for the installation). The gage installation was supported by the USGS WaterSMART program. During the first phase of the ecoflows project, a biotic sampling site was established at Campbell Ranch. The CSA gage, which consists of three recording stage sensors from which discharge can be computed, is intended to complement the SRP gage by allowing for the estimation of discharges higher than the rating curve at the low-flow gage. The combined low-flow and CSA discharges should provide complete discharge records at Campbell Ranch. We are currently seeking funding to continue with Phase 2 of the Verde Ecological Flows project. We anticipate that the Campbell Ranch discharge record will be a valuable data stream in our analyses of the relation between habitat and stream flow.

Work on Verde River ecological flows is continuing with an analysis and publication of data collected during the summer of 2011. The data consists of fish surveys in five reaches of the Verde River and tributaries in which species were identified and associated with local habitat characteristics. This study examines habitat availability and utilization in the upper and middle Verde watershed. This effort, along with the installation and maintenance of the Campbell Ranch CSA gage, has been partly supported by the USGS WaterSMART program. Continued SRP funding support for FY2013 will provide valuable support for ongoing maintenance of the Campbell Ranch gage, analysis and publication of fish survey data, and partial coverage of the publication costs for the Ecological Flows phase 1 report.

Pictures of Field Sampling

Pool survey near Paulden gage.



Channel velocity measurements near Clarkdale gage

Collecting macroinvertebrate samples

Preparing macroinvertebrate samples

The USGS is currently developing Phase 2 of the Ecoflows Project. Phase 2 will be based strongly off of what was learned from phase 1 results, and will sharpen the examination of the relationship between stream flows and habitat. The USGS will look at the Verde River as a complete ecosystem in which the entire range of flows is significant, not just base flow. The plan is to continue sampling at the sites that have been established, and to look more closely at the importance of timing and magnitude of various flow components, such as base flow and flooding. The approach will include statistical analyses of correlations between metrics derived from sampling results and flow properties, as have been done for the available data in phase 1. Phase 2 will also look at small- and reach-scale hydraulic properties and sediment dynamics to establish a process-based understanding of the relation between habitat and stream flows.

APPENDIX E

SRP LETTER TO USFWS REGARDING THE PURCHASE OF INDIAN SPRINGS RANCH

Delivering More Than Power™

SALT RIVER PROJECT
Environmental Services
Mail Station PAB352
POST OFFICE BOX 52025
PHOENIX, ARIZONA
85072-2025
(602) 236-2724

Charles E. Paradzick
Senior Ecologist

April 15, 2011

Mr. Steve Spangle
Field Supervisor
(Attn: Jeff Servoss)
Arizona Ecological Services Field Office
2321 W. Royal Palm Road, Suite 103
Phoenix, Arizona 85021

RE: Horseshoe-Bartlett Habitat Conservation Plan – Proposed Acquisition of 55 acres of Mitigation Habitat on Gila River

Dear Mr. Spangle:

To comply with the obligations of the Horseshoe-Bartlett Habitat Conservation Plan ("H-B HCP") and associated Endangered Species Act Section 10(a)(1)(b) Incidental Take Permit ("Permit") issued on May 30, 2008 by the U.S. Fish and Wildlife Service to the Salt River Project ("SRP") for the continued operation of Horseshoe and Bartlett Reservoirs, SRP must acquire and protect 200 acres of riparian lands that support southwestern willow flycatcher ("flycatcher") and yellow-billed cuckoo ("cuckoo") breeding habitat. To meet this obligation, SRP has placed 150 acres of riparian habitat near Ft. Thomas on the Gila River under a conservation easement. The property is managed by SRP to protect riparian habitat values and surveys have documented cuckoo and nesting flycatcher.

As stipulated in the H-BHCP and Permit, the remaining 50 acres of mitigation lands are to be protected[1] within 10 years of Permit issuance[2]. SRP is required to first evaluate potential lands in the Verde Valley that meet the habitat requirements[3] and cost provision[4] conditions in the HCP, and work to protect those lands if available. If lands meeting those requirements are not available, SRP, in coordination with the U.S. Fish and Wildlife Service (FWS), would locate and protect alternate riparian habitat[5].

