FISH MONITORING OF SELECTED STREAMS

WITHIN THE GILA RIVER BASIN

2015

Annual Report

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ARIZONA GAME AND FISH DEPARTMENT

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Introduction

This report summarizes monitoring activities conducted by Arizona Game and Fish Department (Department) during 2015 for Bureau of Reclamation (BoR) Contract No. 12PC32007, Monitoring of Gila River Basin Waters (MGRB). The purpose of the project is to monitor the status of wild populations of listed fishes in the Gila River Basin.

Monitoring activities were conducted on a subset of streams identified in the "Scope of Work - Monitoring of Gila River Basin Waters to Assist with Conservation of Federally-listed Warm Water Fishes (Native Fish Monitoring) (Revised per Modification 0007)". Focal species identified to monitor for this project include the Gila topminnow (*Poeciliopsis occidentalis*), Gila chub (*Gila intermedia*)*, headwater chub (*G. nigra*)*, roundtail chub (*G. robusta*)*, loach minnow (*Tiaroga cobitis*), and spikedace (*Meda fulgida*).

Supporting tables, maps and photographs for the report are provided in Appendices A, B and C, respectively. Table 1 provides the common and scientific names as well as a "Species Code" of the fishes sampled throughout the project; for brevity, the species code is an abbreviation of the scientific name (first two letters of genus followed by first two letters of epithet) that is used throughout the document to identify or refer to an individual or group of fish belonging to a particular species. Table 2 summarizes species occurrence and absolute numbers per survey site (native and nonnative) across all sites sampled, while Table 3 provides percent relative abundance for each species collected for each site during 2015.

Recommendations to improve the process for following years include the need for greater emphasis on field notes, to help capture details of survey sites and surrounding environments which are not reflected on data sheets, and completion of data sheets in the field.

Methods

Sampling was conducted according to the protocol defined in Clarkson et al. 2011. At each site, a 0.5 km reach of stream was initially surveyed and numbers of each species recorded. If the focal species was not detected within the initial search, another 0.5 km portion of the stream was surveyed at another access site within its known or suspected former range, unless the stream was too short or habitat too limited to allow an expanded search. Once the focal species was detected, a measured 100 m long sample reach was quantitatively sampled according to procedures in Clarkson et al. (2011) to record number of individuals and species encountered within major mesohabitat types (run, riffle, pool). If the focal species was rare within the 100 m reach, sampling continued into adjacent habitat for up to another 0.5 km, again targeting preferred habitats of the focal species. If at least 25 of the focal species were captured within the 100 m, the site was mapped and photographs of the upper and lower boundaries taken (Appendix C). If less than 25 individuals of the focal species were captured, an attempt was made to repeat the entire process at another access point not immediately adjacent to the prior sample, but accessible and geographically representative of the expected or former known distribution; a maximum of three sites per survey reach were to be sampled in this manner.

*Roundtail and headwater chub are identified as distinct species per Minckley and DeMarais (2000). The Arizona Game and Fish Department recognizes roundtail chub, headwater chub and Gila chub as a species complex, rather than composed of three distinct species.

Species- and habitat-appropriate gear was selected to survey each reach. For the majority of surveys, electrofishing using the Smith-Root Model-12R Backpack Electrofisher (BPES) was the primary method of sampling. In areas where stream morphology, water depth, visibility, or substrate instability made sampling with the backpack electrofisher unsafe or impractical, other sampling techniques were employed. Other techniques and equipment included: baited minnow traps (Promar 45.6 cm x 25.4 cm x 0.32 cm mesh); Promar hoop nets (referred to throughout the text as "collapsible" hoop nets; 30.5 cm x 61 cm x 1.27 cm mesh); large hoop nets (61cm x 2 m x 0.65 cm mesh); dip-nets (951.6 cm^2 x 0.32 cm mesh); trammel nets (1.8 m x 15.2 m x 2.54 cm mesh); gill nets (1.4 m x 10 m x 2.54 cm; 1.4 m x 30 m x 2.54 cm mesh); canoe electrofishing (Smith-Root GPP 5.0), straight seines (1.8 m x 3.0 m x 0.64 cm mesh; 1.8 m x 4.6 m x 0.64 cm mesh), bag seines (1.8 m x 7.6 m x .635 cm mesh, with a 1.8 m x 1.8 m x 1.8m bag with .318 cm mesh) and angling. Due to the compact size and light weight of the gear, angling is principally used as a secondary or tertiary sampling technique, usually in more remote locations where access, gear choice and transport are limited. When employed, species-appropriate bait or various artificial lures and flies are used.

Large-bodied fishes captured during the efforts were identified to species, classified as Age-0 (<10 cm) or Age-1+ (>10 cm), enumerated and released. Small-bodied fishes were identified, enumerated and released. Throughout the text, absolute number and relative abundance of a species at a specific site are provided in parentheses following the four letter species abbreviation.

All coordinates reported reference the Universal Transverse Mercator (UTM) geographic coordinate system, North American Datum 1983 (NAD83). Coordinates were determined using either a Garmin GPS 60 or Garmin GPS Map 62s. Discrepancies between photo boundary coordinates, map coordinates, data sheet coordinates and notebook coordinates do not reflect actual changes in localities for each, but are due largely to changing reception quality of satellite signals and resulting accuracy of the GPS units in many of the canyon-bound environments that the work was conducted in.

Departure from Protocol

Departure from protocol during the 2015 field season occurred at three sites. At Romero Canyon, the stream normally consists of a series of isolated bedrock pools in a high-gradient desert canyon. Gila chub are usually found in a series of bedrock pools in the upper canyon, and a 100 m fixed sample site has been established here. High flows and turbid waters due to storm runoff on repeated site visits allowed the completion of only one 500 m reach, and prevented the sampling of additional reaches in the stream. Where the stream could be sampled, the threshold number for a complete sample (n=25) was not achieved, although sampling continued through the end of the 500 m reach. For the effort, the number of seine hauls was recorded, but because an effective sample could not be completed, seine area (m^2) data was not recorded, and CPUE could not be calculated. Plans are to repeat the site and complete it during 2016 field season, in addition to the sites normally scheduled for 2016.

Coordination with Ft. McDowell Yavapai Nation was initiated several months prior to sampling in July of 2015, for the sampling of the lower Verde River across Reservation lands, but permission was not obtained prior to the effort (approximately 15 miles). Therefore, sampling during the 2015 effort was restricted to the ten miles of river below Bartlett Dam and above the Reservation. Percent habitat sampled was not estimated or recorded for the lower three sites on the river.

At Bear Creek in New Mexico, after discussions with New Mexico Department of Game and Fish (NMDGF), access to waters in Bear Cr. could not be obtained. We were informed by NMDGF that they had already sampled the site during 2015, and plan on monitoring the site regularly in future years. After a discussion with BoR Contracting Officer Representative (COR), it was agreed that it could be replaced with another site and AD Wash was monitored instead.

A new species, the gizzard shad (*Dorosoma cepedianum*; DOCE) was encountered during sampling in 2015 on Salt River upstream from Highway 288 Bridge; voucher photos were taken of the specimens and are referenced in the appropriate section in this report; voucher specimens for the species were not preserved.

Results

A total of 50 sites were sampled on 20 streams, rivers or wetlands during the 2015 sampling season. Tables 1 and 2 provide species presence per drainage, numbers sampled and percent total catch of each species per drainage. Of the 20 streams sampled, the focal species were found in 11 (55%) streams, and in 52% of the total sites sampled. Native fishes other than the focal species were found in 10 of the 20 streams (50%) and no natives were found in three streams (15%; Table 2). Nonnative species were found in of 13 of the 20 streams sampled (65%). In the upper Salt River, across nine survey sites, a total of 4,402 fish were handled, but only one native fish was captured, a YOY desert sucker, *Pantosteus clarki* (PACL). Based on the absence of any other native fish across the nine sites, speculation suggests this fish may have dispersed from a tributary source into the Salt River.

Tables summarizing effort and catch data for each site are provided in Appendix A. Total number per species per site and relative abundance is reported in text or in parentheses after the species has been identified. Maps and coordinates of the stream sample boundaries in both 500-m and 100-m reaches are found in Appendix B. For 100 m survey reaches, photographs of upper and lower boundaries were recorded, and are provided in Appendix C. Photo-documentation of habitat and of some species referenced in text are also included in Appendix C.

Unnamed Drainage #68b June 16, 2015

On June 16, 2015, Department personnel conducted a survey of 100 m in Unnamed Drainage #68b on Tonto National Forest (Appendix B, Fig. 1). It is an intermittent, desert canyon stream in eastern Maricopa County, generally found dry except for a series of moderate-sized tinajas in the lower half of the drainage. When flowing, the drainage enters Mesquite Creek, which is tributary to Tortilla Creek. The canyon forming Unnamed Drainage #68-B is oriented in a generally north to south direction and drains into the normally dry Mesquite Creek channel. Slightly over a mile below this juncture, Mesquite Creek joins Tortilla Creek, which itself is comprised of a series of isolated bedrock pools, with intermittent and perennial flow at and below the confluence. Several miles downstream, Tortilla Creek enters Canyon Lake; the entire drainage is contained within the Tonto National Forest.

Focal species of the survey was the Gila topminnow (*Poeciliopsis occidentalis*; POOC); POOC comprised 100% of the species sampled at this site (Tables 4-5), with no exotics observed or captured. Gila topminnow are believed to have established in the canyon pools after being stocked in an upstream stock tank in 1983; they were originally found at this site in 1985, and have persisted since. Sometime

since their establishment in the drainage, they moved further downstream in lower Mesquite and Tortilla creeks, where they were verified as present during 2014 and 2015, respectively.

During drier parts of the year, habitat within the drainage consists of 2-3 pools with little or no connecting flow. Photographs of the upper and lower boundaries of the 100 m sample site are provided in Appendix C (Fig.s 1-4). Three pools were present in the canyon at the time of sampling, with POOC present in all of them. Gila topminnow was the only species found during the effort and all topminnow captured appeared in good condition (Appendix C, Fig. 5). Sampling at the site was carried out using dipnets and minnow traps, with a total of 361 POOC captured for the effort; Tables 4-5 summarize the catch and effort data for different sampling gears, as well as species caught and their relative abundance. Dipnet sweeps proved the more productive technique at this site, resulting in almost twice the number of fish caught in minnow traps. Gila topminnow were abundant in both the upper and lower pools, with adult and juvenile fish common and easily observed.

Habitat available at the time of the survey consisted of three bedrock pools, with the middle pool of the three being considerably smaller, and less than half the volume of the others. Approximately 30 topminnow (mostly juveniles) were observed in this pool, but net sweeps and minnow traps failed to catch any fish. Aquatic insects (notonectids) were abundant, and may have had an impact on topminnow numbers in this pool.

Although areas adjacent to the canyon appear to receive moderate recreational use, traffic and impacts within this specific drainage appear very light. Green sunfish are present and thriving roughly 2.8 km downstream from the site, but based on sampling in Tortilla Creek earlier in the year, do not appear to have invaded upstream of a modified natural instream barrier. Threats to this population include loss of habitat due to prolonged drought, and the invasion of exotics. Management recommendations are to maintain regular monitoring of the population, examine the modified natural barrier downstream on Tortilla Creek to ensure it continues to function as an effective barrier to exotics moving upstream into Tortilla and Mesquite creeks, and to maintain it if it requires upkeep. Also, explore the Tortilla Creek drainage up-canyon from its confluence with Mesquite Wash for perennial pools that might support topminnow or other native fishes. Satellite images show large pools upstream that may prove permanent and capable of supporting topminnow, Gila chub, and perhaps desert sucker.

Other wildlife noted at the site or in the vicinity included one adult and one juvenile black-necked gartersnake (*Thamnophis cyrtopsis*), and a variety of birds including the black-tailed gnatcatcher (*Polioptila melanura*), Black Phoebe (*Sayornis nigricans*) and cactus wren (*Campylorhynchus brunneicapillus*).

Hidden Water Spring June 18, 2015

On June 18, 2015, a reach of 500 m at Hidden Water Spring on Tonto National Forest (Appendix B. Fig. 2) was surveyed for Gila topminnow. Hidden Water Spring is a narrow and shallow canyon-bound desert stream located in northeastern Maricopa County within the boundaries of Tonto National Forest. The drainage is tributary to Cottonwood Creek, a normally dry desert stream that drains to Saguaro Lake on the Salt River. During most of the year, reaches above and below the spring- fed stream are dry, with surface water reaching Cottonwood Creek only during floods, or following periods of high or prolonged precipitation. Perennial surface water at Hidden Water Spring is limited to within 300 m below the

springhead. Down-canyon from perennial surface waters, several isolated tinajas persist for an indeterminate time into the summer, however they do not provide suitable habitat for fish (Appendix C, Fig. 6).

The focal species of the survey was the Gila topminnow, which was stocked in the drainage in 1976; desert pupfish were also stocked in the drainage in 1977, but were never collected or observed following their original stocking. Sampling in the stream was conducted using a Backpack Electrofishing unit (BPES) and resulted in no topminnow being collected or observed at this site. Longfin dace (*Agosia chrysogaster;* AGCH) comprised 100% of the fish sampled, with 483 dace caught during the effort (Table 6); AGCH occupied a variety of available habitats throughout most of the perennial reach. The most recent record of POOC at Hidden Waters is from 2006; efforts during 2012 and 2013 also failed to find topminnow, however at that time, AGCH were common in all habitats except the lowermost pools. Table 6 summarizes absolute numbers and CPUE for this site.

The population of topminnow at Hidden Water Spring was the longest-persisting reintroduced population of POOC in Arizona, occupying the stream from 1976 until at least 2006. Due to undetermined factors, it appears the species is no longer present at Hidden Water. Sampling in 2012 found evidence of a relatively recent fire along the stream, with mature trees showing blackened bark but little other apparent damage; stream substrates showed deposition of several inches of ash overlain by leaf litter. Results of the 2015 survey indicate numbers of AGCH in the stream have increased dramatically and the species appears to be thriving. This may be due to successional changes in habitat and morphology throughout the stream, with conditions becoming more suitable for AGCH and less so for POOC. During the past decade, instream vegetation and tree canopy over the stream have increased dramatically, obstructing open surface water in much of the canyon bottom, and shading most of the stream throughout the day. Canyon morphology combined with denser vegetation in and adjacent to the stream in the canyon bottom slow water velocities through the system, increasing deposition of particulates. Several pools that were present in the stream in previous years have filled with coarse and fine particulates, in-stream vegetation and organic debris, reducing open water habitat (Appendix C, Fig. 7).

The site appears to receive very little recreational traffic, however several hundred meters downstream at the confluence with Cottonwood Creek, OHV use was apparent and recent. Management recommendations for the stream include: 1) thin vegetation along the canyon bottom to reduce fire risk, and improve aquatic habitat; 2) thin a portion of mature trees or tree canopies along the canyon bottom to increase light penetration and stream productivity; 3) reduce the longfin dace population and reintroduce topminnow. Longfin dace removed from the site should be used for reintroductions into appropriate waters along Salt River that have become isolated, or other nearby streams suitable to sustain AGCH.

Upper Salt River-Gleason Flats 1 June 29-30, 2015

On June 29-30, 2015, three sites at Gleason Flats on the upper Salt River above Salt River Canyon Wilderness boundary (Appendix B, Fig. 3) were surveyed, along the eastern and southern shorelines. Weather at the site on day one was sunny and warm throughout most of the day, becoming heavily overcast late in the afternoon, and with light rain in the evening. The focal species of the sampling was roundtail chub (*Gila robusta*; GIRO), but none were captured or observed during the effort.

Due to high turbidity (Appendix C, Fig. 8), it was determined that sampling with the BPES would be ineffective. The site was sampled using hoop and trammel nets, and a 15 ft. straight seine. Also, the trammel net was only fished for five hours and pulled shortly before dark, due to concerns about potential flooding overnight. Sampling at this site was largely conducted between a large, mid-channel vegetated strand and the eastern shoreline. Much of the habitat in this reach was composed of a long, slow moving pool, with steep, moderately undercut banks along the eastern shoreline, and the strand along much of the western edge of the habitat. Substrates were comprised of large boulders, cobbles, and silt.

Tables 7-9 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class for the larger species of fish. No native species were sampled in this reach of river, however red shiner (*Cyprinella lutrensis*; CYLU) (n=1149; 72%), Common carp (*Cyprinus carpio;* CYCA) (n=292; 18%), mosquitofish (*Gambusi affinis;* GAAF) (n=112; 7%), channel catfish (*Ictalurus punctatus;* ICPU) (n=40; 3%), and flathead catfish (*Pylodictus olivaceous;* PYOL) (n=2; < 1%) were all captured. Few adult of any of the larger species were caught, but young-of-year of both CYCA and ICPU appeared unusually common, with many juvenile catfish under 25-mm (Appendix C, Fig. 9) captured in seine hauls containing large tangles of filamentous aquatic vegetation.

During the entire sampling at Gleason Flats, the fact that only a single native fish was sampled, suggests a very low likelihood of GIRO in this reach of river. The greatest threat to the focal species GIRO and other native fishes in the upper Salt River at this time is believed to be the presence of nonnative fish species, particularly the flathead catfish (PYOL). Fishes sampled in this reach of river were exclusively nonnative, and practicable means of their removal or suppression should be pursued. Due to difficult vehicular access, the site appears to receive limited recreational use. A few cattle were present at the site, but signs of any impact were not noted. Other animal species noted during the effort at this site include the Sonora mud turtle (*Kinosternon sonoriense;* KISO), and purple martin (*Progne subis*). Plants common along this reach include Salt cedar (*Tamarix* sp.), mesquite (*Prosopis velutina*), seep willow (*Baccharis salisicifolia*) and cattail (*Typha* sp.).

Upper Salt River @ Gleason Flats-2 June 29-30, 2015

Upper Salt River at Gleason Flats – 2 was the second of three sites surveyed above Salt RiverCanyon Wilderness boundary during this period (Appendix B, Fig. 3). Sampling at this site was largely conducted between the eastern shoreline and a mid-river strand, in habitat comprised of a long pool with moderate flow, and riffle. Substrate within the pool consisted largely of silt over boulder and silt, and cobbles in the sections of riffle. Because of high turbidity, sampling with the BPES was not an effective method to employ, and the site was sampled using hoop nets, and a 15 ft. straight seine.

Tables 10-11 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class for the larger species. A total of 556 fish were captured at this site, with CYLU (n=306; 55%) and Age -0 CYCA (n=204; 37%) being the most common. Age-0 ICPU were also common here (n=29; 5%) with an Age -0 PACL (n=1) being the only native species collected and comprising less than 1% of the total catch (Table 11). The focal species of the effort was roundtail chub (*Gila robusta*; GIRO), but no GIRO were captured or observed during the effort. The most abundant species was CYLU, followed by CYCA and GAAF (n=13; 2%); only two PYOL were sampled at this site, one adult and one Age -0 (Tables 10 and 11, respectively). Red shiner (CYLU) males were found to be in breeding color and tuberculate.

The greatest threat to the focal species GIRO is the presence of nonnative fish species, particularly the flathead catfish (PYOL). Fishes sampled in this reach of river were almost exclusively nonnative (the exception being one Age -0 PACL), and practicable means of their removal or suppression should be pursued. Due to difficult vehicular access, the site appears to receive limited recreational use. A few cattle were present at the site, but signs of any impact were not noted. Other animal species noted during the effort include KISO, and lowland leopard frog (*Rana yavapaiensis; RAYA*). Plants common along this reach include salt cedar, mesquite, seep willow and cattail.

Upper Salt River-Gleason Flats 3 June 29-30, 2015

Upper Salt River at Gleason Flats – 3 was the third of three sites sampled above Salt River Canyon Wilderness boundary on June 29-30, 2015; sampling was conducted along the eastern and southern shorelines of the river (Appendix B, Fig. 3). Weather at the site on day one was sunny and warm throughout most of the day, becoming heavily overcast late in the afternoon and with light rain in the evening. The focal species of the effort was GIRO, but none were captured or observed during the effort. Because of high turbidity resulting in very low water clarity, sampling with the BPES was considered an ineffective method to employ at the site, so sampling was conducted using hoop nets, and a 15 ft. straight seine.

Tables 12-14 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled. A total of 480 fish were captured during the effort at this site, with CYLU (n=272; 57%) and CYCA (n=113; 24%) being the most common; Age -0 ICPU were also abundant (n=95; 20%). No native species were collected at this location.

The greatest threat to the focal species GIRO at this time is recognized to be nonnative fishes, particularly the flathead catfish (PYOL). Fishes sampled at this site were exclusively nonnative, and all practicable means of their removal or suppression should be pursued. Due to difficult access, the site appears to receive limited recreational use. A few cattle were present at the site, but signs of any impact were not noted. The only other wildlife noted at this site was the Sonora mud turtle (KISO). Plants common along this reach include salt cedar, mesquite, seep willow and cattail.

Upper Salt River-Horseshoe Bend 1 June 29-30, 2015

On June 29-30, 2015, Department personnel surveyed three sites at Horseshoe Bend on the upper Salt River along Salt River Canyon Wilderness boundary (Appendix B, Fig. 4). Upper Salt River at Horseshoe Bend 1 was the first and furthest upstream of the three sites. Weather during the first day was sunny and warm earlier in the day, becoming overcast in the afternoon, but clearing overnight. Because of water depth, velocity, and high turbidity (Appendix C, Fig. 10), sampling with the BPES was not employed here; sampling was carried out using hoop and trammel nets, and a 25 ft. bag seine. Due to higher than expected water velocity, trammel nets could not be deployed effectively at two of three sites at Horseshoe Bend.

Tables 15-17 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled. A total of 372 fish

were caught during sampling at this site, with CYLU (n=225; 60%) and ICPU (n=106; 28%) being the most common. The focal species of the effort was GIRO, but no native species were captured or observed during the effort. Juvenile CYCA were relatively common (n=31; < 1%), and adult PYOL were found more common here than upstream in the vicinity of Gleason Flats, comprising 1% (n=7) of the total fish captured. Hoop nets fished for a combined 53.7 hours in this reach caught no fish.

The greatest threat to the focal species (GIRO) and other native fishes is nonnative fish species, particularly flathead catfish (PYOL). Fishes sampled in this reach of river were exclusively nonnative and practicable means of their removal or suppression should be pursued. Recreational use of the site appeared light, probably due to a lack of vehicle access. Other animal species noted during the effort at this site were the spiny softshell turtle (*Apalone spinifera*; APSP), mule deer (*Odocoileus hemionus*), Gila monster (*Heloderma suspectum*), mallard ducks (*Anas platyrhynchos*) and an unidentified species of crayfish. Common plants along this reach include salt cedar, willow (*Salix* sp.), common reed (*Phragmites australis*), cattail, seep willow, and mesquite.

Upper Salt River-Horseshoe Bend 2 June 29-30, 2015

Horseshoe Bend 2 was the second of three – 500 m reaches of the upper Salt River surveyed on June 29-30, 2015 (Appendix B, Fig. 4). Weather at the site on the first day was sunny and warm earlier in the day, becoming overcast in the afternoon and evening. Because of water depth, velocity and high turbidity, sampling with the BPES was not employed at the Horseshoe Bend sites. Sampling in this reach was carried out using hoop nets and a 25 ft. bag seine. Water velocity and shallow depths throughout this reach prevented the effective use of trammel nets.

Tables 18-19 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled. A total of 758 fish were caught during sampling at this site, with CYLU (n=489; 65%) and ICPU (n=196; 26%) being the most common. The focal species of the effort was GIRO, but no GIRO were captured or observed during the effort. Also, no other native fish species were caught or observed during the effort in this reach. Five nonnative species were caught during sampling; all ICPU (n=196; 26%) captured at this site were Age -0. A total of 70 CYCA (9%) were caught, the majority being Age -0. Two PYOL (< 1%) captured during sampling were both Age -1+. One green sunfish (*Lepomis cyanellus*; LECY) was also captured in this reach, comprising < 1% of the total catch. No native fish species were collected within this 500 m section of river.

Recreational use of this area is light due to limited public access. As with the other sites on the upper Salt River, the greatest threat to the focal species (GIRO) and other native fishes at this time is the nonnative flathead catfish (PYOL). Fishes sampled in this reach of river were exclusively nonnative and practicable means of their removal or suppression should be pursued. The only other animal species noted at this site include KISO and an unidentified sp. of crayfish. Common plants along this reach include salt cedar, willow, common reed, cattail, seep willow, and mesquite.

Upper Salt River-Horseshoe Bend 3 June 29-30, 2015

Horseshoe Bend 3 was the third and furthest downstream reach of three – 500 m reaches sampled on June 29-30, 2015 in the vicinity of Horseshoe Bend on the upper Salt River (Appendix B, Fig. 4). The focal

species of the effort was GIRO, but none were captured or observed during the effort. No other native fishes were captured in this sample reach. Because of water depth, velocity and high turbidity, sampling with the BPES was not employed at these sites; sampling was conducted using hoop nets, trammel net and a 25 ft. bag seine.

A total of 460 fish were caught during sampling, with CYLU (n=210; 46%) and ICPU (n=199; 43%) being the most common species captured. Among the CYCA (n=47; 10%) sampled in this reach, the majority were Age -0; all ICPU caught were also Age -0. Only one adult PYOL (< 1%) and one PIPR were sampled at this site. No native fish species were collected within this 500 m section of river. Tables 20-22 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled.

As with the other two sites at Horseshoe Bend, recreational use of this area is light due to limited public access. The predominant threat to the focal species (GIRO) and other native fishes at this time in the upper Salt River is the nonnative flathead catfish (PYOL), and other nonnative fishes. Fishes captured in this reach of river were exclusively nonnative, and practicable means of their removal or suppression should be pursued. Other species noted during the effort include KISO and an unidentified sp. of crayfish. Common plants along this reach include salt cedar (*Tamarix* sp.), willow (*Salix* sp.), common reed (*Phragmites australis*), cattail, seep willow, and mesquite.

Upper Salt River-Hwy 288 Bridge 1 June 29-30, 2015

On June 29-30, 2015, three sites were surveyed above Highway 288 Bridge on the upper Salt River (Appendix B, Fig. 5). Upper Salt River Highway 288 – 1 was the first and furthest upstream of these sites. Weather at the site on the first day was sunny and warm during the morning, becoming heavily overcast in the afternoon, but clearing overnight. The focal species of the effort was GIRO; none were captured or observed during the effort. Because of water depth and velocity, and high turbidity, sampling with the BPES was not employed at the site; sampling was conducted using a straight seine and hoop nets.

A total of four species were caught at this location, with CYCA (n=9; 36%) and GAAF (n=9; 36%) being the most common species sampled. All CYCA were Age -1. Only one adult PYOL (4%) and one PIPR (4%) were captured at this site. No native fish species were collected within this 500 m section of river. Tables 23-24 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled.

As with the other two sites at Horseshoe Bend, recreational use of this site is light due to limited access. The predominant threat to the focal species (GIRO) and other native fishes at this time in the upper Salt River is the nonnative flathead catfish (PYOL) and other nonnative fishes. Fishes caught in this reach of river were exclusively nonnative, and practicable means of their removal or suppression should be pursued. Other species noted during the effort include KISO and crayfish. Common plants along this reach include salt cedar, willow, common reed, cattail, seep willow, and mesquite.

Upper Salt River-Hwy 288 Bridge 2 June 29-30, 2015

Upper Salt River at Highway 288 Bridge 2 was the third of three sites surveyed on June 29-30, 2015 (Appendix B, Fig. 5). Weather at the site on day one was sunny and warm throughout most of the day, becoming heavily overcast late in the afternoon and clearing overnight. Low water clarity due to high turbidity rendered sampling with the BPES ineffective, and the site was sampled using a straight seine and hoop nets.

A total of five species were captured during sampling at this site, with CYLU (n=15; 44%) and GAAF (n=14; 41%) being the most common (Table 25). The focal species of the effort was GIRO, but none were captured or observed during the effort. Unlike all other reaches surveyed on the upper Salt River during this effort, no catfishes were captured here. Other spp. sampled include CYCA (n=2; 6%) and MIDO (n=1; 3%). This was the first reach that gizzard shad, *Dorosoma cepedianum* (DOCE; n=2; 6%) were captured during the surveys; both DOCE were caught in hoop nets (Table 26), but were not classified as Age-0 or Age-1+. Specimens were not collected and preserved, but voucher photos were taken and are provided in Appendix C, Fig. 11. Tables 25-26 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled.

As with other sites on the upper Salt River, the greatest threat to the focal species GIRO at this time is the presence of nonnative fish species, particularly the flathead catfish (PYOL). Fishes sampled in this reach of river were exclusively nonnative, and practicable means of their removal or suppression should be pursued. As with other sites on the upper Salt River previously described, recreational use of the area is light due to limited access. Other animal species noted during the effort include KISO, and lowland leopard frog (*Rana yavapaiensis; RAYA*). Plants common along this reach include salt cedar, mesquite, seep willow and cattail.

Upper Salt River-Hwy 288 Bridge 3 June 29-30, 2015

Upper Salt River at Highway 288 Bridge 3 was the third of three sites surveyed on the upper Salt River on June 29-30, 2015 (Appendix B, Fig. 5). Weather at the site on day one was sunny and warm throughout most of the morning, becoming heavily overcast late in the afternoon and clearing overnight. Because of very low water clarity due to high turbidity, sampling with the BPES was not an effective method to employ. The site was sampled using a straight seine and hoop nets.

The focal species of the effort was roundtail chub (*Gila robusta*; GIRO), but no GIRO were captured or observed during the effort. Tables 27-28 summarize absolute numbers, CPUE and relative abundance for each species of fish caught per sampling method, distinguished by age-class of fish for the larger species sampled. Six species were sampled in this reach, with a total of 124 fish captured. The most abundant species were GAAF (n=69; 56%) and ICPU (n=29; 23%); all ICPU sampled here were Age-0. Other species caught included CYLU (n=15; 12%), MIDO (n=6; 5%), DOCE (n=3; 2%), and CYCA (n=2; 2%).

Fishes sampled in this reach of river were exclusively nonnative species. The presence of nonnative fish species, particularly the flathead catfish (PYOL) pose the greatest threat to GIRO and other native fishes in the upper Salt River at this time, and practicable means of their removal or suppression should be pursued. Due to difficult vehicular access, the site appears to receive limited recreational use. A few cattle were present at the site, but signs of any impact were not noted. Other animal species noted

during the effort include KISO, and lowland leopard frog (*Rana yavapaiensis; RAYA*). Plants common along this reach include salt cedar, mesquite, seep willow and cattail.

NFEF Black River @ 249 Bridge Crossing July 06, 2015

On July 06, 2015, a survey was conducted along the North Fork East Fork (NFEF) Black River, Apache County, AZ (Appendix B, Fig. 6). The NFEF Black River is located approximately 28 km south of Eagar, AZ, and flows in a southerly direction to the confluence of the West Fork Black River, and from there, on to the main stem of the Black River.

Loach Minnow (*Tiaroga Cobitis*; TICO) was the focal species of the survey, however none were captured or observed during the survey. A 500 m section of stream was surveyed using a BPES and blocking seine alone (Appendix C, Fig. 12), or combined with kick-seining in preferred TICO habitat. Tables 29-30 summarize the absolute numbers, CPUE and relative abundance for each species caught for each of the sampling techniques employed during the survey. For larger species, individuals were classified according to age-class (Age-0 or Age-1+), while individuals of smaller species were just counted. A total of five spp. were sampled during this survey, including speckled dace (*Rhinichthys osculus*; RHOS), brown trout (*Salmo trutta*; SATR), PACL, PIPR, and GIRO. Of the five species captured during the survey, RHOS was most abundant (n=450; 81). Other species caught include SATR (n=66; 12%), PACL (n=39; 7%), PIPR (n=2; < 1 %), and GIRO (n= 1; < 1%); a photograph of the GIRO from this site is provided in Appendix C (Fig. 13). No TICO were captured or observed throughout the 500 m survey reach.

Threats to native fishes as this site include predation by nonnative SATR, and predation and habitat degradation by crayfish. No other wildlife was noted during sampling efforts at this location. Common vegetation along the reach included, cottonwood, willow, and alder.

NFEF Black River-Above Boneyard Creek July 07, 2015

On July 07, 2015, a survey was conducted along the NFEF Black River on Apache-Sitgreaves National Forest, at roughly 1.4 km above the confluence of Boneyard creek (Appendix B, Fig. 6). The NFEF Black River is located approximately 28 km south of Springerville-Eagar, AZ, and flows in a southerly direction to its confluence with the West Fork Black River. Conditions throughout the day were sunny with scattered clouds and thunderstorms in the late afternoon.

The focal species of this survey was TICO. A 500 m section of stream was surveyed with a BPES and blocking seine alone, or in combination with kick-seining in preferred TICO habitat. No TICO were captured or observed throughout the sampling reach. Six species of fish were detected within the 500 m survey reach, with a total of 523 fish captured. Speckled dace (RHOS; n=402) was the most common species captured during the survey, comprising 77% of the total catch. Other species caught included SATR (n=77; 15%), PACL (n=40; 8%), GIRO (n=2; < 1%), CAIN (n=1; < 1%) and PIPR (n=1; < 1%). Tables 31-32 summarize the absolute numbers, CPUE and relative abundance for each species caught, for each of the sampling techniques employed during the survey. A photograph of one of the GIROs captured is provided in Appendix C (Fig. 15). Crayfish were noted to be abundant in this reach.

Threats to native fishes at this site include predation by nonnative SATR, and predation and habitat degradation by crayfish. No other wildlife was noted during sampling efforts at this location. Common vegetation along the reach included, cottonwood, willow, and alder.

NFEF Black River-Below Three Forks July 07, 2015

On July 07, 2015, Department personnel conducted a 500 m survey along the North Fork East Fork Black River, Apache County, AZ, approximately 1.0 km below the Three Forks area (Appendix B, Fig. 6). The NFEF Black River is located approximately 28 km south of Springerville-Eagar, AZ, and flows in a southerly direction to the confluence of the West Fork Black River, and into the main stem of the Black River.

The focal species of this survey was TICO. A 500 m section of stream was surveyed with a BPES and blocking seine, and with a combination of the BPES and kick-seining through preferred TICO habitat. Four species of fish were sampled in the 500 m reach, with a total of 265 fish captured, but no TICO were caught or observed; Tables 33-34 summarize the absolute numbers, CPUE and relative abundance for each species caught, for each sampling technique employed during the survey. Native fishes comprised 59% of the total fish sampled. The most abundant species was RHOS (n=145; 54%), followed by SATR (n=108; 41%), PACL (n=10; 4%) and CA sp. (n=2; < 1%). In riffle habitat within the 500 m, only two species were detected, SATR and RHOS, with Age-1+ SATR comprising 11% and Age-0 SATR comprising 42% of total fish captured (Table 34). Based on lip morphology and the presence of a cartilaginous ridge along the lower jaw (Appendix C, Fig.s 15-16), the survey crew reported two “CA sp.” (presumably PACL x CAIN hybrids), however neither specimen was preserved.

The most Common vegetation along the survey reach included, cottonwood, willow, and alder. Other wildlife observed at this location includes terrestrial gartersnake (*Thamnophis elegans*) and Arizona treefrog (*Hyla wrightorum*; Appendix C, Fig.18); crayfish were abundant throughout the sample reach.

Sharp Spring July 9, 2015

On July 9, 2015, a reach of 500 m at Sharp Spring in Santa Cruz County was surveyed for Gila topminnow (Appendix B, Fig. 7). Sharp Spring is a series of normally isolated pools that occasionally connect during seasonal high flows. The drainage is tributary to the upper Santa Cruz River in the San Rafael Valley. The site at Sharp Springs consists of stream channel which normally contains a series of nine pools with various degrees of connection. The uppermost pool in the series was dry at the time of this survey (this may be due to seasonal variation in groundwater levels).

During much of the year, the channel below the pools at Sharp Springs is wet and marshy for a short distance below the lowermost pool, becoming dry further down-channel. Over the past decade, instream vegetation and over-story within the drainage has increased, but periodic moderate grazing maintains several points of access to pools and open surface water.

The focal species at Sharp Spring was POOC, but none were caught; the only species found at the site was GAAF (n=271; 100%). Minnow traps were the only method employed at Sharp Springs; Table 35 provides a summary of the species captured, absolute numbers, CPUE and relative abundance. Water conditions are believed to have become anoxic overnight in the uppermost pool at Sharp Springs,

because all GAAF caught were found dead when the minnow trap was pulled in the morning. Particular attention had been paid to setting traps with one corner above the water surface to allow any wildlife caught in them access to air while they remained fishing overnight, but this trap may have settled under the surface after being set; fish, bullfrogs and KISO (n=1) were found alive in all other traps.

Management recommendations for the site include removal of GAAF by whatever practicable means are available, and stocking of POOC of the Sharp Spring lineage. Water levels in the spring pools should be monitored to determine whether water level within the drainage is declining. Also, several of the pools are relatively large and the potential for establishing GIIN from Sheehy Spring (a spring containing GIIN on neighboring private lands) should be considered. Other wildlife noted at the site includes KISO and bullfrogs (*Rana catesbiana*; RACA). Vegetation along the channel consist largely of deer grass, willow, seep willow, yerba mansa (*Anemopsis californica*) and cottonwood.

Cherry Creek-Below the Falls July 14, 2015

On July 14, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 8), Gila County, AZ, at approximately 2.17 km below The Falls. Cherry Creek is a tributary of Salt River and flows in a southerly direction from below the Mogollon Rim, along the eastern edge of the Sierra Ancha, to its confluence with the Salt River. Surface flow in Cherry Creek is intermittent in its lower reaches, above its confluence with the Salt River.

The focal species in Cherry Creek was GIRO and sampling was conducted solely using a BPES. A lower boundary for a 500 m survey reach was set using points where GIRO had been detected by biologists the previous year (Bonar et al. 2014). Once chub were identified, upper and lower boundaries for a 100 m sample reach were established (Appendix C, Fig.s 17-20) and the reach sampled. Habitats along the 100 m reach consisted primarily of runs and pools, and all native fishes captured appeared in good condition. Total lengths of GIRO ranged from approximately 100 mm to 330 mm (Appendix C, Fig. 21). The majority of fishes captured were native species; the only nonnative caught was green sunfish (LECY; n=73) which represented 49% of the total fish caught. Sampling efforts resulted in the capture of 26 GIRO (17%) within the reach, all of them Age-1+; other native species found to be present included PACL (n= 31; 21%) and CAIN (n=19; 13%), nearly all being Age-1+ (the exception of one Age-0 PACL). Table 36 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey.

Javelina was the only wildlife species noted at the site during the time of the survey. Crayfish were present but appeared to be uncommon (n<10). Common plants along this reach of stream included alder, cottonwood, willow, and oak.

Cherry Creek-Below Cherry Creek Lodge 1 July 15, 2015

On July 15, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 9), Gila County, AZ, approximately 4.6 km below Cherry Creek Lodge, southeast of Young, AZ. Cherry Creek is a tributary to Salt River and flows in a southerly direction from below the Mogollon Rim, along the eastern edge of the Sierra Ancha, to its confluence with the Salt River. Surface flow in the stream becomes intermittent in its lower reaches before its confluence with the Salt River.

The focal species of the surveys in Cherry Creek was GIRO. Sampling was conducted exclusively with a BPES along a 500 m reach of stream; no GIRO were captured or observed. Sampling in this section of stream found native species to be the most common, with AGCH comprising the greatest part of the catch (n=345; 50%); other native species found to be common at this location included PACL (n=230; 33%) and RHOS (n=108; 16%). The only nonnative species detected at this location was LECY (n=2; < 1%) which appeared to be uncommon. Of the 230 PACL sampled at this location, 50 were classified as Age-0 (7%). Table 37 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for this monitoring site. All native species appeared to be suffering light to moderate infection of black grub (*Neascus* sp.; Appendix C, Fig. 22), but otherwise appeared in good health.

Common plants along the riparian corridor include alder, cottonwood, willow, and oak. Other wildlife seen at this site included crayfish, which were abundant, and a black-necked gartersnake (*Thamnophis cyrtopsis*).

Cherry Creek-Below Cherry Creek Lodge 2 July 15, 2015

On July 15, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 9), Gila County, AZ, approximately 5.5 km below Cherry Creek Lodge, southeast of Young, AZ. Cherry Creek is a tributary to Salt River and flows in a southerly direction from below the Mogollon Rim, along the eastern edge of the Sierra Ancha, to its confluence with the Salt River. Surface flow in Cherry Creek becomes intermittent in its lower reaches before its confluence with the Salt River.

The focal species of the surveys along Cherry Creek was GIRO. Sampling was conducted exclusively with a BPES along a 500 m reach of stream; no GIRO were captured or observed. The section of stream sampled was comprised largely of riffle and pool habitats with low current (Appendix C, Fig. 23). Sampling efforts resulted in the detection of only three species, all of which were natives; there were no nonnative fishes caught or seen here. Although over 1000 seconds of shocking time was expended at this site, total number of fish caught was low (Table 38); AGCH (n=25) was the most abundant, accounting for 47% of the total catch, while PACL (n=20; 38%) and RHOS (n=8; 15%) comprised the two other species present; all PACL caught were classified as Age-1+. A summary of absolute numbers, CPUE and relative abundance for each species caught during the survey is provided in Table 38. Though no chub were found here, suitable habitat for them occurs within the 500 m survey reach. Management recommendations include evaluating adjacent reaches of stream for suitability of chub (or other native spp.) reintroduction, and the removal of nonnative fishes from the drainage.

No other wildlife was noted during the effort along this section of stream. Common riparian plants at this site include alder, cottonwood, willow, New Mexico locust (*Robinia neomexicana*) and oak.

Cherry Creek-Below Cherry Creek Lodge 3 July 15, 2015

On July 15, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 9), Gila County, AZ, approximately 6.1 km below Cherry Creek Lodge, southeast of Young, AZ. Cherry Creek is a tributary of Salt River and flows from below the Mogollon Rim, in a southerly direction along the eastern edge of the Sierra Ancha, to its confluence with the Salt River. After leaving the canyon-bound reach of stream and before reaching its confluence with the Salt River, surface flow in Cherry Creek becomes intermittent.

The focal species of the surveys along Cherry Creek was GIRO. Sampling was conducted exclusively with a BPES along a 500 m reach of stream; no GIRO were captured or observed. Habitat within this survey reach contained long, flat runs with interspersed pools throughout. A total of four species were caught at this location, with 95% of the total catch consisting of native fishes. Although a comparable effort was expended at this site to the two sites upstream, the total number of fish sampled here was low. The two native species PACL (n=17; 46%) and AGCH (n=17; 46%) were captured in equal numbers, with RHOS (n=1; 3%) being the third native species detected. The only nonnative species found at this location was LECY (n=2; 5%), which was also uncommon. Table 39 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey.

No other wildlife was noted during sampling efforts along this section of stream. Common vegetation through this reach included alder, cottonwood, willow, and oak.

Cherry Creek-Above Ellison Ranch 1 September 02, 2015

On September 02, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 10), Gila County, AZ, approximately 0.9 km north of Ellison Ranch. Cherry Creek is a tributary of Salt River and flows from below the Mogollon Rim, in a southerly direction along the eastern edge of the Sierra Ancha, to its confluence with the Salt River. After leaving the canyon-bound reach of stream and before reaching its confluence with the Salt River, flow in Cherry Creek becomes intermittent.

The focal species in Cherry Creek was GIRO. A 500 m section of stream was surveyed exclusively with a BPES at this location, with no GIRO captured or observed. Local storms during the previous week had left turbidity and flows very high throughout the stream (Appendix C, Fig. 24). High turbidity made sampling difficult and may have lowered the catch rate. Total effort expended was 2140 seconds and resulted in the capture of 387 fishes in four species. All fishes collected here were nonnative, with no native species detected. The most common species collected was CYLU (n=338; 87%), and the second most common LECY (n=47; 12%); two other nonnatives comprised the remainder of the catch, PIPR (n=1; < 1%) and PYOL (n=1; < 1%). Table 40 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey.

The abundance of nonnative fishes and crayfish appear to be the predominant threat to native fishes at this site. Of the nonnative species detected, flathead catfish (Appendix C, Fig. 25) is the most concerning and poses the greatest threat to native fishes within this stream. Every practicable effort should be considered to remove flatheads and other exotic fishes from the drainage, and prevent their reinvading the stream. Placement of a fish-barrier structure in the lowermost canyon of this stream should be considered.

Common plants along the riparian area include alder, cottonwood, willow, and oak. Additional wildlife observed in the area was a Sonoran whipsnake (*Masticophis bilineatus*; Appendix C, Fig. 28).

Cherry Creek-Above Ellison Ranch 2 October 15, 2015

On October 15, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 10), Gila County, AZ, approximately 1.4 km north of Ellison Ranch. Cherry Creek is a tributary of the Salt

River, flowing in a southerly direction along the eastern edge of the Sierra Ancha, from below the Mogollon Rim to its confluence with the Salt River. After leaving the canyon-bound reach of stream and before reaching its confluence with the Salt River, flow in Cherry Creek becomes intermittent.