[1] "Protected" may include purchase of fee title, acquisition of conservation easement, or protection under agreement with a third party. See H-BHCP p. 173
[2] H-BHCP p. 175.
[3] H-BHCP p. 172.
[4] H-BHCP p. 205. SRP would spend up to $11,000 per acre for mitigation lands in Verde Valley.
[5] H-BHCP p. 180.

As explained below, based on review of lands in the Verde Valley, SRP has determined that no lands meet the mitigation requirements as stipulated in the H-BHCP, and we plan to pursue land acquisition on the Gila River near SRP's existing habitat preserves. SRP will continue its watershed and instream flow protection efforts in the Verde Valley that help conserve covered aquatic species as well as the riparian habitat used by breeding flycatcher and yellow-billed cuckoo. This letter summarizes SRP's efforts to locate suitable mitigation lands in the Verde Valley, and provides for coordination with the FWS to select an alternate property, as required by the H-BHCP and Permit.

Verde Valley Land Search Findings:
As documented in SRP's 2010 H-BHCP Annual Implementation Report ("Annual Report")[6], SRP conducted an extensive review of parcels in the Verde Valley from near Clarkdale downstream to Beasley Flat. Parcel ownership, acreage of riparian habitat, habitat potential, and possible management concerns were assessed for parcels that contained floodplain. We also met with staff from The Nature Conservancy (TNC) in fall of 2009 to discuss their research and knowledge of property along the Verde River, and visited lands that could have potentially met our mitigation requirements.

As detailed in the Annual Report, we found one parcel (Spur Land and Cattle/Babbitt Property) that met the acreage requirement (50 acres). However, as noted in the Annual Report and meeting, the property is owned in trust by the Babbitt family, and TNC and SRP have made numerous unsuccessful attempts to acquire the property. The land has also a value greater than the $11,000 per acre price cap as noted in the HCP[7] (see cost analysis below). Six other parcels, which were larger than approximately 25 acres, were identified and assessed, but none contained suitable breeding habitat for flycatcher and/or would have been difficult to manage to protect and conserve habitat values, and had estimated costs greater than $11,000 per acre (see cost analysis below).

SRP's Lands Acquisition Division also conducted an inventory and cost appraisal analysis of potential floodplain lands in the Verde Valley. Their results showed that no parcels containing solely floodplain habitat were available, and that the cost per acre ranged from approximately $19,000[8] (for lands with little adjacent upland and improvements) to $33,000[9] (floodplain lands with greater amounts of uplands and improvements), which is greater than the $11,000 per acre price cap.

Based on this review of potential lands in the Verde Valley and the cost per acre analysis, SRP found that no lands meet the mitigation criteria as defined in the HCP. We then conducted a search for alternate lands on the Gila River near Ft. Thomas that would fulfill our HCP and Permit obligations[10].

[6] Draft report sent to USFWS on November 18, 2010; final report (see pages 19-26) sent on January 19, 2011.
[7] H-BHCP p. 205.
[8] approximate cost per acre of recent TNC purchase of 20 acre property "Otter Water"
[9] approximate cost per acre of TNC/State Parks purchase of 209 acre property "Rocking River Ranch"
[10] H-BHCP p. 180. "The first priority for alternate sites will be to augment mitigation lands along the Gila and San Pedro rivers where SRP is conserving habitat as part of the Roosevelt HCP."

Proposed Acquisition – Ft. Thomas "Indian Springs" Riparian Lands

Also as noted in the 2010 Annual Report and discussed at the fall implementation meeting, SRP has identified a 55 acre parcel ("Indian Springs") on the Gila River near Ft Thomas that contains suitable breeding habitat for flycatchers and cuckoos (see attachment). The property is adjacent to SRP's existing Ft. Thomas Preserve (1200 acres) managed for the Roosevelt Lake Habitat Conservation Plan ("RHCP"), and the 150-acre H-BHCP parcel is located approximately 2 miles downstream. The riparian vegetation on the parcel contains a mixture of tamarisk, willow, and cottonwood trees at densities suitable as nesting habitat for flycatcher and cuckoo. The active channel of the Gila River currently bisects the parcel, and the entire property is within the Gila River floodplain.