The focal species in Cherry Creek was GIRO. A 500 m section of stream was surveyed exclusively with a BPES; no GIRO were captured or observed. Table 41 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey. Total effort expended was 1606 seconds, which resulted in the capture of 201 fishes in six species, of which only three individuals were natives. The only indigenous fish species detected here was AGCH (n=3; 1%), with the remaining 99% sampled being nonnatives. The most common species caught was CYLU (n=172; 86%), followed by PIPR (n=14; 7%), LECY (N=5; 2%) and black bullhead (*Ameiurus melas*), AMME (N=5; 3%); flathead catfish PYOL (n=2; 1%) were also found to be present at this site.

Suitable GIRO habitat was present throughout this reach of stream, but abundant nonnative fishes and crayfish may preclude native fishes here. Of the nonnative species detected, flathead catfish (PYOL) pose the greatest threat to chub and other native fishes within this system. Every practicable effort should be explored to remove exotic fishes from this drainage, and prevent their reinvasion. Installation of a fish-barrier in the lowermost canyon and the eradication of the exotic species in Cherry Creek should be pursued. Common plants along the riparian area include alder, cottonwood, and willow. No additional wildlife was observed within the area.

Cherry Creek-Above Ellison Ranch 3 October 15, 2015

On October 15, 2015, Department personnel conducted a survey on Cherry Creek (Appendix B, Fig. 10), Gila County, AZ, at USGS gaging station 09497980, approximately 3.2 km northwest of Ellison Ranch. Cherry Creek is tributary to the Salt River, flowing in a southerly direction along the eastern edge of the Sierra Ancha, from below the Mogollon Rim to its confluence with Salt River. After leaving the canyon-bound reach of stream and before reaching its confluence with Salt River, flow becomes intermittent.

The focal species in Cherry Creek was GIRO. A 500 m section of stream was surveyed employing the BPES exclusively; no GIRO were captured or observed. Habitat throughout much of the reach consisted of boulders, deep pools and undercut bedrock wall. Table 42 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for the site. Total effort through the reach was 1349 seconds, resulting in the capture of 4 different species, all nonnative. The most commonly detected species was CYLU (n=55), comprising 71% of the total fish caught; the next most common was LECY (n=13; 17%), followed by PYOL (n=6; 8%), and AMME (n=3; 4%). No native species were observed or sampled at this site.

Crayfish were noted as abundant throughout this sampling reach. Of the nonnative species detected, flathead catfish (PYOL) likely pose the greatest threat to chub and other native fishes within the stream. Excellent GIRO habitat was widespread and common in this reach, but neither chub nor any other native species were found. Several habitats considered good chub habitat (pools and undercut bedrock walls) were occupied by flathead catfish. Practicable methods for the removal of exotic fishes from this drainage should be explored. Installation of a fish-barrier in the lowermost canyon and the eradication of the exotic species should be pursued.

Common plants along the riparian area include alder, cottonwood, willow, and oak. No additional wildlife was noted during the surveys.

Lower Verde River – Below Bartlett Dam 1 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 11), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. The lower Verde River is tributary to the Salt River, flowing for the most part in a southerly direction to its confluence with Salt River. This section of river is regulated by Salt River Project (SRP) for the production of hydroelectric power and water to the Phoenix metropolitan area (Bryan and Hyatt, 2004). The lower Verde extends roughly 25 miles from Bartlett Dam to its confluence with Salt River, and the SOW for this Project calls for a total of nine sites along the river to be sampled. Although coordination had been underway for several months prior to the sampling effort, permission was not received from FMYN to sample within Reservation boundaries, so sampling was restricted to six sites on the upper 10 miles of the lower Verde River. Efforts will continue to obtain permission for sampling the lower portion of the river, and should it be received, sampling of nine sites in the lower Verde will be completed.

Habitat throughout much of the reach consisted of long deep pools, with a fairly fast current and relatively short lengths of riffle (Appendix C, Fig. 26). Instream structure included extensive root masses along beds of common cane, bedrock walls with various amounts of undercut, and instream boulders. The focal species for this effort was GIRO, and none were captured or observed throughout the reach. A 500 m section of stream was surveyed employing an electrofishing canoe with a capture canoe and inflatable kayaks. Total effort through the reach was 615 seconds, resulting in the capture of three species, including two native species CAIN (n=8; 50%) and PACL (n=1; 6%). The third species collected during sampling this reach was MISA (n=7), comprising 44% of the total fish captured. Table 43 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey. It was estimated at the time of sampling that no more than 40% of the total number of suckers rolled during electrofishing were captured in this reach, due to stream current and depth. No young-of-year suckers (Age-0) were caught or seen in this reach of stream.

The most apparent threat to native fishes is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO, and should populations reach low levels, stocking to augment the population should be initiated. No wildlife was noted in this reach of stream during the sampling effort. Common plants in the reach included common reed, willow, cottonwood and salt cedar.

Lower Verde River – Below Bartlett Dam 2 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 11), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. Habitat throughout much of the upper reach consisted of a long deep pool, with fairly fast current and relatively short lengths of riffle, while the lower third of the reach was largely one long, pooled habitat with low flows. Instream structures included extensive root masses along beds of common cane, bedrock walls with various amounts of undercut, and instream boulders along the shoreline.

A 500 m section of stream was surveyed employing an electrofishing canoe with a capture canoe and inflatable kayaks; the focal species of the lower Verde River was GIRO, and none were caught or observed. Total effort through the reach was 1270 seconds, resulting in the capture of only two species, both nonnatives. Largemouth bass (MISA n=12) was the most common species sampled in this reach, comprising 80% of the total fish captured; the only other species captured was CYCA (n=3; 20%). Table 44 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for the site.

The most apparent threat to native fishes is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO, and should populations reach low levels, stocking to augment the population should be initiated. Other wildlife noted during sampling of this reach included osprey (*Pandion haliaetus*), great blue heron (*Ardea herodius*), common merganser (*Mergus merganser*) and patch-nosed snake (*Salvadora hexalepis*). Common plants in the reach included common reed, willow, cottonwood and salt cedar.

Lower Verde River – Below Bartlett Dam 3 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 11), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. Habitat throughout much of this reach consisted of run and riffle, with fairly fast currents compared to the two earlier sites. Instream structures included extensive root masses along beds of common cane, willow root masses, bedrock walls with various amounts of undercut, and instream boulders throughout the channel and along the shoreline. The channel here was much narrower than in both reaches above, so a greater percentage of habitat was covered during sampling.

The focal species in lower Verde River was GIRO. As in the previous sections, the stream here was surveyed employing an electrofishing canoe with a capture canoe and inflatable kayaks. As with other sections sampled upstream, no GIRO were captured or observed. Total effort through the reach was 1128 seconds, resulting in the capture of 41 fish in three species. Most common of the three was the native sucker CAIN (n=19; 46%), followed by another native sucker, PACL (n=15; 37%). Largemouth bass (MISA) was the only nonnative captured during the effort at this site and was the least common, comprising only 17% of the total fish caught; all captured fish were classified as Age -1+. Table 45 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for the site.

The most apparent threat to native fishes is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO, and should populations reach low levels, stocking to augment the population should be initiated. The only other wildlife noted during sampling of this reach was the peregrine falcon (*Falco peregrinus*). Common plants in the reach included common reed, willow, cottonwood and salt cedar.

Lower Verde River @ Needle Rock - 1 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 12), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. The lower Verde River is tributary to the Salt River, flowing in a generally southerly direction to its confluence with Salt River. This section of river is regulated by Salt River Project (SRP) for the production of hydroelectric power and water to the Phoenix metropolitan area (Bryan and Hyatt, 2004). The lower Verde extends roughly 25 miles from Bartlett Dam to its confluence with Salt River, and the SOW for this Project calls for a total of nine sites along the river to be sampled. Although coordination had been underway for several months prior to the sampling effort, permission was not received from FMYN to sample within Reservation boundaries, and sampling was restricted to six sites on the upper 10 miles of the lower Verde River.

This section of stream was the fourth of six 500 m sample sites on the lower Verde River. Stream morphology throughout much of this reach consisted of a relatively narrow channel width, with moderate velocity and slight turbulence, resulting in what would best be described as run habitat. In the lower part of the survey reach, the channel narrowed further, with instream boulders and higher water velocity forming riffle habitat over perhaps the last 100 m. Instream structure included extensive root masses along beds of common cane and bedrock walls with possibly various amounts of subsurface structure.

The focal species here was GIRO; all sampling was conducted using an electrofishing canoe, with a capture canoe and inflatable kayaks removing fish as they were stunned; no GIRO were captured or observed. The channel here was much narrower than in both reaches above, while water velocities were higher, so a greater percentage of habitat was covered during sampling. Total effort through the reach was 716 seconds, capturing a total of 56 fish in five species. Most common of the five species were the native suckers PACL (n=21; 38%) and CAIN (n=14; 25%); together they accounted for 63% of the total fishes sampled. The remaining species caught in this stretch were all nonnatives, including MISA (n=10; 18%), CYCA (n=8; 14%) and CYLU (n=3; 5%). Table 46 summarizes the absolute numbers, CPUE and relative abundance for each species caught during the survey. All fish captured (with the exception of CYLU, which are not classified within an age class) were classified as Age -1+. Percent habitat sampled was not estimated for any of the three sites in the Needle Rock reach.

The most apparent threat to native fishes on the lower Verde River is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO, and if necessary, stocking to augment the population. No other wildlife was noted during sampling of this reach; however river otters (*Lontra canadensis*) were seen by some members of the sampling crew while paddling down to this location. Common plants in the reach included common reed, willow, cottonwood and salt cedar.

Lower Verde River @ Needle Rock - 2 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 12), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. Because of restricted access to the lower 15 miles of river, sampling was restricted to six sites on the upper 10 miles of the lower Verde River.

The focal species in lower Verde River was GIRO. This section of stream was the fifth of six 500 m sample sites on the lower Verde River, and no GIRO were captured or observed. Stream morphology throughout

much of this reach consisted of a narrow channel width, with generally higher velocity and turbulence than found throughout most of the previous sections, resulting in what would best be described as almost exclusively run and riffle habitats. Instream structure included extensive root masses of common cane along the stream margins, with short stretches of channel with submerged cane, or covered by overhanging cane. Additional structure in this reach included bedrock cliff and occasional large boulders.

Total effort through the reach was 544 seconds, capturing a total of 28 fish in five species. Most common of the five species were the native suckers PACL (n=11; 39%) and CAIN (n=8; 29%); together they accounted for nearly 68% of the total fishes sampled. The remaining species caught here were all nonnatives, including MISA (n=6; 21%), CYCA (n=2; 7%) and CYLU (n=1; 4%). As in the previous reach, all fish captured (with the exception of CYLU which are not classified within an age class) were classified as Age -1+, and no young-of-year (Age -0) fish were sampled. Table 47 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for the site.

The most apparent threat to native fishes is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO, and should populations reach low levels, stocking to augment the population should be initiated. No other wildlife was noted during sampling of this reach. Common plants in the reach were mostly common reed, willow, and salt cedar.

Lower Verde River @ Needle Rock - 3 July 21, 2015

On July 21, 2015, Department personnel conducted a survey on the lower Verde River below Bartlett Dam (Appendix B, Fig. 12), Maricopa County, AZ, above the boundary of the Fort McDowell Yavapai Nation (FMYN) Reservation. This was the sixth and final site of six sampled along the lower Verde River between Bartlett Dam and the Fort McDowell Yavapai Nation Reservation boundary. All Sampling was conducted by Canoe electrofishing. Stream morphology throughout most of this reach consisted of run and riffle, a relatively broad channel with shallow depth and little turbulence. Instream structure included extensive root masses of common cane along stream margins, with occasional large instream boulders.

As with other sites on the lower Verde, the focal species for this survey reach was GIRO, and none were captured or observed during the effort. A total of four species were captured here, with an effort of 1058 seconds, resulting in the capture of 117 fish in total. Two native suckers PACL (n=60; 51%) and

CAIN (n=32; 28%) were the most common species, and were the only native species encountered. Also in this reach, young-of-year (Age -0) suckers were encountered for the first time during the survey, comprising roughly 15% of the total fish caught. Other species caught were MISA (n=6; 5%) and CYLU (n=19; 16%); Table 48 provides a summary of the species captured, absolute numbers, CPUE and relative abundance for the site.

As with the other reaches along the lower Verde River, the most apparent threat to native fishes is the presence of nonnative fishes. Management recommendations for the lower Verde River include maintaining regular surveys of the river to monitor the status of GIRO. No other wildlife was noted during sampling of this reach, however shortly downstream from this site and above the take-out point, horses were seen in and along the river. Common plants in the reach were mostly common reed, willow, and salt cedar.

Little Sycamore Creek July 27, 2015

Little Sycamore Creek (Appendix B, Fig. 13) flows in a westerly direction to its confluence with Sycamore Creek, which is tributary to the Agua Fria River. Tributaries to Little Sycamore include Willow Spring Gulch, Rock Spring Draw, Chalk Tank Canyon and Reno Canyon. Prescribed fire was applied to the watershed in 2001, followed by a few years of drought. A large storm event in 2005 resulted in high sediment/bedload in the drainage, partially filling habitats within the drainage with fine sediments. Additional storms and associated runoff in 2006 and 2007 further filled in habitats (Albert Sillas, USFS, pers. comm.).

This is the second survey of Little Sycamore Creek at this location and under this project; GIIN were found at the sample site established in 2012, and were the exclusive species found in 2015. A 100 m sample in 2012 found 74 GIIN and one AGCH; Figures 27-30 (Appendix C) provide photographs of the upper and lower boundaries of the 100 m sample site. Comparison of photos from the 2012 report show surface waters not as extensive in 2015, but this may be due to a lack of seasonal precipitation. Sampling in 2012 was conducted 3 months later in the year, after the summer rainy season. Sampling of the 100 m reach during 2015 captured a total of 56 GIIN, finding both adult (n=33; 59%) and juvenile (n=23; 41%) chub present and in good numbers; Table 49 provides a summary of total numbers, relative abundance and effort for the sample at Little Sycamore Creek.

Habitat at the site of survey is small and consists of a series of small pools. Surface water was not as extensive in 2015 as during sampling in 2012. Unlike 2012, surface flows did not extend up to or onto the adjacent private property. Management recommendation includes conducting surveys downstream to further document distribution of GIIN within the drainage, to find additional locations that may be sustaining chub, or to find suitable habitat to stock chub into. Pools at this site have become noticeably sediment-filled, and cattails appear to have become established. Sediments should be dredged and cattails removed to reclaim habitat suitable for GIIN. Riparian vegetation at this site consists largely of mixed juniper grasslands and chaparral, including sycamore (*Platanus wrightii*), Arizona ash (*Fraxinus velutina*), alder (*Alnus oblongifolia*), oak (*Quercus* sp.) and cottonwood (*Populus fremontii*). Also, cattail (*Typha dominguensis*) was noted as established.

Sycamore Creek-Double T Falls July 27, 2015

On July 27, 2015, Department and USFS personnel conducted a survey of Sycamore Creek (Appendix B, Fig. 14), Yavapai County, AZ, located west of Double T Ranch. Sycamore Creek is located approximately 23 km east of Cordes Junction, AZ, and flows in a westward direction to the confluence of the Agua Fria River.

Sampling in Sycamore Creek was performed using a BPES and collapsible hoop nets. Gila chub (GIIN) was the focal species of the survey and was the only native species captured; a second species, ONMY was also present. Once the presence of GIIN was confirmed, a 100 m reach was established and sampled; boundary photographs for the sample site are provided in Appendix C (Fig.s 31-34). The BPES proved the more effective technique for sampling here, with a total effort of 1,903 seconds expended. Chub comprised 38% of the total fishes sampled below TT Falls. Although clearly outnumbered by ONMY, adult GIIN (Appendix C, Fig. 35) were common (n=34; 35%), while juvenile chub (n=3; 3%) accounted for

a much smaller proportion of the total fish caught. Rainbow trout (ONMY; n=63) comprised 62% of the total catch, with GIIN (n=37) comprising the remaining 37%. Collapsible hoop nets were also used and fished for an average of 2.5 hours, resulting in the capture of only two ONMY. Tables 50-51 summarize the absolute numbers, CPUE and relative abundance of each species caught for each sampling technique employed.

The 100 m reach contained suitable habitat for chub, and all fish handled appeared in good condition. The presence of nonnative fish appears to be the greatest threat to the GIIN population at this time. Common vegetation along the stream includes willow, ash, and poison ivy (*Toxicodendrons radicans*). No crayfish were noted as present, and deer were the only other wildlife noted at the time of the survey.

Sycamore Creek-Middle Box July 28, 2015

On July 28, 2015, Department personnel, in cooperation with USFS, conducted a survey on Sycamore Creek (Appendix B, Fig. 15), Yavapai County, AZ. Sycamore Creek is located approximately 19 km east of Cordes Junction, AZ, and flows in a westward direction to the confluence of the Agua Fria River. The Middle Box site is located roughly three miles downstream from the Double T Falls site.

The focal species for monitoring at Sycamore Creek is GIIN. Sampling was conducted using a BPES exclusively, with a total of 879 fishes captured during 1,035 seconds of effort. Once GIIN was identified, a 100 m sample reach was established. A total of 77 GIIN were caught within the sampling reach, forming 8% of total fish sampled. All fishes captured at the Middle Box site were native species. The most abundant species was AGCH (n=461) accounting for 52% of the total catch. Juvenile CAIN (n=341) were also abundant at this site, comprising 39% of the total catch, but no adult suckers were captured. Table 52 provides a summary of effort and capture data for the site. Photographs of the upper and lower boundary points of the 100 m sample site are provided in Appendix C (Fig. 28-31).

No nonnative fishes were detected and all fishes handled appeared in good condition. All fish captured at this site were restricted to the two lowermost pools, and no fish were observed above. Habitat that was sampled may not be perennial, and limited habitat throughout the reach may pose a threat to the current population of GIIN and other native fishes present. Common vegetation along the riparian area includes cottonwood, sycamore, ash, and New Mexico locust. Crayfish were not noted within the reach, and the only other wildlife noted during the effort was an Arizona black rattlesnake (*Crotalus cerberus*).

Indian Creek July 29, 2015

The upper portion of the Indian Creek drainage runs north and west from the southwest side of 22 Mesa in the Agua Fria sub-basin, gradually turning in a southwesterly direction to its confluence with the Agua Fria River (Appendix B, Fig. 16); the survey site is located in the upper extent of the drainage.

On July 29, 2015, Department personnel sampled Indian Creek. The target species for Indian Creek was GIIN. There were only two species of fishes found in Indian Creek, AGCH (n=31; 42%) and GIIN (n=43; 58%), with chub more abundant and with young-of-year (Age 0) detected. Table 53 provides a summary of effort and capture data for the site. Due to changes in stream morphology and volume of surface water present, a 100 m sample site was established upstream of the fixed site established in 2012. The lower boundary was established once a chub was caught. The sample reach during 2015 covered all

chub habitat that remained in the stream (Appendix C. Fig. 32-35), while the previously established, fixed site would have covered much unsuitable stream. Habitat throughout the reach was predominantly pool and run, with very little riffle, and there was not sufficient surface water above the lower boundary to complete a 100 m reach. Once suitable amounts of surface water were found to hold GIIN, there was only 88-m of wetted habitat; much of the reach was established in the upper portion of the drainage. Water temperature at 1201h was 23.8^{o}C, pH 7.9, conductivity 489 µS/cm, and dissolved oxygen at 5.4 mg/L. The upstream exclosure fence was entirely down, and signs of extremely heavy cattle use were observed throughout the stream channel and adjacent terraces. At the time of the sampling, cattle were seen traveling only over the terraces, though there was an abundance of fresh sign throughout the stream channel.

The greatest threat to chub appeared to be habitat loss due to drought or climate change and sediment accumulation, and extreme impacts on habitat quality and quantity due to unregulated use by cattle in the spring channel and associated terraces. Management recommendations include repairing the upper fence to exclude cattle, and the establishment or enforcement of more rigorous standards for grazing impacts than are currently being applied.

Tule Creek July 30, 2015

Tule Creek is tributary to Humbug Creek, a channel that formerly connected to the Agua Fria River (Appendix B, Fig. 17). Originating from a spring (Tule Spring) and associated seeps within a canyon on the southwestern edge of the Bradshaw Mountains, surface water is usually present for several hundred meters, and supports a stable population of Gila topminnow (POOC). Managed by the BLM, the drainage is fenced to minimize damage caused by burros and cattle. Pupfish (*Cyprinodon macularius*) were stocked at the site in 2008 and 2009, but never established.

Tule Creek was surveyed by Department personnel on July 30, 2015; POOC was the focal species and was found to be present and doing well. The 100 m sampling site had been established here during a previous effort under this project in 2012. Sampling during 2015 again found only POOC (n=398; 100%) to be present; sampling was conducted using minnow traps and dip-net sweeps. Tables 54-55 summarize the absolute numbers, CPUE, and relative abundance for each species caught, for each of the sampling techniques employed. Photographs of the upper and lower boundaries of the sample reach are provided in Appendix C (Fig. 36-39).

Habitat within the 100 m has changed dramatically since 2012, with the canyon bottom having become thickly choked with cattails and sedges (*Scirpus* sp.), and the majority of open water restricted to two moderately-sized pools at the upper and lower ends of the sample reach. Also, open water was found occasionally along the stream margins, where it appeared that wildlife activity was maintaining small areas of open water. Although the amount of open water habitat has declined at Tule Creek, Gila topminnow are still abundant. Below the survey reach, the canyon appeared to have been scoured by excessive runoff during the intervening years. Most riparian vegetation was gone, as were all sediments that had once lined the channel bottom; the survey reach immediately above this channel section appeared entirely intact, however.

The only other wildlife noted at the site was lowland leopard frogs (*R. yavapaiensis*). Other plants common along the drainage include seep willow, arrow weed (*Pluchea sericea*), willow, cottonwood, mesquite, saguaro (*Carnegiea gigantea*), salt cedar, bulrush (*Scirpus* sp.) and yerba mansa (*Anemopsis*

californica). Threats include danger of fire and associated water quality problems within the canyon, due to the accumulation of excessive fuels, and prolonged drought. Management recommendations are for the control and removal of some of the aquatic vegetation in the channel bottom to increase open water habitat and reduce fuel load. After seeing how this section of stream withstood apparent flooding that scoured the lower canyon since 2012, recommendations are to remove up to 50% of instream vegetation to increase open water habitat within the stream. There were no sign of cattle or burros noted by us during our visit to Tule Creek.

Sabino Canyon August 10, 2015

On August 10, 2015, Department personnel conducted a survey along Sabino Creek, (Appendix B, Fig. 18), Pima County, approximately 20 km northeast of Tucson, AZ. The upper reaches of Sabino Creek receive runoff from Rattlesnake Peak, Mt. Lemmon, and Rose Peak watersheds of the Santa Catalina Mountains, north of Tucson. Sabino Creek flows in a southerly direction, through Pusch Ridge Wilderness in the Santa Catalina, with perennial surface flow along the creek limited to within the boundaries of Coronado National Forest. The focal species for Sabino Creek were GIIN.

Sampling in Sabino Creek was performed using collapsible hoop nets, minnow traps, and a straight seine. After visually confirming the presence of chub, a 100 m reach was designated and sampled. Sampling efforts found 100% of total fish captured to be GIIN, with minnow traps being the most effective capture technique. Collapsible hoop nets were set for an average of two hours, resulting in a total catch sum of 71 GIIN. Both age classes were present, with juveniles accounting for 28% and adults for 72% of the total catch rate. A total of nine minnow traps were set throughout the 100 m reach, resulting in a total of 171 GIIN, with both juvenile (79%) and adult (21%) size classes present. A total of four seine hauls were performed over a 192 m^2 area, resulting in a total of 10 GIIN (Age-0). Tables 56-58 provide a summary of effort and fish caught per sampling gear type. Photographs for the upper and lower boundaries of the 100 m reach were taken after sampling was complete (Fig. 40-43).

A total of 252 GIIN were caught within the 100 m reach using various gear types. The population of GIIN appears to be doing excellent, and no nonnative fishes or crayfish are present at this time. Common vegetation along the stream includes cottonwood, sycamore, ash, and willow. No additional wildlife was noted during sampling.

Romero Canyon August 11, 2015

On August 11, 2015, Department personnel conducted a survey in Romero Canyon (Appendix B, Fig. 19), located in the Santa Catalina Mountains of Pima County, within the Coronado National Forest. Habitats supporting fish in Romero Canyon are primarily a series of tinajas located within the boundaries of the main canyon. Romero Canyon channels runoff from the northwestern slopes of the Santa Catalina Mountains downstream to Sutherland Wash.

Habitat at Romero Canyon normally consists of a series of bedrock slot-pools in a high-gradient desert canyon, with low-volume flows connecting them during much of the year. During 2012, successful surveys at Romero Canyon led to the establishment of a 100 m survey site, encompassing the majority of permanent, high-quality habitat in the upper canyon. Since the establishment of GIIN in Romero

Canyon, sampling has normally taken place at these pools using straight seines or hoop nets, and sampling in 2015 focaled on this location using those methods. Due to unstable footing during dangerously high flows, sampling with a straight seine proved precarious and only marginally effective; hoop nets could not be deployed effectively. Because sampling was not successful at Romero Canyon, completed tables were not generated for this site; however, Table 59 provides absolute abundance for all fish that were captured at the site. All but one GIIN collected were seined within the established 100 m sample site, with one additional animal captured in the remaining 400 m canyon reach, but the threshold number for a complete sample (n=25) was not achieved. Conditions in the canyon precluded sampling of two additional 500 m reaches.

A second sampling effort was undertaken in November; lower portions of the stream below the canyon are normally dry, but again, storms and subsequent high flows prevented sampling. Storm runoff and resulting flows (Fig. C. 44) created conditions too hazardous to allow effective sampling in all but a few small sections of the stream, so two additional 500 m surveys were not undertaken.

Square-meter (m^2) estimates were not recorded for either effort at Romero Canyon, because having not achieved the threshold number of chub for a complete sample, crew members believed the sampling effort would have to be repeated. No nonnatives were caught during either sampling effort. Due to the given conditions of the site, sampling was ineffective and personnel did not carry out two more 500 m reaches.

Additional wildlife observed in the area were adult and tadpole canyon treefrog (*Hyla arenicolor*), and a Sonora mud turtle (*Kinosternon sonoriense*). Common vegetation along the stream within the canyon includes willows.

Red Tank Draw August 24, 2015

On August 24, 2015, Department personnel conducted a survey along Red Tank Draw (Appendix B, Fig. 20), approximately 20 km southeast of Sedona, AZ. Located on the Coconino National Forest in Yavapai County, Red Tank Draw is tributary to Wet Beaver Creek in the Verde River drainage. Streamflow in Red Tank Draw is in a southerly direction and stream flow is intermittent throughout much of the year.

The focal species for Red Tank Draw is GIIN. Crew members sampled Red Tank Draw at the fixed 100 m reach established in 2012. After the 100 m sampling effort was completed without finding chub, sampling continued for another 400 m upstream. Habitat of superior quality and quantity with GIIN was found several hundred meters upstream, with resulting efforts leading to the capture of a total of 33 GIIN.

The survey was conducted using a BPES exclusively, with a total sampling effort of 1130 seconds. Four species were detected within the sampling reach, with 87% of those being nonnative fishes. The most abundant species sampled at the site was AMME (n=103), comprising 41% of the total fish captured. Other species identified include LECY (n=82; 32%) and PIPR (n=34; 13%); GIIN (13% of the total fish captured) was the only native fish detected. All but four GIIN captured during the survey were found within two pools in the upper reach of the 500 m, approximately 330 m upstream of the lower boundary point. Table 60 provides a summary of effort and capture data for the reach.

The abundance of nonnative fishes and limited habitat appear to be the greatest threats to Gila chub for this site. Surface flow was intermittent throughout the reach and the last 50 m of the reach was dry. After the BOR monitoring protocol was completed, personnel returned to a pool in the lower portion of the reach to remove nonnative fishes. Four of the 33 GIIN were detected during the process, all greater than Age-1. The greatest threat to this population at this time is the presence of nonnative fishes. Management recommendations include future removal and suppression of nonnatives and crayfish in the drainage, and the movement of the 100 m fixed sample site upstream to the point where it captures the two pools with the best chub numbers and habitat.

No other wildlife were recorded during the survey, however crayfish were abundant throughout the reach. Riparian vegetation commonly occurring in the drainage includes cattail, cottonwood, sycamore (*Plantanus wrightii*), Arizona ash, alder and willow.

Red Rock Canyon – Cott Tank September 16, 2015

On September 16, 2015, a 500 m section of stream below Cott Tank (Appendix B, Fig. 21) was surveyed by Department personnel in Redrock Canyon. This site is located in the Patagonia Mountains northwest of the San Rafael Valley, roughly 13 km east of Patagonia AZ. The stream is intermittent throughout its length, to its confluence with Sonoita Creek, a tributary of the Santa Cruz River. The focal species for this site was POOC.

The survey site was chosen at Cott Tank due to its accessibility, permanence of surface water, and for continuity with previous sampling. A 500 m survey reach was established beginning at the first permanent water accessed from the trail and continuing downstream. The entire reach consisted of a series of nine pools of varying connection and dimensions, most of which were largely unshaded and full of algae. Based on clarity, volume and productivity, the pools that appear to be of the best quality are the upper (upstream) five of nine, however, over the last five years, no fish have been found in them, and they may not be permanent. Three of the lower four pools contain GAAF, the only fish found in this part of the drainage.

Tables 61-63 provide a summary of effort and fish caught per sampling gear type. Three sampling methods were employed at this site. Minnow traps caught no fish (Table 61). Dip-netting proved the most effective method of sampling and 103 net sweeps resulted in the capture of 90 fish through the lower reach (Table 62). Electrofishing with the BPES was attempted but regardless of settings, quickly proved ineffective at collecting GAAF (Table 63). No POOC were caught at this site.

Management recommendations include the eradication of GAAF in the drainage by whatever means available and the reestablishment of POOC in all suitable habitats. The greatest threats to their reestablishment include the presence of GAAF within the drainage, and loss of aquatic habitats due to prolonged drought. Also, private landowners in the lower canyon should be approached and offered the opportunity to enroll their properties under the Safe Harbor Agreement for topminnow and pupfish, as either participating or non-participating permittees. Common plants along the drainage included oak trees and deer grass (*Muhlenbergia rigens*). The only wildlife noted during the survey was KISO.

Red Rock Canyon – The Falls September 17, 2015

On September 17, 2015, a 500 m section of stream in Redrock Canyon at The Falls, a section of stream roughly 9.6 km east of Patagonia AZ; Redrock Canyon is tributary to Sonoita Creek (Appendix B, Fig. 22), a tributary of Santa Cruz River. The focal species for this site was POOC.

Hiking up-canyon to the survey site, larval and post-larval fish were seen along the stream margin. Closer examination revealed AGCH nests in shallow waters over sand substrates; nests still had larval fish suspended over the bottom of the depressions. The majority of the survey reach for this site is located above The Falls, with the lower boundary of the 500 m located at the base of The Falls. Though surface water was present throughout the reach, no fish were seen or captured above the falls. Habitat consisted primarily of shallow sandy runs with occasional shallow pools and riffle, and all sampling was conducted using a straight seine; Tables 64-65 provide a summary of effort and capture data for the site.

As previously stated, the lower boundary of this survey reach is at the base of The Falls. From this point and for roughly an additional 350-m downstream, a number of opportunistic seine hauls were employed, resulting in the capture of a total of 15 adult and two juvenile AGCH (over the total 850-m). All adults showed varying degrees of tuberculation across the head, anal and caudal fins. Juvenile dace were seen along much this reach, usually schooling against mats of filamentous algae. Longfin dace (AGCH) was the only species sampled in this reach and below in Redrock Canyon.

The Falls in Redrock Canyon probably form a natural barrier against the upstream movement of at least some species of fish in the drainage. It is recommended that all future surveys encompass The Falls and that upper and lower boundaries be moved downstream by approximately 250-m from their present locations. Although POOC appear to no longer occur in Redrock Canyon, every effort should be made to reestablish the species in all suitable habitats within Redrock canyon. The greatest threats to their reestablishment include the presence of GAAF within the drainage, and loss of aquatic habitats due to prolonged drought. Common plants along the drainage included cottonwood, mesquite, oak (*Quercus* sp.), willow, and Arizona ash (*Fraxinus velutina*). The only other wildlife noted at this site during the survey was a zone-tailed hawk.

Red Rock Canyon – Pig Camp September 17, 2015

On September 17, 2015, Department personnel sampled a 500 m section of stream in Redrock Canyon at Pig Camp, roughly 8 km east of Patagonia AZ (Appendix B, Fig. 23). Redrock Canyon is tributary to Sonoita Creek, a tributary of the Santa Cruz River. The focal species for this site was POOC.

No POOC were captured or observed at this site. Habitat within the survey reach was slow-flowing water, with nearly the entire reach being <8 cm deep and <60 cm wide, and with occasional connected backwaters. A few post-larval fish were seen in some of the backwater habitats, but were not captured. Near the midway point in the survey reach, a scour pool greater than 15 cm deep was found and seined, resulting in the capture of three Age -1+ AGCH, the only fish caught in this reach. Also in the backwater habitat, what were presumed to be AGCH nests were observed, but showed light deposits of silt and algae, so were probably not fresh. Tables 66-67 provide a summary of effort and capture data for the site.

Although POOC appear to no longer occur in Redrock Canyon, every effort should be made to remove GAAF from the drainage and reestablish POOC in all suitable habitats within the drainage. The greatest threats to their reestablishment include the presence of GAAF within the drainage, and loss of aquatic habitats due to prolonged drought. Also, private landowners in the lower canyon should be approached with the opportunity to enroll their property under the Safe Harbor Agreement for topminnow and pupfish, as either participating or non-participating permittees.

Common plants along the drainage included cottonwood, Arizona ash, and spiny hackberry (*Celtis pallida*). Other wildlife seen at the site included the KISO, Sonoran whipsnake (*Masticophus bilineatus*) and black-tailed rattlesnake (*Crotalus molossus*).

T-4 Spring September 29, 2015

Tributary to the Babocomari River, T4 Spring is located north of the river channel on the Babocomari Ranch, north of Canelo Hills (Appendix B, Fig. 24). Habitat consisted primarily of a large modified pool, with a series of four smaller pools upstream. For roughly 70-m upstream of the large terminal pool, diffuse surface flow less than 5 cm deep was present, connecting with the two lowermost of the smaller pools. Downstream of the large pool, surface water was present across the road, ending on marshy ground approximately 60-m below it. The channel below the wetted area was hiked for over 500 m to find additional water, but none was found, so two additional 500 m surveys were not completed.

An approximate 120 m reach was established from below the large pool and up-channel to include the smallest isolated pool near the head of the channel. A major portion of the large pool was covered with cattail growth. A straight seine and minnow traps were used to sample the reach, covering available habitat greater than 5 cm depth. Gila chub was the focal species at T-4 Spring, and appear to no longer be present. Mosquitofish was the only species of fish captured, with efforts resulting in 1351 (100%) fish caught (Tables 68-69). Bullfrogs (juvenile and adult) and Sonoran mud turtle were also present, and crayfish were abundant.

Management recommendations include exploring the potential for a conservation easement with the landowners to allow the eradication of mosquitofish and crayfish, and the reintroduction of GIIN, POOC and AGCH. Crayfish were abundant in the large pool, with 185 caught in minnow traps. Additional wildlife seen during the survey include turkeys (*Melleagris gallopavo*), Gray Hawks (*Buteo plagiatus*), Cassin's kingbird (*Tyrannus vociferans*), Sonora mud turtle, Mojave rattlesnake (*C. scutulatus*), and bullfrogs.

Lower Cienega Creek – Below Quarry - 1 October 8, 2015

On October 8, 2015, Department personnel accessed lower Cienega Creek at Cienega Creek Natural Preserve to monitor native fishes, with Gila topminnow and Gila chub being the focal species. The stream was accessed roughly 2.7 km upstream from 3-Bridges. Gila topminnow were present here

during surveys in 2012, so a fixed site for future POOC surveys was established at that time (Appendix B, Fig. 25).

As previously stated, the focal species for this site was POOC; their presence was visually confirmed shortly after reaching the stream, and the boundaries for the 100 m sample reach were established (Appendix C, Fig. 36-39). A large pool that had been present at this site during 2012 surveys and deemed suitable GIIN habitat was no longer present, having been filled by coarse and fine sediments. The only habitat present during the 2015 survey was shallow sandy riffles of between 5-10 cm in depth, and sampling was conducted using a straight seine. Only two species were found within this 100 m reach, AGCH (n=123; 77%) and POOC (n=33; 23%); no nonnative species were caught or seen during the survey. A summary of effort and capture data for the site is provided in Table 70. All fish handled appeared healthy, with some AGCH showing tuberculation.

The main threat perceived to the lower Cienega Creek population appears to be potential dewatering of the channel due to drought, climate change or groundwater pumping. A large pool that was formerly found immediately above this 100 m reach has been completely filled and no longer exists here.

Common riparian vegetation encountered at this location included cottonwood, willow, Arizona ash and cattail; photographs were taken at this site for both upper and lower boundaries (Appendix C, Fig.s 36-39).

Lower Cienega Creek – Below Quarry - 2 October 8, 2015

On October 8, 2015, Department personnel accessed lower Cienega Creek at Cienega Creek Natural Preserve to monitor POOC and survey for GIIN. Gila topminnow (POOC) were present at this site during surveys for this project in 2012, and GIIN had been collected here prior to that effort. The stream was accessed roughly 2.7 km upstream from 3-Bridges near a fixed sample site for POOC established during 2012 surveys. A 500 m survey reach was sampled in 2015, upstream from where POOC had been sampled earlier the same day (Appendix B, Fig. 26).

Gila chub (GIIN) was the second focal species designated for this location, but no suitable habitat for GIIN was found here during 2015 sampling. A large pool that had previously been at this site and deemed suitable GIIN habitat (during surveys in 2012) was no longer present, having been entirely filled by coarse and fine sediments. Following the earlier survey for Gila topminnow (POOC), an additional survey was carried out to find GIIN. The survey crew hiked downstream from the site previously sampled to find suitable GIIN habitat, but all downstream habitat was comprised of very shallow riffle, with occasional slow, shallow run. All surface water disappeared roughly 600-m downstream, so no time or effort was expended. Personnel subsequently hiked upstream from the POOC sample site looking for suitable GIIN habitat, but none was found. Regardless, a 500 m survey reach through the only habitat available (shallow riffle and run) was seined, catching only AGCH (n=410; 92%) and POOC (n=35; 8%). Table 71 provides a summary of effort and capture data for the site. Some pool habitat against bedrock (< 0.4m deep and < $3m^2$) was found and seined above the 500 m reach, but contained only AGCH.

No suitable chub habitat was found throughout the 1 km channel of stream surveyed. Habitat that was present during the 2012 survey had been filled by coarse and fine sediments during the intervening years. The main threat perceived to lower species that persist appears to be potential dewatering of the

channel due to drought, climate change or groundwater pumping. Common riparian vegetation encountered at this location included cottonwood, willow, Arizona ash and cattail; no wildlife was noted during this survey.

Lower Cienega Creek – Above 3-Bridges October 8, 2015

On October 8, 2015, Department personnel accessed lower Cienega Creek at 3-Bridges on Cienega Creek Natural Preserve, Pima County (Appendix B, Fig. 27), to survey for GIIN. The site is located roughly 4.5 km NE of the Interstate 10 Mountain View Interchange, just upstream from the Pantano Road Bridge. Weather conditions at lower Cienega Creek throughout the day were sunny, warm and dry.

With the exception of several small pools formed against bedrock walls of the channel, surface flow over the first 100 m upstream from the bridges was generally less than 8 cm deep. A 500 m survey reach was established upstream from the bridges and seined. This reach of lower Cienega Creek was very shallow throughout, comprised primarily of shallow, sandy riffle. Pools that were present were small and shallow, usually associated with undercut bedrock and less than 30 cm deep. Sampling throughout the reach found only AGCH (n=23; 56%) and POOC (n=18; 44%); Table 72 provides a summary of effort and capture data for the site.

No GIIN were caught or seen during the survey. The only habitat in the reach that approached suitable GIIN habitat at the time of the survey was a pool in the upper extent of the 500 m, approximately 30 m^2 and less than 40 cm deep, with silt substrate and no instream cover. Two additional pools under the bridges were opportunistically sampled; they were nearly isolated from the streamflow and against the bedrock wall of the channel. Both pools were less than 60 cm deep and produced only AGCH (n=60) and POOC (n=4). No nonnative fish were caught or seen during sampling of this reach.

Minimal suitable chub habitat was found throughout the 500 m channel of stream surveyed. Habitat that was present would be considered marginal. The main threat perceived to lower Cienega Creek and the species that are present, appears to be potential dewatering of the channel due to drought, climate change or groundwater pumping. Common riparian vegetation encountered at this location included cottonwood, willow, Arizona ash and cattail; no wildlife was noted during this survey.

AD Wash November 02, 2015

On November 02, 2015, Department personnel conducted a survey on AD Wash (Appendix B, Fig. 28), Yavapai County, AZ, approximately 18 km northwest of Lake Pleasant. The focal species in AD Wash was POOC.

Sampling AD Wash was conducted exclusively using minnow traps. Once the identification of POOC was confirmed, a 100 m sample reach was designated. Sampling efforts found POOC to be the only species present. Almost all were isolated to one slot pool within the 100 m reach. Minnow traps were used exclusively to sample this site, resulting in a total of 1716 POOC captured; all fish handled appeared in good condition. Visual observations performed at habitat too shallow to sample with traps, resulted in an approximate count of 50 additional POOC; Table 73 provides a summary of effort and capture data for the site. Photographs of the upper and lower boundary points of the 100 m sample site are provided in Appendix C (Fig.s 40-43).

Common plants along the riparian area include mesquite and willow. Additional wildlife noted within the drainage was lowland leopard frogs (larval and adults). On arrival at the site, a dead javelina "piglet" was observed in the bottom of the main pool, with topminnow grouped at the carcass, appearing to feed on it. No crayfish were found at AD Wash.

Webber Creek-Below Camp Geronimo 1 November 09, 2015

On November 09, 2015, Department personnel conducted a survey on Webber Creek (Appendix B, Fig. 29), Gila County, AZ, approximately 18 km north of Payson, AZ. Located on the Tonto National Forest, Webber Creek flows in a southerly direction to its confluence with the East Verde River. Conditions throughout the day were cold with clear skies and low water temperatures (6.9°C). The focal species in Webber Creek is GINI.

Due to unforeseen access issues, sampling sites had to be moved further downstream, below Camp Geronimo, instead of above Camp Geronimo, as originally planned. A 500 m section of stream along Webber Creek was surveyed exclusively with a BPES; no GINI were captured or observed. Total effort with the BPES was 1162 seconds and resulted in capture of only two species. RHOS was the most abundant species, comprising 58% (n=22) of the total catch rate, while ONMY comprised 42% of the total; Table 74 provides a summary of effort and capture data for the site.

Crayfish were observed, but in very few numbers (<10). Chub habitat was present throughout the reach, including pools and undercut bedrock, but no fish were detected in the available habitat. The presence of crayfish and intermittent flows may be the greatest threat to the reestablishment of a GINI population. Common vegetation along the stream included ponderosa pine, oak, and alder. No additional wildlife was noted during sampling.

Webber Creek-Below Camp Geronimo 2 November 09, 2015

On November 09, 2015, Department personnel conducted a survey on Webber Creek (Appendix B, Fig. 29), Gila County, AZ, approximately 18 km north of Payson, AZ. Located on the Tonto National Forest, Webber Creek flows in southwardly direction towards the confluence of the East Verde River. Conditions throughout the day were cold with clear skies and low water temperatures (6.9°C). The focal species in Webber Creek is GINI.

A 500 m section of stream along Webber Creek was surveyed exclusively with a BPES; no GINI were captured or observed. Total effort with the BPES was 1124 seconds and resulted in capture of two species. Only a total of eight fish were captured throughout the reach, with RHOS was being the most abundant (88%) and only one ONMY (13%). A summary of effort and capture data for the site is provided in Table 75.

Habitat was limited throughout much of the reach and flow was intermittent. Crayfish were present, but in very few numbers (<10). Common vegetation along the stream included ponderosa pine, oak, and alder. No additional wildlife was noted during sampling.

Webber Creek-Below Camp Geronimo 3 November 09, 2015

On November 09, 2015, Department personnel conducted a survey on Webber Creek (Appendix B, Fig. 29), Gila County, AZ, approximately 18 km north of Payson, AZ. Located on the Tonto National Forest, Webber Creek flows in southwardly direction towards the confluence of the East Verde River. Conditions throughout the day were cold with clear skies and low water temperatures (6.9°C). The focal species in Webber Creek is GINI.

A 500 m section of stream along Webber Creek was surveyed exclusively with a BPES; no GINI were captured or observed. A total effort of 954 seconds with a BPES resulted in the capture of zero fish. Habitat was very limited and the stream shallow throughout most of the reach (<0.5 m). Habitat throughout the reach was predominately small riffles and very shallow runs. Crayfish were present, but few in number (<10). Common vegetation along the stream included ponderosa pine, oak, and alder. No additional wildlife was noted during sampling.