As described in the H-BHCP[11], the riparian habitat acquired as mitigation should include some combination of the following characteristics as provided in the Southwestern Recovery Plan:

- Floodplain and stream hydrological conditions are favorable to habitat maintenance, i.e., subject to scouring floods, sediment deposition, periodic inundation and ground water recharge, and having low stream gradient. The dynamics of the natural processes and resulting patterns of riparian vegetation on the properties support breeding habitat for both flycatcher and cuckoo. These conditions already exist on occupied and suitable habitat, which are the priority for acquisition.
    - *The parcel is located entirely in the Gila River floodplain; natural fluvial geomorphic processes support and maintain riparian habitat suitable for flycatcher and cuckoo breeding. Nesting flycatcher and cuckoo exist in close proximity up and downstream of the parcel.*

- Habitat will be located in proximity to Horseshoe within the Verde Management Unit or within the same Recovery Unit to the extent possible.
    - *Habitat is located in the Gila River Recovery Unit - the same Recovery Unit as Horseshoe Reservoir.*

- Habitat occupied by flycatchers that is currently unprotected will be the highest priority for acquisition.
    - *As recent as 2009, there was anecdotal evidence that the habitat was occupied by both flycatcher and cuckoo. The habitat is currently under private ownership and not managed for riparian protection.*

- Habitat that is suitable, but currently unoccupied in proximity to existing populations of flycatchers will be the second highest priority for acquisition.
    - *As noted above, the habitat is likely occupied or has been recently. Flycatcher nesting pairs and cuckoos were located on the RHCP Ft. Thomas Preserve directly adjacent to the Indian Spring's property boundary.*

[11] H-BHCP P. 172. Criteria is based upon the Southwestern Willow Flycatcher Recovery Plan

- Locations where relatively large blocks of riparian land and patches of potential or suitable habitat greater than 10 acres in size can be acquired and protected, or that are in proximity to other riparian land conservation efforts, in order to allow natural stream processes to function and to minimize impacts from adjacent land uses.
    - *The parcel is approximately 55 acres, of which all (or nearly all) are currently suitable as flycatcher and cuckoo nesting (dominated by tall dense tamarisk, willow, and cottonwood forest patches). The parcel is also bounded on three sides by the RHCP Ft. Thomas Preserve increasing the conservation value (size and effectiveness) of the mitigation habitat.*

- Locations where stresses to riparian habitat such as water diversions, grazing and adverse recreational uses, and stream channelization are minimized as much as possible.
    - *The parcel is well situated to be managed for long-term habitat protection. The northern, southern, and eastern boundaries are adjacent to the RHCP Ft. Thomas Preserve and would be protected from stressors (e.g., grazing, adverse recreational trespass). The western boundary is bordered by an agricultural field and can be effectively fenced to protect habitat values. Small agricultural diversions occur upstream of the property, but no large dams or diversion are present that would impede flood flows and adversely affect flycatcher and cuckoo breeding habitat quality or quantity on the property.*

- Riparian land will be acquired that has, or will have, the potential for similar or greater proportions of future flycatcher habitat found at Horseshoe, i.e., about 50 percent or more tall dense vegetation on a site-specific basis and will have moist soil or surface water during the nesting season.
    - *As noted above, the vegetation is dominated by > 50% of tall dense riparian forest suitable as nesting habitat for flycatchers and cuckoos. The parcel is in the Gila River floodplain and portions of the parcel are inundated during periodic flood events, which supports habitat persistence and moist soils during the breeding season. Additionally, the Gila River is perennial in the reach that bisects the property and would provide surface water during the nesting season.*

- Habitat acquisitions will be in a diversity of locations to minimize the risk of simultaneous catastrophic loss.
    - *The parcel is located 2 miles upstream from the other 150-acre property acquired as mitigation under the H-BHCP, and thus could be subject to simultaneous catastrophic loss (i.e., large floods or wildfire). Large flooding events could temporarily reduce habitat quantity or quality on both parcels simultaneously. However, based on tree recruitment and growth rates nesting habitat would likely be available within 3-5 years after a large scouring flood event. SRP is working closely with the local fire department, Bureau of Reclamation, Bureau of Land Management, and the Arizona State Forestry*