Babocomari River-Below Bridge Crossing 1 November 16, 2015

On November 16, 2015, Department personnel conducted a survey along the Babocomari River (Appendix B, Fig. 30), Cochise County, AZ, approximately 25 km southeast of Sonoita, AZ. Tributary to the San Pedro River, the Babocomari River drains portions of the Mustang Mountains and Canelo Hills watersheds. The stream channel travels in an easterly direction through Elgin and the Babocomari Ranch headquarters, eventually joining the San Pedro River. Important tributaries to the Babocomari River include O'Donnell Creek and Lyle Canyon.

The focal species for the Babocomari River was GIIN and sampling for chub took place on November 16, 2015, however no chub were caught. Electrofishing was conducted over roughly 145-m of stream through riffle and run habitat, and in pools shallow enough to be effectively sampled, while hoop nets were set in pools too deep to be effectively fished with the BPES. Weather during sampling was inclement, with low temperatures, gusting winds and snow. Neither hoop net-sets nor electrofishing resulted in any fish being caught or seen in this reach of stream. After sampling, it is thought that this section of stream may be ephemeral, and should not be continued with as part of this effort; a third location should be sought further downstream. A summary of effort and capture data for the sites are provided in Tables 77-78. No additional wildlife was noted.

Babocomari River-Below Bridge Crossing 2 November 16, 2015

This section of stream was the second site to be sampled on the Babocomari River. Habitat consisted mainly of shallow runs and riffles with little to no flow, intermixed with pools of shallower than 1.5 m depth. No GIIN were captured or observed within the 500-m section of stream (Appendix B, Fig. 30) sampled. The only method of sampling employed in this section of the Babocomari River was a BPES, with a total of 1955 seconds of effort expended. Three species were captured, all nonnative, with *Lepomis* hybrid (LE sp.) being the most abundant species, comprising 51% of the total catch. No specimens of the LE sp. were collected as vouchers, and no photographs taken, so no conclusive identification of the species can be made. Additional species identified include, MISA (40%) and GAAF (9%). Table 79 provides a summary of effort and capture data for the site.

Babocomari River-Above Bridge Crossing November 16, 2015

On November 16, 2015, Department personnel conducted a survey along the Babocomari River (Appendix B, Fig. 31), Cochise County, AZ, approximately 25 km southeast of Sonoita, AZ. The Babocomari River flows in an easterly directions towards the confluence of the San Pedro River. Weather conditions were overcast and windy, with intermittent rain and snow and air temperatures in the low 30's. This is the site sampled on the Babocomari during previous surveys; the river forms a slow moving stream with a variety of habitats from short, sandy riffles, to long, shallow runs and long deep pools in excess of 2m depth.

The focal species of surveys along the Babocomari River is GIIN. During 2015, a 500 m section of stream along the Babocomari River was surveyed exclusively using a BPES, however no GIIN were captured or observed. Two nonnative species were found to be present during the 2015 effort, MISA (n=3; 60%) and LECY (n=2; 40%); a third species, GAAF, was documented here during 2013 surveys (Timmons et al. 2014), but were not detected here during 2015. A summary of effort and capture data is provided in in Appendix A, Table 80. Suitable habitat for GIIN remains present throughout the wetted reach of the Babocomari, however several highly piscivorous nonnatives currently occupy these and adjacent habitats in the stream.

The greatest threat to the reestablishment of GIIN and other native fishes in the drainage is the continued presence of predatory nonnative fishes within the drainage. Discussions with landowners and other local interested parties should be initiated to explore the possibility for the removal of nonnative species from the system, and the reestablishment of Gila chub and other native fishes. Development of a Conservation Easement, or a Habitat Conservation Plan with the landowners for the management of native aquatic species should be explored. Methods for removing the nonnative fishes should be examined, and the most practicable applied, followed by reestablishment of GIIN and other natives. No additional wildlife was noted and crayfish were not observed.

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Appendix A.

Tables

(Appendices are available from Bureau of Reclamation in electronic format only)

Appendix B.

Maps

(Appendices are available from Bureau of Reclamation in electronic format only)

Appendix C.

Photographs

(Appendices are available from Bureau of Reclamation in electronic format only)

FISH MONITORING OF SELECTED STREAMS

WITHIN

THE GILA RIVER BASIN

2015

Annual Report

Appendix A

Tables

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Common Name	Scientific Name	Species Code
Longfin dace	*Agosia chrysogaster*	AGCH
Sonora sucker	*Catostomus insignis*	CAIN
Desert sucker	*Pantosteus clarki*	PACL
Headwater chub	*Gila nigra*	GINI
Roundtail chub	*Gila robusta*	GIRO
Gila chub	*Gila intermedia*	GIIN
Gila topminnow	*Poeciliopsis occidentalis*	POOC
Speckled dace	*Rhinichthys osculus*	RHOS
Loach minnow	*Tiaroga cobitis*	TICO
Flathead catfish	*Pylodictus olivaris*	PYOL
Channel catfish	*Ictalurus punctatus*	ICPU
Black bullhead	*Ameiurus melas*	AMME
Green sunfish	*Lepomis cyanellus*	LECY
Bluegill	*Lepomis macrochirus*	LEMA
Smallmouth bass	*Micropterus dolomieu*	MIDO
Largemouth bass	*Micropterus salmoides*	MISA
Rainbow trout	*Oncorhynchus mykiss*	ONMY
Brown Trout	*Salmo trutta*	SATR

Table 1. List of species sampled in the Gila River Basin Monitoring in 2015, their scientific names and 4-letter species codes.

Common Name	Scientific Name	Species Code
Fathead minnow	*Pimephales promelas*	PIPR
Red shiner	*Cyprinella lutrensis*	CYLU
Common carp	*Cyprinus carpio*	CYCA
Mosquitofish	*Gambusia affinis*	GAAF
Gizzard shad	*Dorosoma cepedianum*	DOCE
Lowland leopard frog	*Rana yavapaiensis*	RAYA
Spiny softshell turtle	*Apalone spinifera*	APSP
Sonoran mud turtle	*Kinosternon sonoriense*	KISO
American bullfrog	*Lithobates (Rana) catesbiana*	RACA

Table 1. (cont.) List of species sampled in the Gila River Basin Monitoring in 2015, their scientific names and 4-letter species codes.

Site/Species	AGCH	CAIN	GIIN	GINI	GIRO	TICO	PACL	POOC	RHOS	AMME	CYCA	CYLU	GAAF	DOCE	ICPU	LE spp.	LECY	LEMA	MIDO	MISA	ONMY	PIPR	PYOL	SATR
Unnamed Drainage #68b	-	-	-	-	-	-	-	361	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hidden Water Spring	483	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Salt-Gleason Flats 1	-	-	-	-	-	-	-	-	-	-	290	1149	112	-	40	-	-	-	-	-	-	-	2	-
Upper Salt-Gleason Flats 2	-	-	-	-	-	-	1	-	-	-	205	306	13	-	29	-	-	-	-	-	-	-	2	-
Upper Salt-Gleason Flats 3	-	-	-	-	-	-	-	-	-	-	113	272	-	-	95	-	-	-	-	-	-	-	-	-
Upper Salt-Horseshoe Bend 1	-	-	-	-	-	-	-	-	-	-	34	225	-	-	106	-	-	-	-	-	-	-	7	-
Upper Salt-Horseshoe Bend 2	-	-	-	-	-	-	-	-	-	-	70	489	-	-	196	-	1	-	-	-	-	-	2	-
Upper Salt-Horseshoe Bend 3	-	-	-	-	-	-	-	-	-	-	47	210	-	-	199	-	-	-	-	2	-	1	1	-
Upper Salt-Hwy 288 Bridge 1	-	-	-	-	-	-	-	-	-	-	9	6	9	-	-	-	-	-	-	-	-	-	1	-
Upper Salt-Hwy 288 Bridge 2	-	-	-	-	-	-	-	-	-	-	2	15	14	2	-	-	-	-	1	-	-	-	-	-
Upper Salt-Hwy 288 Bridge 3	-	-	-	-	-	-	-	-	-	-	2	15	69	3	29	-	-	-	6	-	-	-	-	-
Black River-249 Bridge Crossing	-	-	-	-	1	-	39	-	450	-	-	-	-	-	-	-	-	-	-	-	-	2	-	66
Black River-Above Boneyard Ck	-	1	-	-	2	-	40	-	402	-	-	-	-	-	-	-	-	-	-	-	-	1	-	77
Black River-Below Three Forks	-	1	-	-	-	-	11	-	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	108
Sharp Spring	-	-	-	-	-	-	-	-	-	-	-	-	271	-	-	-	-	-	-	-	-	-	-	-
Cherry Creek-Below the Falls	-	19	-	-	26	-	31	-	-	-	-	-	-	-	-	-	73	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 1	345	-	-	-	-	-	230	-	108	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 2	25	-	-	-	-	-	20	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 3	17	-	-	-	-	-	17	-	1	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Cherry Creek-Above Ellison Ranch 1	-	-	-	-	-	-	-	-	-	-	-	338	-	-	-	-	47	-	-	-	-	1	1	-
Cherry Creek-Above Ellison Ranch 2	3	-	-	-	-	-	-	-	-	5	-	172	-	-	-	-	5	-	-	-	-	14	2	-
Cherry Creek-Above Ellison Ranch 3	-	-	-	-	-	-	-	-	-	3	-	55	-	-	-	-	13	-	-	-	-	-	6	-
Lower Verde-Below Bartlett Dam 1	-	8	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-
Lower Verde-Below Bartlett Dam 2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	12	-	-	-	-
Lower Verde-Below Bartlett Dam 3	-	19	-	-	-	-	15	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-

Table 2. Summary of fish species, native (blue) and non-native (red), detected in each stream (highlights indicate the target species for a specific stream).

Site/Species	AGCH	CAIN	GIIN	GINI	GIRO	TICO	PACL	POOC	RHOS	AMME	CYCA	CYLU	GAAF	DOCE	ICPU	LE spp.	LECY	LEMA	MIDO	MISA	ONMY	PIPR	PYOL	SATR
Lower Verde-Needle Rock 1	-	14	-	-	-	-	21	-	-	-	8	3	-	-	-	-	-	-	-	10	-	-	-	-
Lower Verde-Needle Rock 2	-	8	-	-	-	-	11	-	-	-	2	1	-	-	-	-	-	-	-	6	-	-	-	-
Lower Verde-Needle Rock 3	-	32	-	-	-	-	60	-	-	-	-	19	-	-	-	-	-	-	-	6	-	-	-	-
Little Sycamore Creek	-	-	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sycamore Creek-Double T Falls	-	-	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63	-	-	-
Sycamore Creek-Middle Box	461	341	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indian Creek	31	-	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tule Creek	-	-	-	-	-	-	-	398	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabino Canyon	-	-	252	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Romero Canyon	-	-	14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red Tank Draw	-	-	33	-	-	-	-	-	-	103	-	-	-	-	-	-	82	-	-	-	-	34	-	-
Redrock Canyon-Cott Tank Canyon	-	-	-	-	-	-	-	-	-	-	-	-	94	-	-	-	-	-	-	-	-	-	-	-
Redrock Canyon-The Falls	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redrock Canyon-Pig Camp	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T4 Spring-Babocomari Ranch	-	-	-	-	-	-	-	-	-	-	-	-	1351	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Below Quarry POOC	123	-	-	-	-	-	-	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Below Quarry	410	-	-	-	-	-	-	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Above 3 Bridges	23	-	-	-	-	-	-	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AD Wash	-	-	-	-	-	-	-	1766	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Webber Creek-Below Camp Geronimo 1	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-
Webber Creek-Below Camp Geronimo 2	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Webber Creek-Below Camp Geronimo 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Babocomari River-Below Bridge Cross 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Babocomari River-Below Bridge Cross 2	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	23	-	-	-	18	-	-	-	-
Babocomari River-Above Bridge Cross	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	3	-	-	-	-

Table 2. (cont.) Summary of fish species, native (blue) and non-native (red), detected in each stream (highlights indicate the target species for a specific stream).

Site/Species	AGCH	CAIN	GIIN	GINI	GIRO	TICO	PACL	POOC	RHOS	AMME	CYCA	CYLU	GAAF	DOCE	ICPU	LE spp.	LECY	LEMA	MIDO	MISA	ONMY	PIPR	PYOL	SATR
Unnamed Drainage #68b	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hidden Water Spring	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Upper Salt-Gleason Flats 1	-	-	-	-	-	-	-	-	-	-	18.20	72.13	7.03	-	2.51	-	-	-	-	-	-	-	0.13	-
Upper Salt-Gleason Flats 2	-	-	-	-	-	-	0.18	-	-	-	36.87	55.04	2.34	-	5.22	-	-	-	-	-	-	-	0.36	-
Upper Salt-Gleason Flats 3	-	-	-	-	-	-	-	-	-	-	23.54	56.67	-	-	19.79	-	-	-	-	-	-	-	-	-
Upper Salt-Horseshoe Bend 1	-	-	-	-	-	-	-	-	-	-	9.14	60.48	-	-	28.49	-	-	-	-	-	-	-	1.88	-
Upper Salt-Horseshoe Bend 2	-	-	-	-	-	-	-	-	-	-	9.23	64.51	-	-	25.86	-	0.13	-	-	-	-	-	0.26	-
Upper Salt-Horseshoe Bend 3	-	-	-	-	-	-	-	-	-	-	10.22	45.65	-	-	43.26	-	-	-	-	0.43	-	0.22	0.22	-
Upper Salt-Hwy 288 Bridge 1	-	-	-	-	-	-	-	-	-	-	36.00	24.00	36.00	-	-	-	-	-	-	-	-	-	4.00	-
Upper Salt-Hwy 288 Bridge 2	-	-	-	-	-	-	-	-	-	-	5.88	44.12	41.18	5.88	-	-	-	-	2.94	-	-	-	-	-
Upper Salt-Hwy 288 Bridge 3	-	-	-	-	-	-	-	-	-	-	1.61	12.10	55.65	2.42	23.39	-	-	-	4.84	-	-	-	-	-
Black River-249 Bridge Crossing	-	-	-	-	0.18	-	6.99	-	80.65	-	-	-	-	-	-	-	-	-	-	-	-	0.36	-	11.83
Black River-Above Boneyard Ck	-	0.19	-	-	0.38	-	7.65	-	76.86	-	-	-	-	-	-	-	-	-	-	-	-	0.19	-	14.72
Black River-Below Three Forks	-	0.38	-	-	-	-	4.15	-	54.72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40.75
Sharp Spring	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
Cherry Creek-Below the Falls	-	12.75	-	-	17.45	-	20.81	-	-	-	-	-	-	-	-	-	48.99	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 1	50.36	-	-	-	-	-	33.58	-	15.77	-	-	-	-	-	-	-	0.29	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 2	47.17	-	-	-	-	-	37.74	-	15.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cherry Creek-Below Cherry Ck Lodge 3	45.95	-	-	-	-	-	45.95	-	2.70	-	-	-	-	-	-	-	5.41	-	-	-	-	-	-	-
Cherry Creek-Above Ellison Ranch 1	-	-	-	-	-	-	-	-	-	-	-	87.34	-	-	-	-	12.14	-	-	-	-	0.26	0.26	-
Cherry Creek-Above Ellison Ranch 2	1.49	-	-	-	-	-	-	-	-	2.49	-	85.57	-	-	-	-	2.49	-	-	-	-	6.97	1.00	-
Cherry Creek-Above Ellison Ranch 3	-	-	-	-	-	-	-	-	-	3.90	-	71.43	-	-	-	-	16.88	-	-	-	-	-	7.79	-
Lower Verde-Below Bartlett Dam 1	-	50.00	-	-	-	-	6.25	-	-	-	-	-	-	-	-	-	-	-	-	43.75	-	-	-	-
Lower Verde-Below Bartlett Dam 2	-	-	-	-	-	-	-	-	-	-	20.00	-	-	-	-	-	-	-	-	80.00	-	-	-	-
Lower Verde-Below Bartlett Dam 3	-	46.34	-	-	-	-	36.59	-	-	-	-	-	-	-	-	-	-	-	-	17.07	-	-	-	-

Table 3. Percent relative abundance of each species identified within each stream (highlights indicate the target species for a specific stream).

Site/Species	AGCH	CAIN	GIIN	GINI	GIRO	TICO	PACL	POOC	RHOS	AMME	CYCA	CYLU	GAAF	DOCE	ICPU	LE spp.	LECY	LEMA	MIDO	MISA	ONMY	PIPR	PYOL	SATR
Lower Verde-Needle Rock 1	-	25.00	-	-	-	-	37.50	-	-	-	14.29	5.36	-	-	-	-	-	-	-	17.86	-	-	-	-
Lower Verde-Needle Rock 2	-	28.57	-	-	-	-	39.29	-	-	-	7.14	3.57	-	-	-	-	-	-	-	21.43	-	-	-	-
Lower Verde-Needle Rock 3	-	27.35	-	-	-	-	51.28	-	-	-	-	16.24	-	-	-	-	-	-	-	5.13	-	-	-	-
Little Sycamore Creek	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sycamore Creek-Double T Falls	-	-	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63.00	-	-	-
Sycamore Creek-Middle Box	52.45	38.79	8.76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Indian Creek	41.89	-	58.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tule Creek	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sabino Canyon	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Romero Canyon	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red Tank Draw	-	-	13.10	-	-	-	-	-	-	40.87	-	-	-	-	-	-	32.54	-	-	-	-	13.49	-	-
Redrock Canyon-Cott Tank Canyon	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
Redrock Canyon-The Falls	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Redrock Canyon-Pig Camp	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T4 Spring-Babocomari Ranch	-	-	-	-	-	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Below Quarry POOC	77.36	-	-	-	-	-	-	22.64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Below Quarry	92.13	-	-	-	-	-	-	7.87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lower Cienega-Above 3 Bridges	56.10	-	-	-	-	-	-	43.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AD Wash	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Webber Creek-Below Camp Geronimo 1	-	-	-	-	-	-	-	-	57.89	-	-	-	-	-	-	-	-	-	-	-	42.11	-	-	-
Webber Creek-Below Camp Geronimo 2	-	-	-	-	-	-	-	-	87.50	-	-	-	-	-	-	-	-	-	-	-	12.50	-	-	-
Webber Creek-Below Camp Geronimo 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Babocomari River-Below Bridge Cross 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Babocomari River-Below Bridge Cross 2	-	-	-	-	-	-	-	-	-	-	-	-	8.89	-	-	51.11	-	-	-	40	-	-	-	-
Babocomari River-Above Bridge Cross	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	60	-	-	-	-

Table 3. (cont.) Percent relative abundance of each species identified within each stream (highlights indicate the target species for a specific stream).

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
POOC	N/A	238	19.80	12.02	100
TOTAL		238	19.80	12.02	100

Table 4. Unnamed Drainage #68-b. Summary of effort and catch data for dip net sweeps within a 100-m survey reach for POOC.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
POOC	N/A	123	19.72	6.24	100
TOTAL		123	19.72	6.24	100

Table 5. Unnamed Drainage #68-b. Summary of effort and catch data for minnow traps set within a 100-m survey reach for POOC .

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
AGCH	N/A	483	949	50.90	100
TOTAL		483	949	50.90	100

Table 6. Hidden Water Spring. Summary of effort and catch data for BPES within a 500-m survey reach for POOC .

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	1	56.02	0.02	33
CYLU	N/A	2	56.02	0.04	67
TOTAL		3	56.02	0.05	100

Table 7. Upper Salt River – Gleason Flats 1. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	2	4.97	0.40	40
PYOL	1	2	4.97	0.40	40
ICPU	1	1	4.97	0.20	20
TOTAL		5	4.97	1.01	100

Table 8. Upper Salt River – Gleason Flats 1. Summary of effort and catch data for a trammel net within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYCA	0	287	838	0.34	18
CYLU	N/A	1147	838	1.37	72
ICPU	0	39	838	0.05	2
GAAF	N/A	112	838	0.13	7
TOTAL		1585	838	1.89	100

Table 9. Upper Salt River – Gleason Flats 1. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	0	2	111.69	0.02	50
CYCA	1	1	111.69	0.01	25
PYOL	1	1	111.69	0.01	25
TOTAL		4	111.69	0.04	100

Table 10. Upper Salt River – Gleason Flats 2. Summary of effort and catch data for collapsible hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYLU	N/A	306	461	0.66	55
CYCA	0	202	461	0.44	37
ICPU	0	29	461	0.06	5
PACL	0	1	461	0.00	0.2
GAAF	N/A	13	461	0.03	2
PYOL	0	1	461	0.00	0.2
TOTAL		552	461	1.20	100

Table 11. Upper Salt River – Gleason Flats 2. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	0	3	173.18	0.02	75
CYCA	1	1	173.18	0.01	25
TOTAL		4	173.18	0.02	100

Table 12. Upper Salt River – Gleason Flats 3. Summary of effort and catch data for collapsible hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	1	51.82	0.02	100
TOTAL		1	51.82	0.02	100

Table 13. Upper Salt River – Gleason Flats 3. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYCA	0	108	42	2.57	23
CYLU	N/A	272	42	6.48	57
ICPU	0	95	42	2.26	20
TOTAL		475	42	11.31	100

Table 14. Upper Salt River – Gleason Flats 3. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
0000	--	0	53.70	0.00	--
TOTAL		0	53.70	0.00	--

Table 15. Upper Salt River – Horseshoe Bend 1. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
ICPU	1	3	17.68	0.17	23
CYCA	1	3	17.68	0.17	23
PYOL	1	7	17.68	0.40	54
TOTAL		13	17.68	0.74	100

Table 16. Upper Salt River – Horseshoe Bend 1. Summary of effort and catch data for a trammel net within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYLU	N/A	225	342	0.66	63
ICPU	0	103	342	0.30	29
CYCA	0	31	342	0.09	9
TOTAL		359	342	1.05	100

Table 17. Upper Salt River – Horseshoe Bend 1. Summary of effort and catch data for a bag seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	0	2	56.85	0.04	17
CYCA	1	4	56.85	0.07	33
ICPU	0	3	56.85	0.05	25
LECY	0	1	56.85	0.02	8
CYLU	N/A	2	56.85	0.04	17
TOTAL		12	56.85	0.21	100

Table 18. Upper Salt River – Horseshoe Bend 2. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
ICPU	0	193	1026	0.19	26
CYLU	N/A	487	1026	0.47	65
CYCA	0	63	1026	0.06	8
CYCA	1	1	1026	0.00	0.1
PYOL	1	2	1026	0.00	0.3
TOTAL		746	1026	0.72	100

Table 19. Upper Salt River – Horseshoe Bend 2. Summary of effort and catch data for a bag seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	1	61.83	0.02	50
CYLU	N/A	1	61.83	0.02	50
TOTAL		2	61.83	0.03	100

Table 20. Upper Salt River – Horseshoe Bend 3. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	4	20.95	0.19	80
PYOL	1	1	20.95	0.05	20
TOTAL		5	20.95	0.24	100

Table 21. Upper Salt River – Horseshoe Bend 3. Summary of effort and catch data for a trammel net within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
ICPU	0	199	798	0.25	44
CYLU	N/A	209	798	0.26	46
CYCA	0	42	798	0.05	9
PIPR	N/A	1	798	0.00	0.2
MISA	1	2	798	0.00	0.4
TOTAL		453	798	0.57	100

Table 22. Upper Salt River – Horseshoe Bend 3. Summary of effort and catch data for a bag seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYLU	N/A	3	25	0.12	27
GAAF	N/A	8	25	0.32	73
TOTAL		11	25	0.44	100

Table 23. Upper Salt River – Hwy 228 Bridge 1. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	9	59.29	0.15	64
PYOL	1	1	59.29	0.02	7
CYLU	N/A	3	59.29	0.05	21
GAAF	N/A	1	59.29	0.02	7
TOTAL		14	59.29	0.24	100

Table 24. Upper Salt River – Hwy 288 Bridge 1. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
CYLU	N/A	15	120	0.13	50
GAAF	N/A	14	120	0.12	47
MIDO	1	1	120	0.01	3
TOTAL		30	120	0.23	100

Table 25. Upper Salt River – Hwy 288 Bridge 2. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	2	65.70	0.03	50
DOCE	N/A	2	65.70	0.03	50
TOTAL		4	65.70	0.06	100

Table 26. Upper Salt River – Hwy 288 Bridge 2. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
MIDO	0	3	80	0.04	2
MIDO	1	3	80	0.04	2
GAAF	N/A	69	80	0.86	57
CYLU	N/A	15	80	0.19	12
DOCE	N/A	3	80	0.04	2
ICPU	0	29	80	0.36	24
TOTAL		122	80	1.53	100

Table 27. Upper Salt River – Hwy 288 Bridge 3. Summary of effort and catch data for a straight seine within a 500-m survey for GIRO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
CYCA	1	2	70.48	0.03	100
TOTAL		2	70.48	0.03	100

Table 28. Upper Salt River – Hwy 288 Bridge 3. Summary of effort and catch data for hoop nets within a 500-m survey for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
RHOS	N/A	392	5626	6.97	82
PACL	0	3	5626	0.05	1
PACL	1	30	5626	0.53	6
PIPR	N/A	2	5626	0.04	0.4
GIRO	1	1	5626	0.02	0.2
SATR	0	39	5626	0.69	8
SATR	1	11	5626	0.20	2
TOTAL		478	5626	8.50	100

Table 29. North fork East fork (NFEF) Black River @ 249 Bridge Crossing. Summary of effort and catch data for BPES within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
RHOS	N/A	58	857	6.77	73
PACL	1	6	857	0.70	8
SATR	0	13	857	1.52	16
SATR	1	3	857	0.35	4
TOTAL		80	857	9.33	100

Table 30. North fork East fork (NFEF) Black River @ 249 Bridge Crossing. Summary of effort and catch data for BPES combined with kick seining within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
RHOS	N/A	348	6253	5.57	79
SATR	1	27	6253	0.43	6
SATR	0	27	6253	0.43	6
PACL	1	33	6253	0.53	8
PACL	0	1	6253	0.02	0.2
PIPR	N/A	1	6253	0.02	0.2
CAIN	1	1	6253	0.02	0.2
GIRO	1	2	6253	0.03	0.5
TOTAL		440	6253	7.04	100

Table 31. NFEF Black River – above Boneyard Creek. Summary of effort and catch data for BPES within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
RHOS	N/A	54	569	9.49	65
SATR	0	21	569	3.69	25
SATR	1	2	569	0.35	2
PACL	1	6	569	1.05	7
TOTAL		83	569	14.59	100

Table 32. NFEF Black River – above Boneyard Creek. Summary of effort and catch data for BPES combined with kick seining within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
RHOS	N/A	127	3168	4.01	56
SATR	1	51	3168	1.61	22
SATR	0	37	3168	1.17	16
PACL	1	10	3168	0.32	4
PACL	0	1	3168	0.03	0.4
CAIN	1	1	3168	0.03	0.4
TOTAL		227	3168	7.17	100

Table 33. NFEF Black River – below Three Forks. Summary of effort and catch data for BPES within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
SATR	1	4	933	0.43	11
RHOS	N/A	18	933	1.93	47
SATR	0	16	933	1.71	42
TOTAL		38	933	4.07	100

Table 34 . NFEF Black River – below Three Forks. Summary of effort and catch data for BPES combined with kick seining in riffle habitat within a 500-m survey reach for TICO.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
GAAF	N/A	271	184.55	1.47	100
TOTAL		271	184.55	1.47	100

Table 35. Sharp Spring. Summary effort and catch data with minnow traps within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
GIRO	1	26	3226	0.81	17
LECY	0	51	3226	1.58	34
LECY	1	22	3226	0.68	15
PACL	0	1	3226	0.03	1
PACL	1	30	3226	0.93	20
CAIN	1	19	3226	0.59	13
TOTAL		149	3226	4.62	100

Table 36. Cherry Creek – below the Falls. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	0	50	3667	1.36	7
PACL	1	180	3667	4.91	26
RHOS	N/A	108	3667	2.95	16
AGCH	N/A	345	3667	9.41	50
LECY	0	1	3667	0.03	0.1
LECY	1	1	3667	0.03	0.1
TOTAL		685	3667	18.68	100

Table 37. Cherry Creek below Lodge 1. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	1	20	1080	1.85	38
AGCH	N/A	25	1080	2.31	47
RHOS	N/A	8	1080	0.74	15
TOTAL		53	1080	4.91	100

Table 38. Cherry Creek below Lodge 2. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	1	17	1032	1.65	46
AGCH	N/A	17	1032	1.65	46
RHOS	N/A	1	1032	0.10	3
LECY	1	2	1032	0.19	5
TOTAL		37	1032	3.59	100

Table 39. Cherry Creek below Lodge 3. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
CYLU	N/A	338	2140	15.79	87
LECY	0	25	2140	1.17	6
LECY	1	22	2140	1.03	6
PIPR	N/A	1	2140	0.05	0.3
PYOL	0	1	2140	0.05	0.3
TOTAL		387	2140	18.08	100

Table 40. Cherry Creek - above Ellison Ranch 1. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
LECY	0	2	1606	0.12	1
LECY	1	3	1606	0.19	1
AMME	0	1	1606	0.06	0.5
AMME	1	4	1606	0.25	2
CYLU	N/A	172	1606	10.71	86
AGCH	N/A	3	1606	0.19	1
PIPR	N/A	14	1606	0.87	7
PYOL	0	1	1606	0.06	0.5
PYOL	1	1	1606	0.06	0.5
TOTAL		201	1606	12.52	100

Table 41. Cherry Creek - above Ellison Ranch 2. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
CYLU	N/A	55	1349	4.08	71
LECY	1	13	1349	0.96	17
AMME	1	3	1349	0.22	4
PYOL	1	6	1349	0.44	8
TOTAL		77	1349	5.71	100

Table 42. Cherry Creek - above Ellison Ranch 3. Summary of effort and catch data for BPES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
CAIN	1	8	615	1.30	50
PACL	1	1	615	0.16	6
MISA	1	7	615	1.14	44
TOTAL		16	615	2.60	100

Table 43. Lower Verde River – below Bartlett Dam 1. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
MISA	0	1	1270	0.08	7
MISA	1	11	1270	0.87	73
CYCA	1	3	1270	0.24	20
TOTAL		15	1270	1.18	100

Table 44. Lower Verde River – below Bartlett Dam 2. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	1	15	1128	1.33	37
CAIN	1	19	1128	1.68	46
MISA	1	7	1128	0.62	17
TOTAL		41	1128	3.63	100

Table 45. Lower Verde River – below Bartlett Dam 3. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	1	21	716	2.93	38
CAIN	1	14	716	1.96	25
MISA	1	10	716	1.40	18
CYCA	1	8	716	1.12	14
CYLU	N/A	3	716	0.42	5
TOTAL		56	716	7.82	100

Table 46. Lower Verde River @ Needle Rock 1. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	1	11	544	2.02	39
CAIN	1	8	544	1.47	29
MISA	1	6	544	1.10	21
CYCA	1	2	544	0.37	7
CYLU	N/A	1	544	0.18	4
TOTAL		28	544	5.15	100

Table 47. Lower Verde River @ Needle Rock 2. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
PACL	0	15	1058	1.42	13
PACL	1	45	1058	4.25	38
CAIN	0	2	1058	0.19	2
CAIN	1	30	1058	2.84	26
MISA	1	6	1058	0.57	5
CYLU	N/A	19	1058	1.80	16
TOTAL		117	1058	11.06	100

Table 48. Lower Verde River @ Needle Rock 3. Summary of effort and catch data for Canoe ES within a 500-m survey reach for GIRO.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
GIIN	0	23	1295	1.78	41
GIIN	1	33	1295	2.55	59
TOTAL		56	1295	4.32	100

Table 49. Little Sycamore Creek. Summary of effort and catch data for BPES within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
ONMY	0	32	1903	1.68	33
ONMY	1	29	1903	1.52	29
GIIN	0	3	1903	0.16	3
GIIN	1	34	1903	1.79	35
TOTAL		98	1903	5.15	100

Table 50. Sycamore Creek – Double T Falls. Summary of effort and catch data for BPES within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
ONMY	1	2	24.21	0.08	100
TOTAL		2	24.21	0.08	100

Table 51. Sycamore Creek – Double T Falls. Summary of effort and catch data for collapsible hoop nets within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
AGCH	N/A	461	1035	44.54	52
CAIN	0	341	1035	32.95	39
GIIN	0	20	1035	1.93	2
GIIN	1	57	1035	5.51	6
TOTAL		879	1035	84.93	100

Table 52. Sycamore Creek – Middle Box. Summary of effort and catch data for BPES within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
AGCH	N/A	31	1064	2.91	42
GIIN	0	4	1064	0.38	5
GIIN	1	39	1064	3.67	53
TOTAL		74	1064	6.95	100

Table 53. Indian Creek. Summary of effort and catch data for BPES within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
POOC	N/A	238	7.86	30.28	100
TOTAL		238	7.86	30.28	100

Table 54. Tule Creek. Summary of effort and catch data for minnow traps within a 100-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
POOC	N/A	160	15	10.67	100
TOTAL		160	15	10.67	100

Table 55. Tule Creek. Summary of effort and catch data for dip net sweeps within a 100-m survey reach for POOC.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
GIIN	0	20	19.97	1.00	28
GIIN	1	51	19.97	2.55	72
TOTAL		71	19.97	3.56	100

Table 56. Sabino Canyon. Summary of effort and catch data for collapsible hoop nets within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
GIIN	0	135	18.70	7.22	79
GIIN	1	36	18.70	1.93	21
TOTAL		171	18.70	9.14	100

Table 57. Sabino Canyon. Summary of effort and catch data for minnow traps within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
GIIN	0	10	58.60	0.17	100
TOTAL		10	58.60	0.17	100

Table 58. Sabino Canyon. Summary of effort and catch data for a straight seine within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
GIIN	0	6	--	--	43
GIIN	1	8	--	--	57
TOTAL		14	--	--	100

Table 59. Romero Canyon. Summary of fish captured at Romero Canyon using a straight seine. High flows due to storm run-off combined with canyon and stream morphology prevented successful sampling of this site over several different visits during 2015.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
AMME	0	82	1130	7.26	33
AMME	1	21	1130	1.86	8
LECY	0	43	1130	3.81	17
LECY	1	39	1130	3.45	15
PIPR	N/A	34	1130	3.01	13
GIIN	1	33	1130	2.92	13
TOTAL		252	1130	22.30	100

Table 60. Red Tank Draw. Summary of effort and catch data for BPES unit within a 100-m survey reach for GIIN.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
0000	N/A	0	43.13	0.00	--
TOTAL		0	43.13	0.00	--

Table 61. Redrock Canyon – Cott Tank Canyon. Summary of effort and catch data for minnow traps within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
GAAF	N/A	90	34	2.65	100
TOTAL		90	34	2.65	100

Table 62. Redrock Canyon – Cott Tank Canyon. Summary of effort and catch data for dip net sweeps within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
GAAF	N/A	4	193	2.07	100
TOTAL		4	193	2.07	100

Table 63. Redrock Canyon – Cott Tank Canyon. Summary of effort and catch data for BPES within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/ m^2)	% of total catch
AGCH	N/A	13	521	0.02	100
TOTAL		13	521	0.02	100

Table 64. Redrock Canyon – The Falls. Summary of effort and catch data for a straight seine within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (# of m^2 hauls)	CPUE (fish/m^2)	% of total catch
0000	N/A	0	6	0	--
TOTAL		0	6	0	--

Table 65. Redrock Canyon – The Falls. Summary of effort and catch data for kick seining within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
AGCH	N/A	3	651	0.01	100
TOTAL		3	651	0.01	100

Table 66. Redrock Canyon- Pig Camp. Summary of effort and catch data for a straight seine within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (# of m^2 hauls)	CPUE (fish/m^2)	% of total catch
0000	N/A	0	9	0	--
TOTAL		0	9	0	--

Table 67. Redrock Canyon- Pig Camp. Summary of effort and catch data for kick seining within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
GAAF	N/A	958	93	10.30	100
TOTAL		958	93	10.30	100

Table 68. T-4 Spring. Summary of effort and catch data for a straight seine within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
GAAF	N/A	393	56.84	6.91	100
TOTAL		393	56.84	6.91	100

Table 69. T-4 Spring. Summary of effort and catch data for minnow traps within a 500-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
POOC	N/A	36	87	0.40	23
AGCH	N/A	123	87	1.40	77
TOTAL		159	87	1.80	100

Table 70. Lower Cienega Creek – below Quarry 1. Summary of effort and catch data for a straight seine within a 100-m survey reach for POOC.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
AGCH	N/A	410	308	1.33	92
POOC	N/A	35	308	0.11	8
TOTAL		445	308	1.44	100

Table 71. Lower Cienega Creek – below Quarry 2. Summary of effort and catch data for a straight seine within a 500-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (m^2 sampled)	CPUE (fish/m^2)	% of total catch
AGCH	N/A	23	348	0.07	56
POOC	N/A	18	348	0.05	44
TOTAL		41	348	0.12	100

Table 72. Lower Cienega Creek – 3 Bridges. Summary of effort and catch data for a straight seine within a 500-m survey reach for GIIN.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
POOC	N/A	1716	8.75	196.11	100
TOTAL		1716	8.75	196.11	100

Table 73. AD Wash – Summary of effort and catch data for minnow traps within a 100-m survey reach for POOC.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
ONMY	0	1	1162	0.09	3
ONMY	1	15	1162	1.29	39
RHOS	N/A	22	1162	1.89	58
TOTAL		38	1162	3.27	100

Table 74. Webber Creek – below Camp Geronimo 1. Summary of effort and catch data for BPES within a 500-m survey reach for GINI.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
ONMY	1	1	1124	0.09	13
RHOS	N/A	7	1124	0.62	88
TOTAL		8	1124	0.71	100

Table 75. Webber Creek – below Camp Geronimo 2. Summary of effort and catch data for BPES within a 500-m survey reach for GINI.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
0000	N/A	0	954	0.00	--
TOTAL		0	954	0.00	--

Table 76. Webber Creek – below Camp Geronimo 3. Summary of effort and catch data for BPES within a 500-m survey reach for GINI.

Species	Age class	Fish captured	Net hours	CPUE (fish/hour)	% of total catch
0000	N/A	0	20.93	0.00	--
TOTAL		0	20.93	0.00	**--**

Table 77. Babocomari River – Below Bridge Crossing 1. Summary of effort and catch data for collapsible hoop nets within a 500-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
0000	N/A	0	467	0.00	--
TOTAL		0	467	0.00	**--**

Table 78. Babocomari River – Below Bridge Crossing 1. Summary of effort and catch data for BPES within a 500-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
Lepomis spp.	0	3	1955	0.15	7
Lepomis spp.	1	20	1955	1.02	44
MISA	0	10	1955	0.51	22
MISA	1	8	1955	0.41	18
GAAF	N/A	4	1955	0.20	9
TOTAL		45	1955	2.30	100

Table 79. Babocomari River – Below Bridge Crossing 2. Summary of effort and catch data for BPES within a 500-m survey reach for GIIN.

Species	Age class	Fish captured	Effort (sec)	CPUE (fish/100 sec)	% of total catch
MISA	0	2	999	0.20	40
MISA	1	1	999	0.10	20
LECY	1	2	999	0.20	40
TOTAL		5	999	0.50	100

Table 80. Babocomari River – above Bridge Crossing. Summary of effort and catch data for BPES within a 500-m survey reach for GIIN.

FISH MONITORING OF SELECTED STREAMS

WITHIN

THE GILA RIVER BASIN

2015

Annual Report

Appendix B

Maps

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Unnamed Drainage #68b

June 16, 2015

UTM 12S Lower Boundary: 464850E, 3711162N Upper Boundary: 464842E, 3711247N

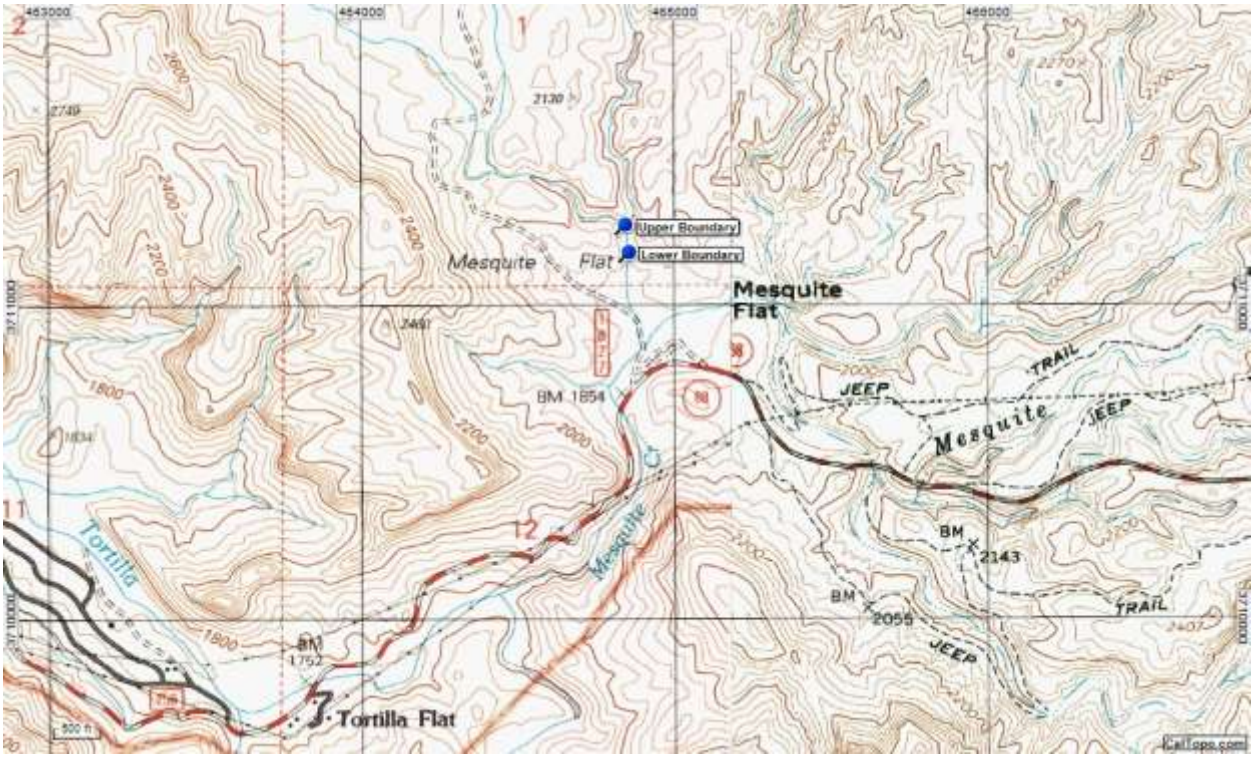


Figure 1. Unnamed Drainage #68b – 100m sample site.

Hidden Water Spring

June 18, 2015

UTM 12S Lower Boundary: 459210E, 3717019N Upper Boundary: 459454E, 3717084N

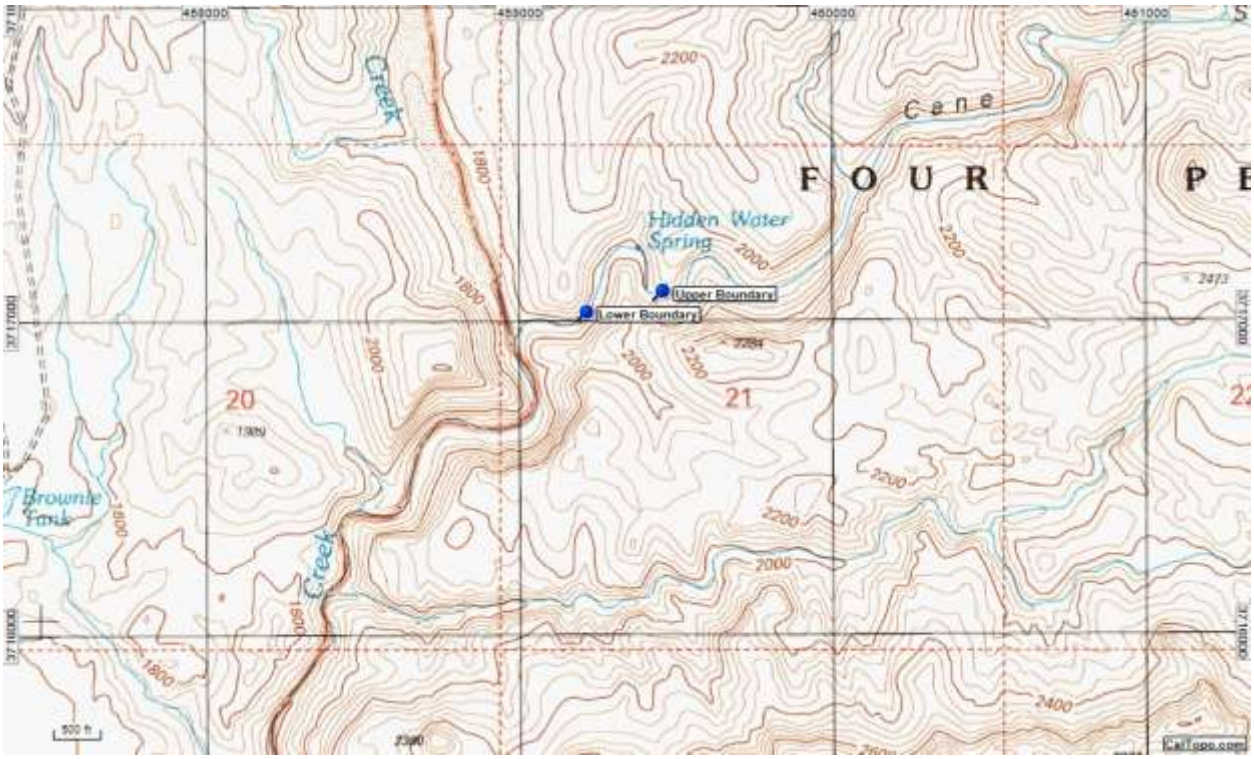


Figure 2. Hidden Water Spring – 500m sample site.