Division to develop a comprehensive fire plan for the entire Ft Thomas Preserve (both H-BHCP and RCHP parcels) to minimize fire impact potential. Also, considering both the RHCP and H-BHCP mitigation acquisitions, flycatcher and cuckoo breeding habitat is protected on the Verde River, San Pedro River, Salt River (Rock House), and continues to be available even at high reservoir levels at Roosevelt Lake and Horseshoe Reservoir.

Additionally, SRP remains committed to continue our aggressive protection of instream flows in the Verde River for the aquatic and riparian species covered under the H-BHCP. This flow protection program complements the work by our RHCP project manager to conserve and manage riparian habitat values both on the 125-acre Camp Verde Preserve, as well as coordinate flycatcher and cuckoo conservation actions with state and federal agencies, private landowners, and interested nongovernmental organizations in the Verde Valley and surrounding area. Together these actions will aid in the conservation and recovery of flycatcher and cuckoo, and their habitats in the Verde River watershed.

As explained above, we believe the Indian Springs property meets the mitigation obligations of the H-BHCP, and, due to its proximity to the RHCP Ft. Thomas Preserve, increases the overall effectiveness of flycatcher and cuckoo mitigation and conservation efforts in the Ft. Thomas area. We have made initial contact with the landowner of Indian Springs, and we plan to continue the process of working with them to acquire the parcel. If you have any concerns or questions regarding this potential acquisition please contact me by May 2, 2011. Otherwise, we will assume that you do not have any concerns and will continue to pursue the acquisition.

We appreciate the assistance and coordination by you and your staff as we implement the H-BHCP. Thank you.