Upper Salt River-Gleason Flats 1 June 29, 2015

UTM 12S Lower Boundary: 530216E, 3737878N Upper Boundary: 530315E, 3738285N

Upper Salt River-Gleason Flats 2 June 29, 2015

UTM 12S Lower Boundary: 530093E, 3737441N Upper Boundary: 530161E, 3737818N

Upper Salt River-Gleason Flats 3 June 29, 2015

UTM 12S Lower Boundary: 529742E, 3736914N Upper Boundary: 530073E, 3737343N

Figure 3. Upper Salt River, Gleason Flats, Sites 1, 2 and 3 – 500m sample sites.

Upper Salt River-Horseshoe Bend 1 June 29, 2015

UTM 12S Lower Boundary: 519190E, 3722251N Upper Boundary: 519385E, 3722626N

Upper Salt River-Horseshoe Bend 2 June 29, 2015

UTM 12S Lower Boundary: 518533E, 3721807N Upper Boundary: 518963E, 3721981N

Upper Salt River-Horseshoe Bend 3 June 29, 2015

UTM 12S Lower Boundary: 518249E, 3722374N Upper Boundary: 518310E, 3722038N

Figure 4. Upper Salt River, Horseshoe Bend, Sites 1, 2 and 3 – 500m sample sites.

Upper Salt River-Hwy 288 Bridge 1

June 29, 2015

UTM 12S Lower Boundary: 508174E, 3720162N Upper Boundary: 508183E, 3719876N

Upper Salt River-Hwy 288 Bridge 2

June 29, 2015

UTM 12S Lower Boundary: 508069E, 3720417N Upper Boundary: 508216E, 3720223N

Upper Salt River-Hwy 288 Bridge 3

June 29, 2015

UTM 12S Lower Boundary: 507728E, 3720049N Upper Boundary: 507994E, 3720392N

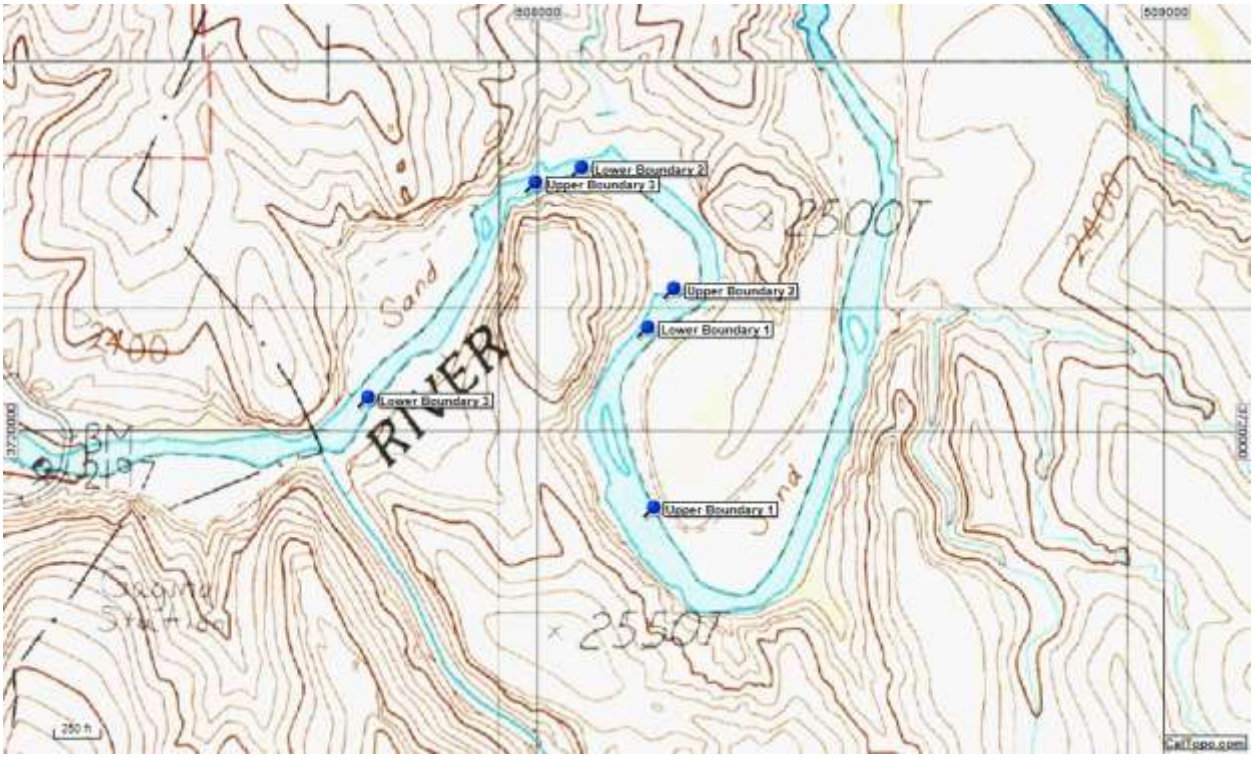


Figure 5. Upper Salt River, Hwy 288 Bridge 1, 2 and 3 – 500m sample sites.

NFEF Black River @ 249 Bridge Crossing

July 06, 2015

UTM 12S Lower Boundary: 655907E, 3747345N Upper Boundary: 655662E, 3747646N

NFEF Black River-Above Boneyard Creek

July 07, 2015

UTM 12S Lower Boundary: 655288E, 3748428N Upper Boundary: 654827E, 3748455N

NFEF Black River-Below Three Forks

July 07, 2015

UTM 12R Lower Boundary: 656412E, 3747004N Upper Boundary: 656174E, 3746625N

July 06, 2015

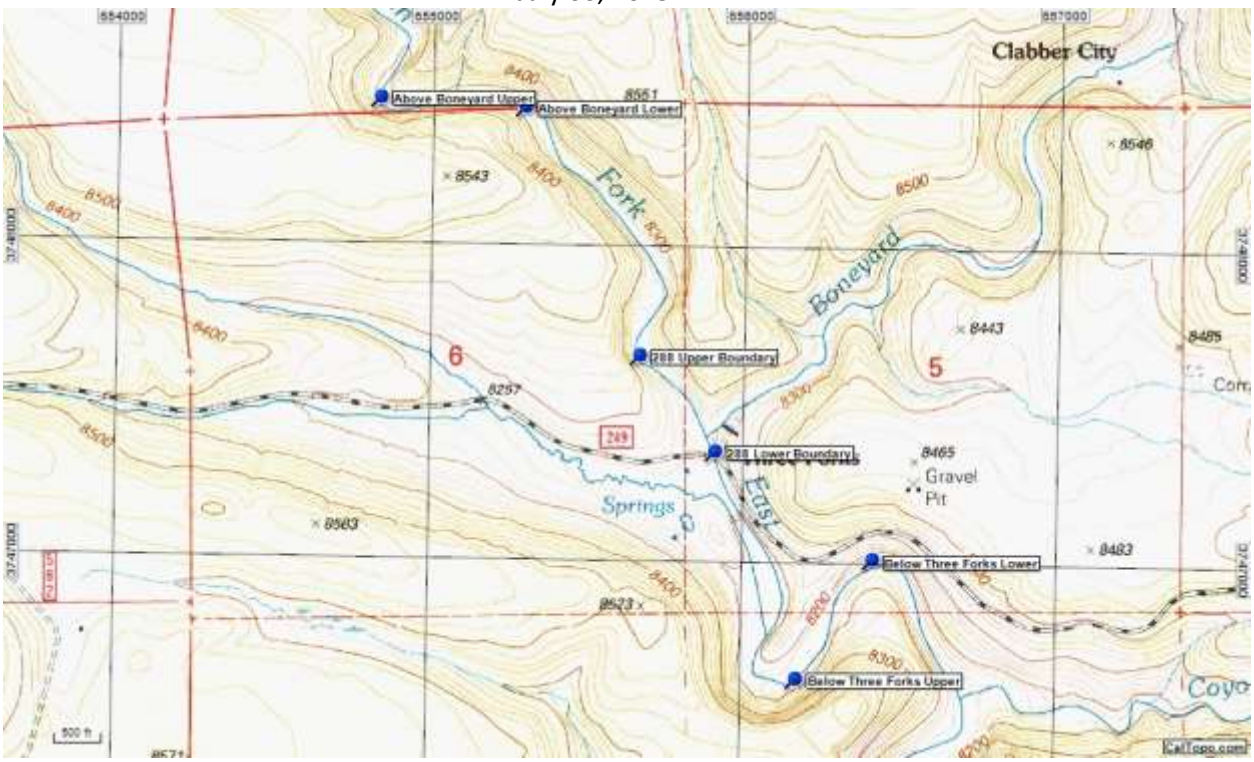


Figure 6. NFEF Black River, @249 bridge crossing, above Boneyard Creek, below Three Forks – 500m sample sites.

Sharp Spring

July 09, 2015

UTM 12S Lower Boundary: 539882E, 3468608N Upper Boundary: 540639E, 3468796N

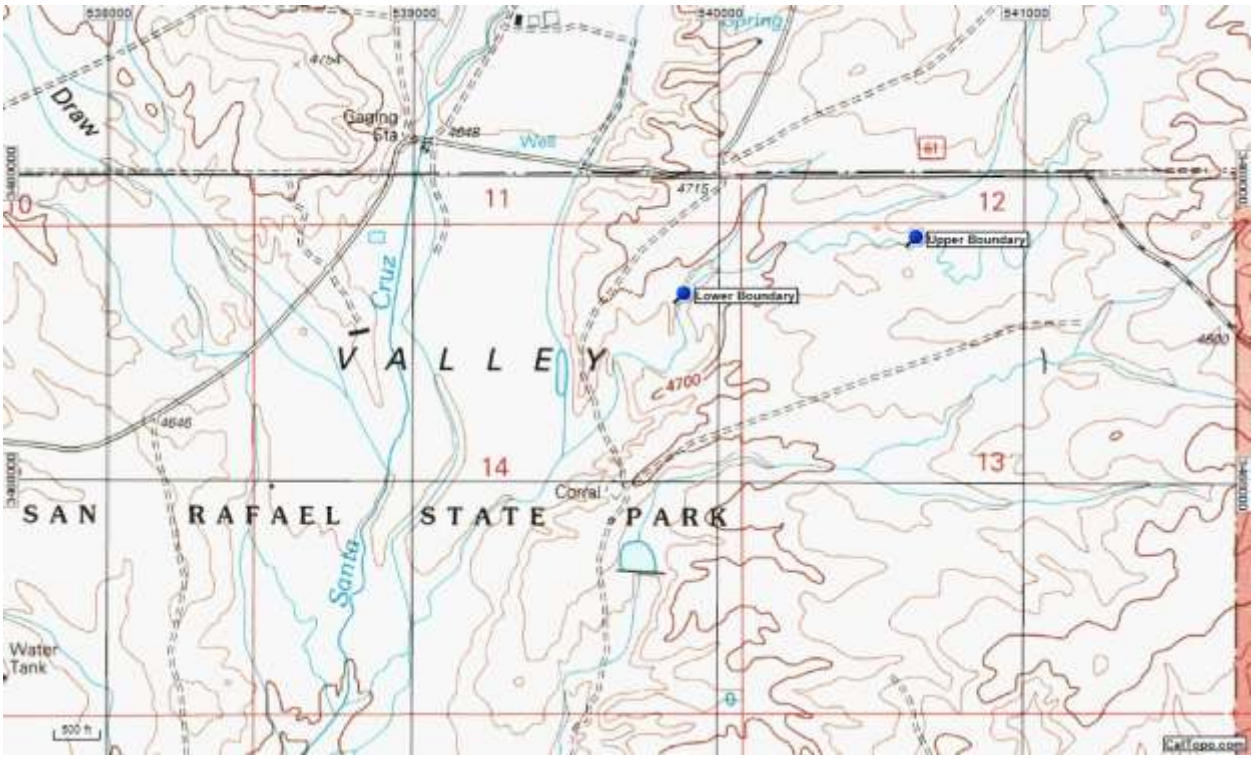


Figure 7. Sharp Spring – 500m sample site.

Cherry Creek-Below the Falls

July 14, 2015

UTM 12R Lower Boundary: 510437E, 3748740N Upper Boundary: 510390E, 3748839N

Figure 8. Cherry Creek, below the falls – 100m sample site.

Cherry Creek-Below Cherry Creek Lodge 1 July 15, 2015

UTM 12R Lower Boundary: 510599E, 3762581N Upper Boundary: 510716E, 3762788N

Cherry Creek-Below Cherry Creek Lodge 2 July 15, 2015

UTM 12R Lower Boundary: 510802E, 3762761N Upper Boundary: 510977E, 3763042N

Cherry Creek-Below Cherry Creek Lodge 3 July 15, 2015

UTM 12R Lower Boundary: 510837E, 3763035N Upper Boundary: 510769E, 3763480N

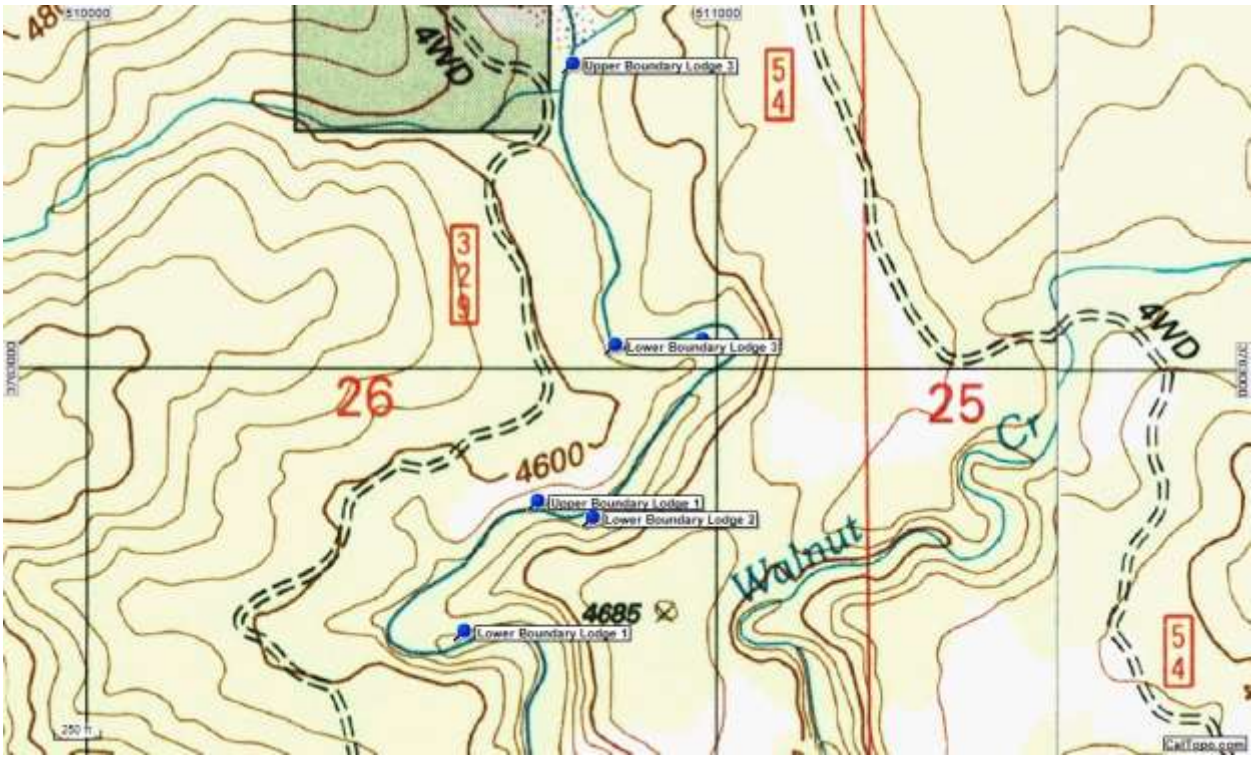


Figure 9. Cherry Creek, below Cherry Creek Lodge 1, 2 and 3 – 500m sample sites.

Cherry Creek-Above Ellison Ranch 1

September 02, 2015

UTM 12S Lower Boundary: 515005E, 3741322N Upper Boundary: 514824E, 3741676N

Cherry Creek-Above Ellison Ranch 2

October 15, 2015

UTM 12S Lower Boundary: 514703E, 3741830N Upper Boundary: 514412E, 3742052N

Cherry Creek-Above Ellison Ranch 3

October 15, 2015

UTM 12S Lower Boundary: 513324E, 3743098N Upper Boundary: 513076E, 3743326N

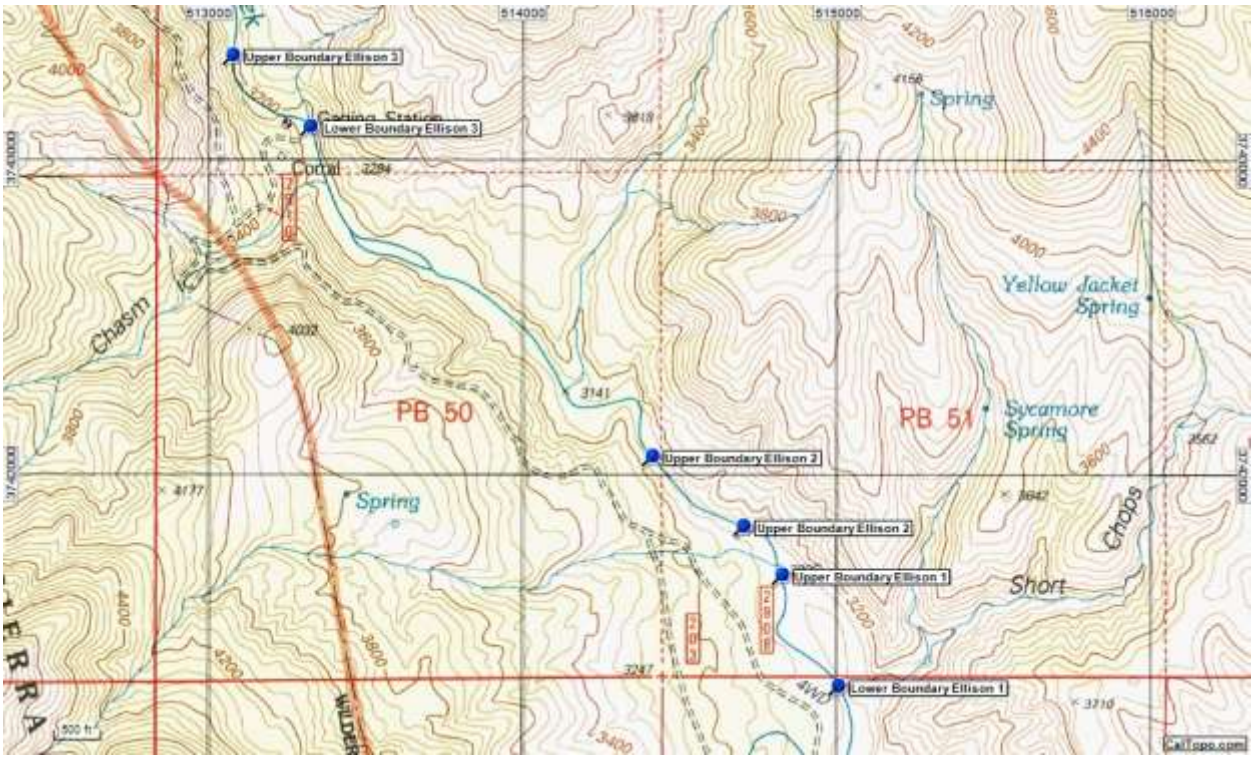


Figure 10. Cherry Creek, above Ellison Ranch 1, 2 and 3 – 500m sample sites.

Lower Verde River-Below Bartlett Dam 1 July 21, 2015

UTM 12S Lower Boundary: 440522E, 3741430N Upper Boundary: 440966E, 3741785N

Lower Verde River-Below Bartlett Dam 2 July 21, 2015

UTM 12S Lower Boundary: 439937E, 3740946N Upper Boundary: 440417E, 3741319N

Lower Verde River-Below Bartlett Dam 3 July 21, 2015

UTM 12S Lower Boundary: 438536E, 3741050N Upper Boundary: 439090E, 3740805N

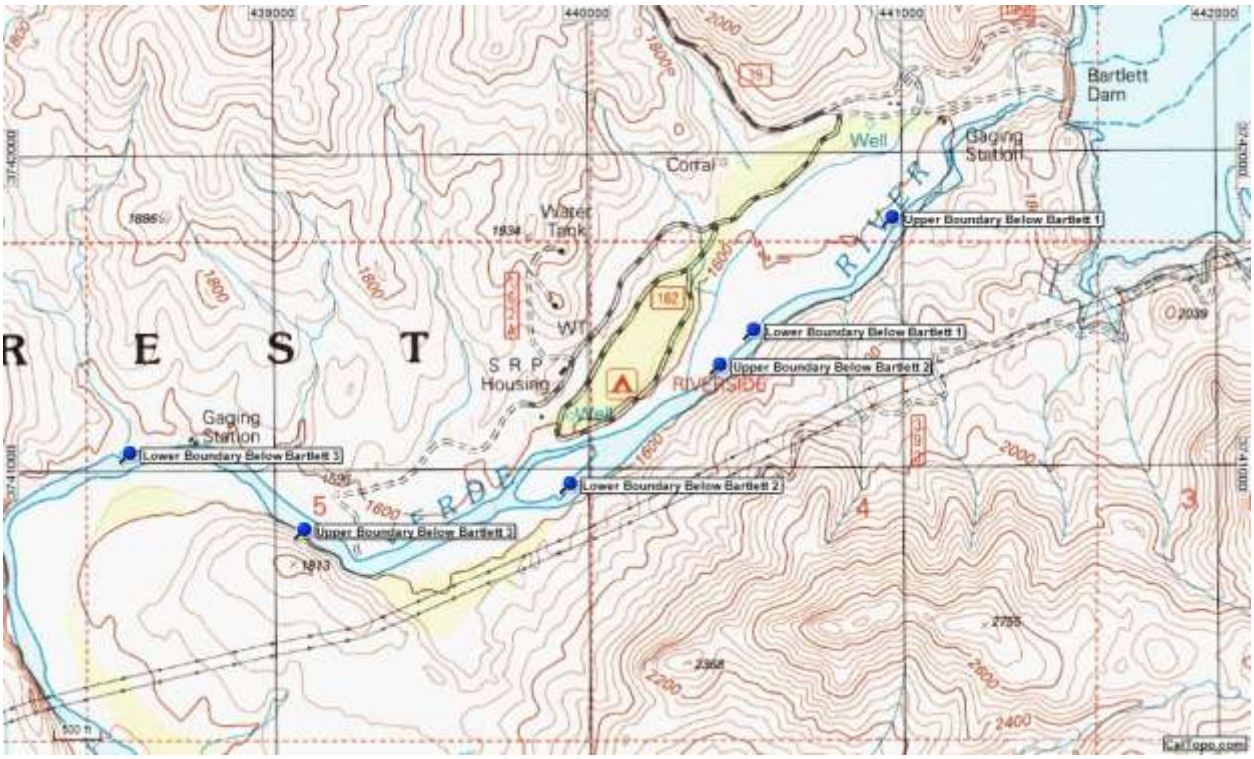


Figure 11. Lower Verde River, below Bartlett Dam 1, 2 and 3 – 500m sample sites.