Sincerely,

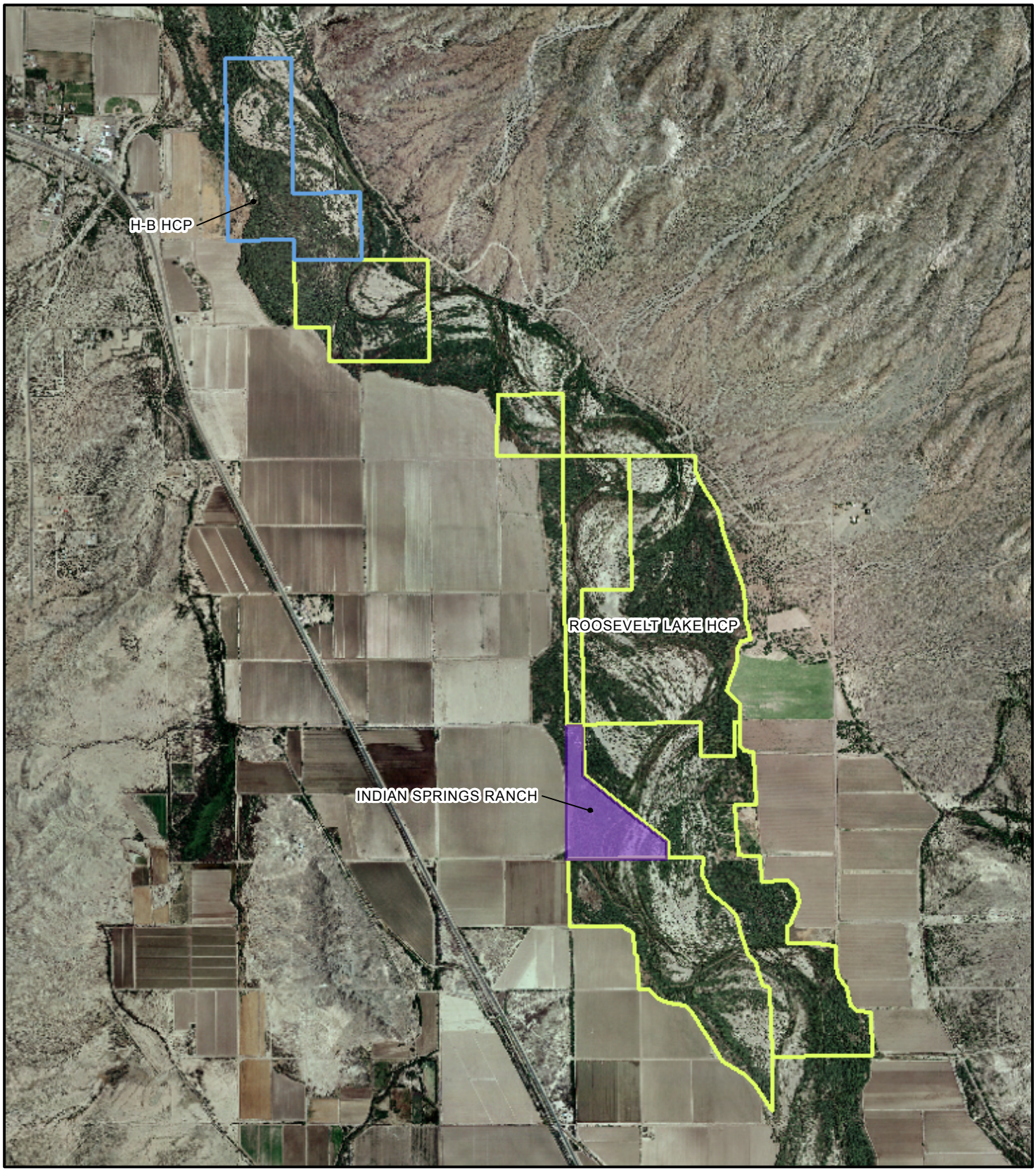
Charles E. Paradzick

Charles E. Paradzick

Attachment

cc: Tom Buschatzke, City of Phoenix, Water Resources Advisor
Bill Powell, SRP, Manager, Environmental Services and Risk Management
Kevin Wanttaja, SRP, Manager, Environmental Services
Ray Hedrick, SRP, Manager, Siting and Studies
Dave Roberts, SRP, Manager, Water Resources
Chris Banks, SRP, Sr. Land Management Agent, Lands Acquisition Department
Craig Sommers, ERO Resources

FORT THOMAS PRESERVE - INDIAN SPRINGS RANCH PARCEL
GRAHAM COUNTY, ARIZONA



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AERIAL PHOTOGRAPHY JUNE 2006
FTP_INDIANSPRINGS.MXD. 04/13/11

Indian Springs Ranch Parcel
H-B HCP Fort Thomas Preserve
Roosevelt Lake HCP Fort Thomas Preserve

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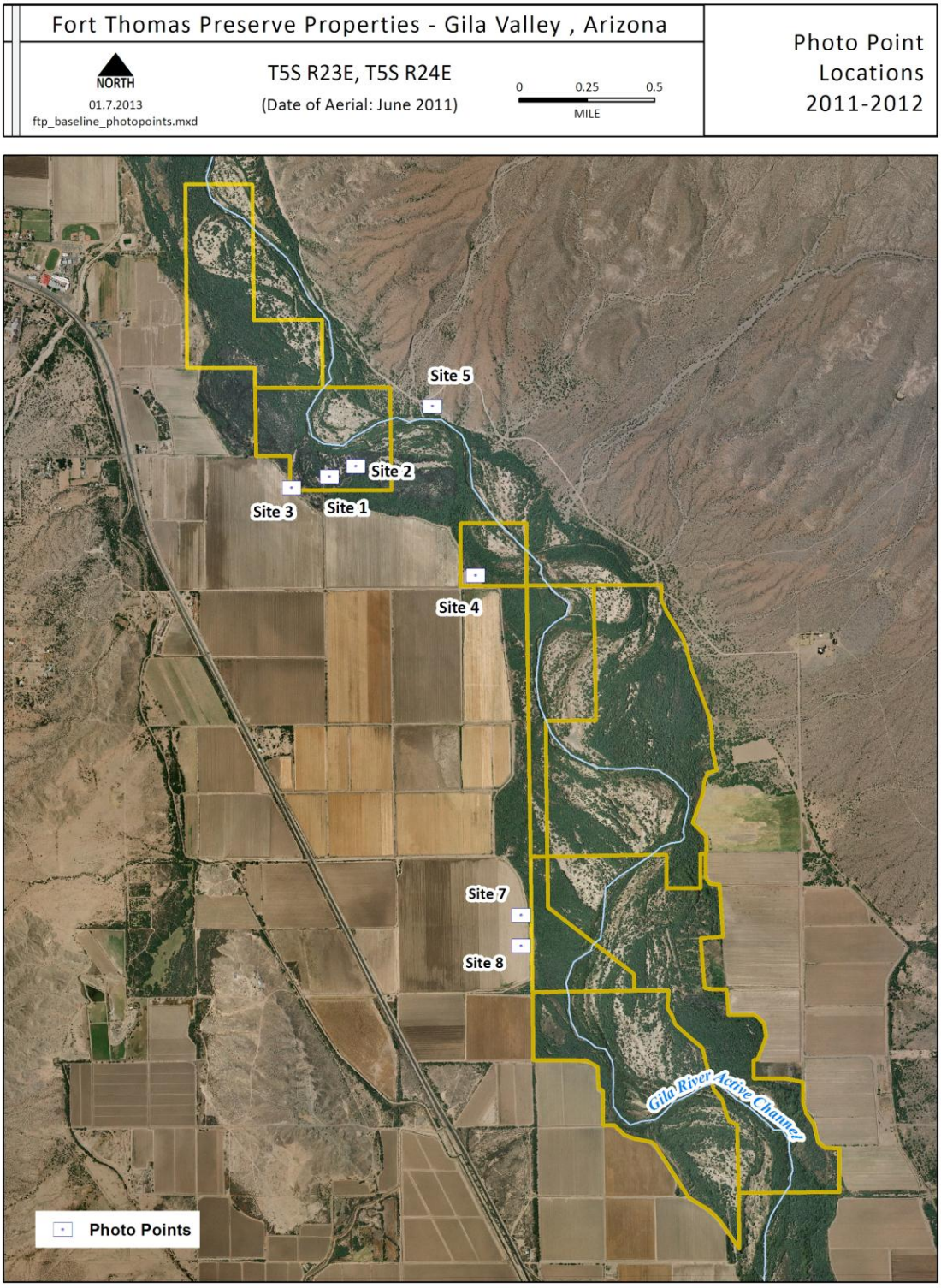
APPENDIX F

FORT THOMAS PHOTO POINTS

Photo Point Locations

In 2012, photo point locations were established for the newly acquired Indian Springs Ranch Parcel. The map below indicates the locations of the newly established points. The current Photo Point 6 (not included on the map) fell outside of the Indian Springs Ranch Parcel and will be re-established in 2013.



Fort Thomas Photo Point Record
Photo Point 1 – View 1

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 1 – View 2

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 1 – View 3

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 2 – View 1

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 2 – View 2

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 2 – View 3

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 3 – View 1

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 3 – View 2

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 3 – View 3

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 4 – View 1

November 9, 2011

Fort Thomas Photo Point Record

Photo Point 4 – View 2

November 9, 2011

Fort Thomas Photo Point Record

Photo Point 4 – View 3

November 9, 2011

Fort Thomas Photo Point Record

Photo Point 5 – View 1

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 5 – View 2

November 9, 2011

Fort Thomas Photo Point Record

Photo Point 5 – View 3

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 5 – View 4

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 5 – View 5

November 9, 2011

Fort Thomas Photo Point Record
Photo Point 6 – View 1

August 16, 2012

Fort Thomas Photo Point Record
Photo Point 6 – View 2

August 16, 2012

Fort Thomas Photo Point Record
Photo Point 7 – View 1

August 16, 2012

Fort Thomas Photo Point Record
Photo Point 7 – View 2

August 16, 2012

Fort Thomas Photo Point Record
Photo Point 8 – View 1

August 16, 2012

Fort Thomas Photo Point Record
Photo Point 8 – View 2

August 16, 2012