Lower Verde River @ Needle Rock 1

July 21, 2015

UTM 12S Lower Boundary: 438884E, 3737592N Upper Boundary: 439402E, 3737853N

Lower Verde River @ Needle Rock 2

July 21, 2015

UTM 12S Lower Boundary: 438546E, 3737259N Upper Boundary: 438833E, 3737564N

Lower Verde River @ Needle Rock 3

July 21, 2015

UTM 12S Lower Boundary: 438496E, 3734462N Upper Boundary: 438052E, 3736545N

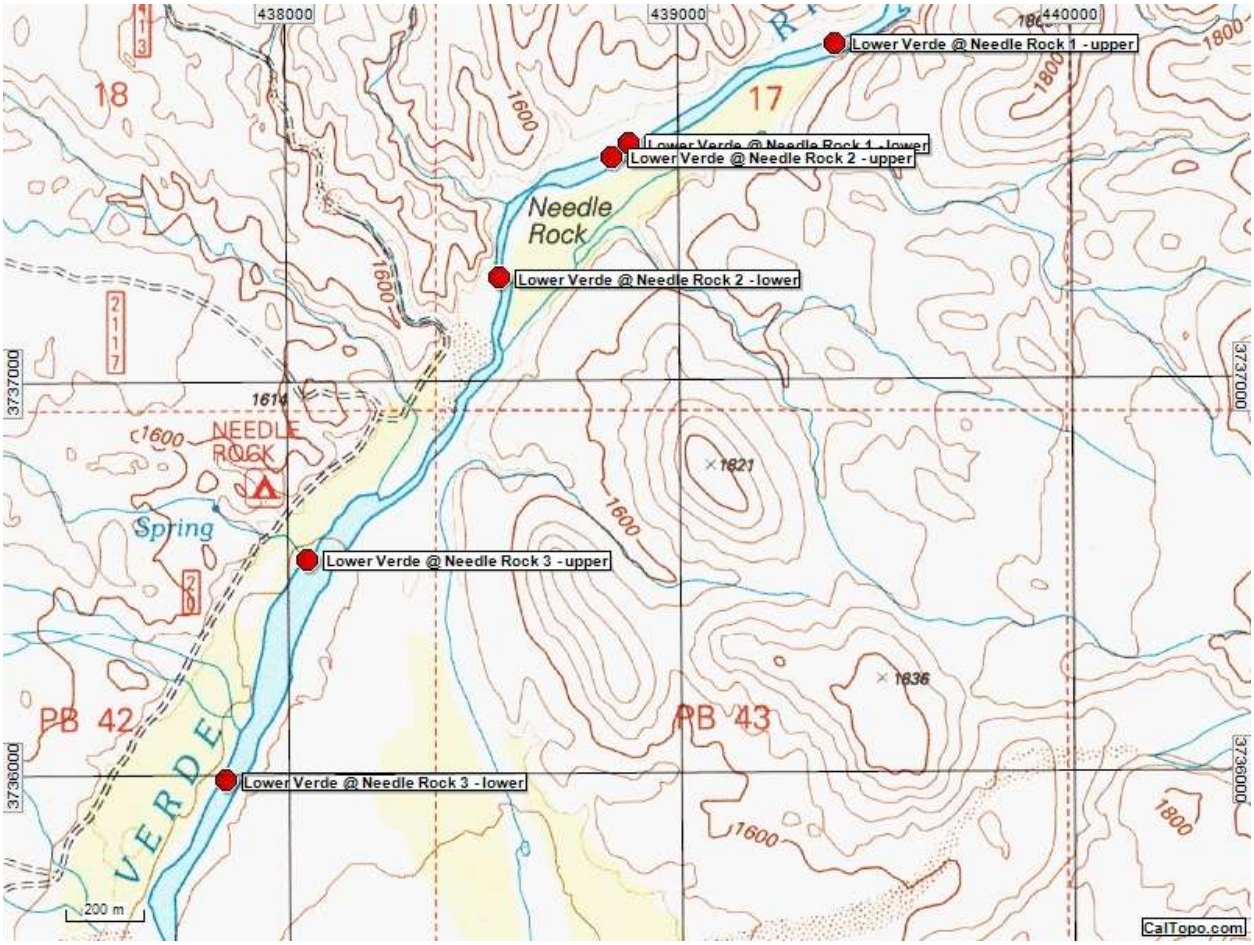


Figure 12. Lower Verde River, @ Needle Rock 1, 2 and 3 – 500m and 1000m (#3) sample sites.

Little Sycamore Creek

July 27, 2015

UTM 12S Lower Boundary: 413791E, 3802742N Upper Boundary: 413879E, 3802803N

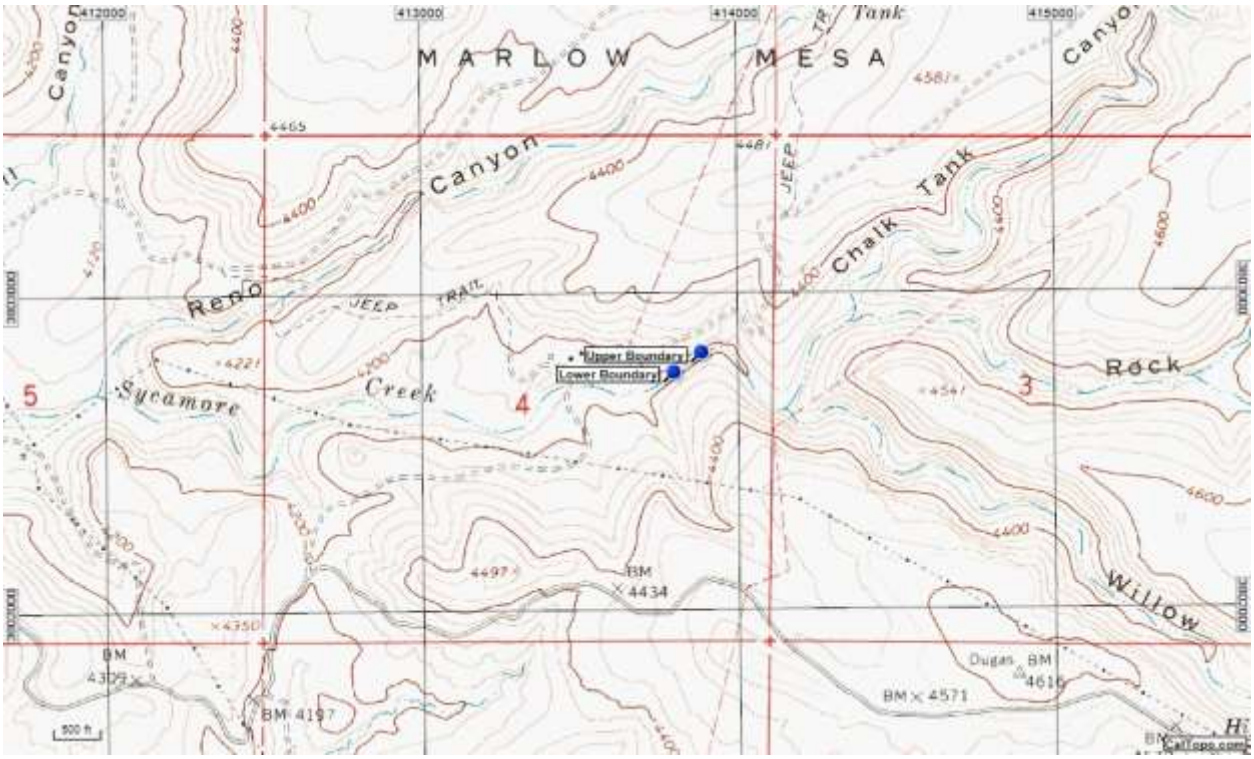


Figure 13. Little Sycamore Creek – 100m sample site.

Sycamore Creek-Double T Falls

July 27, 2015

UTM 12S Lower Boundary: 419845E, 3798021N Upper Boundary: 419975E, 3798093N

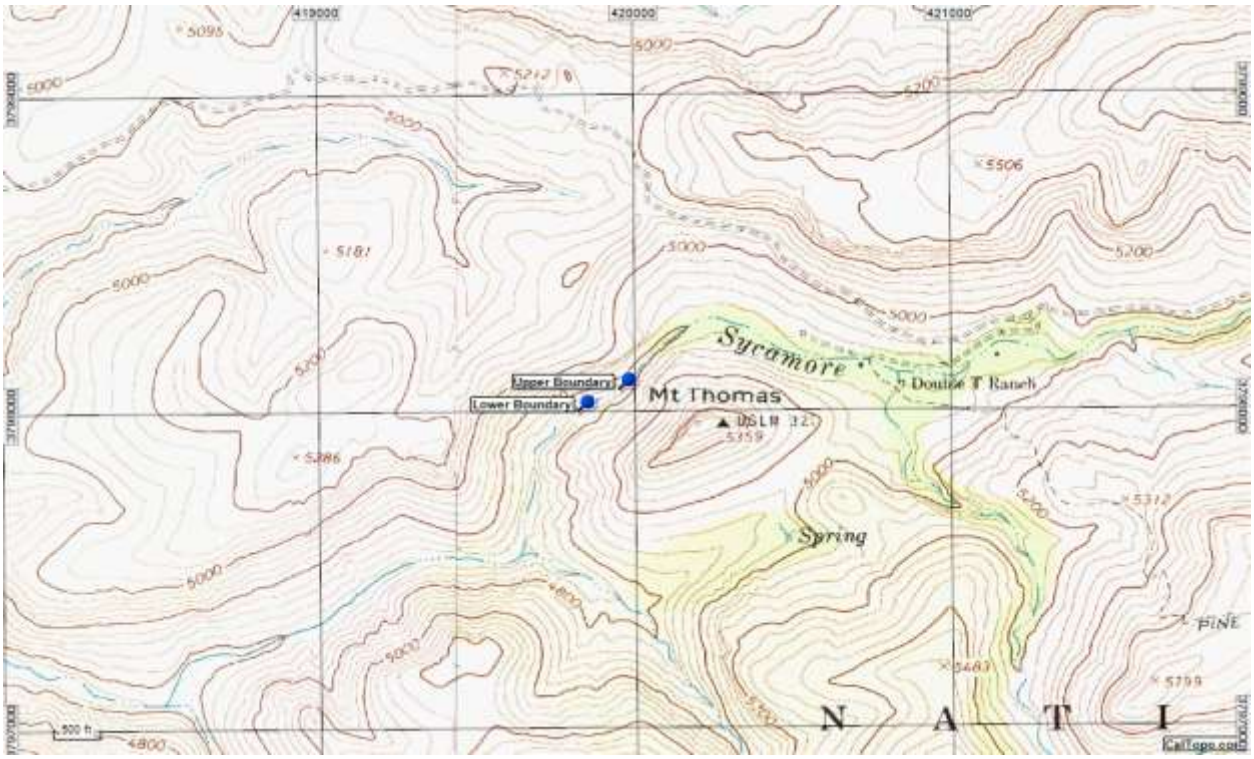


Figure 14. Sycamore Creek-Double T Falls – 100m sample site.

Sycamore Creek-Middle Box

July 28, 2015

UTM 12S Lower Boundary: 416176E, 3798784N Upper Boundary: 416239E, 3798717N

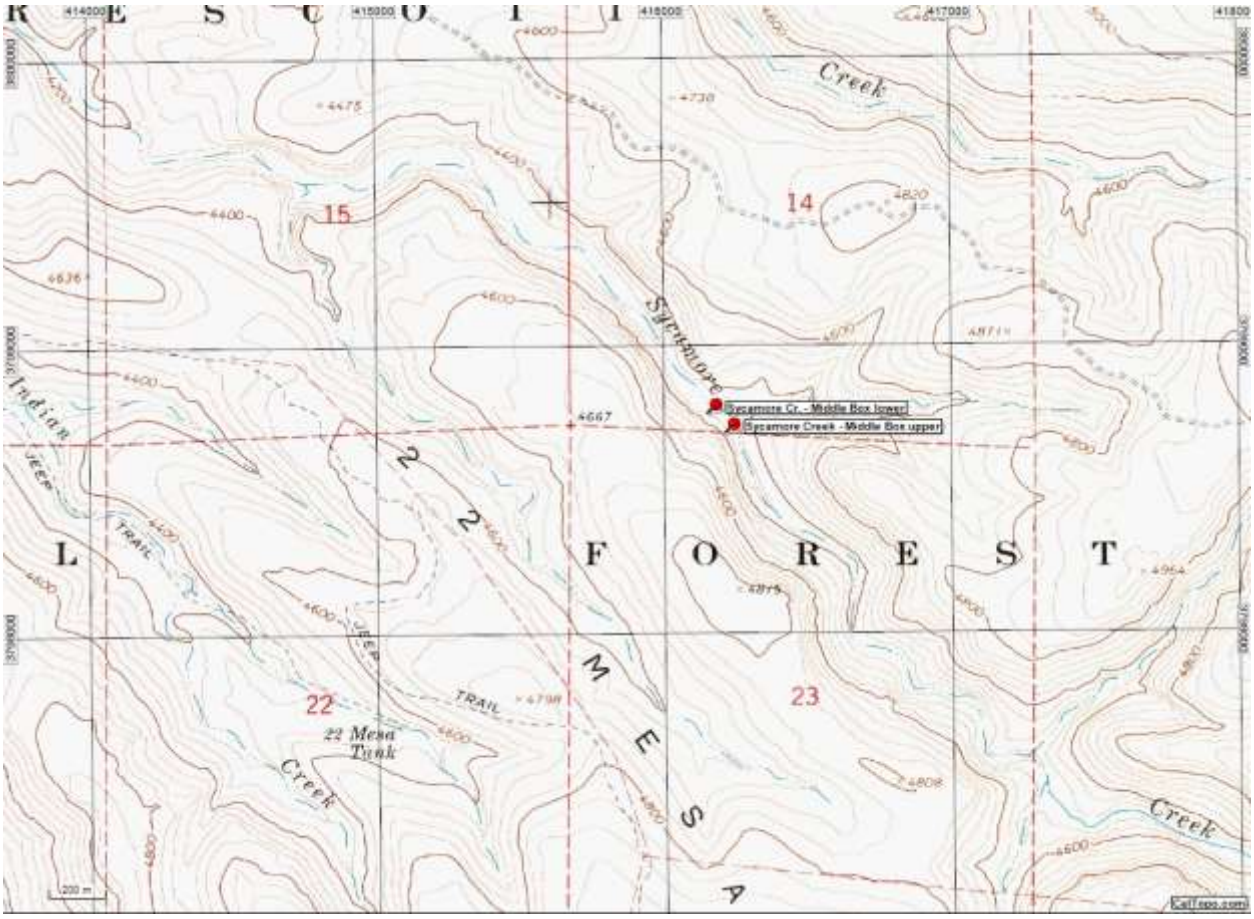


Figure 15. Sycamore Creek-Middle Box – 100m sample site.

Indian Creek

July 29, 2015

UTM 12S Lower Boundary: 413449E, 3798881N Upper Boundary: 413540E, 3798877N

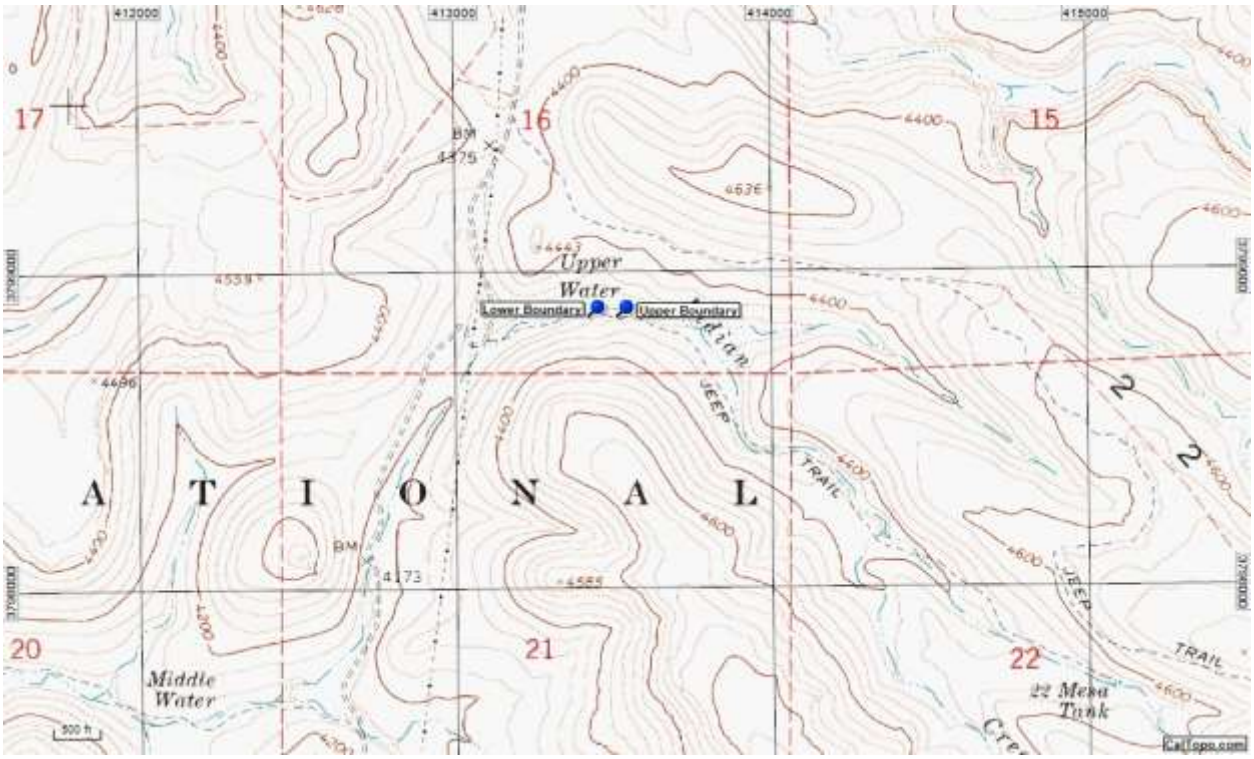


Figure 16. Indian Creek – 100m sample site.

Tule Creek

July 30, 2015

UTM 12S Lower Boundary: 382308E, 3763893N Upper Boundary: 382322E, 3764001N

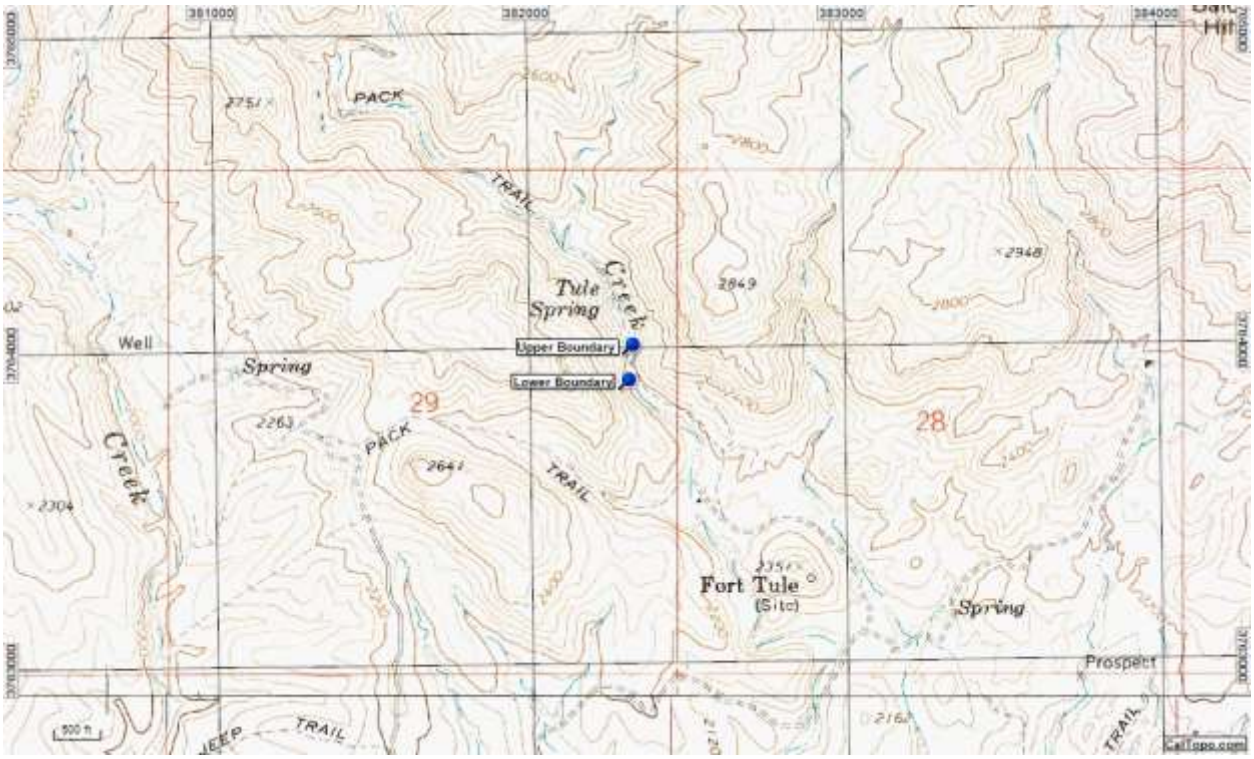


Figure 17. Tule Creek – 100m sample site.

Sabino Canyon

August 10, 2015

UTM 12S Lower Boundary: 520171E, 3578078N Upper Boundary: 520200E, 3578138N

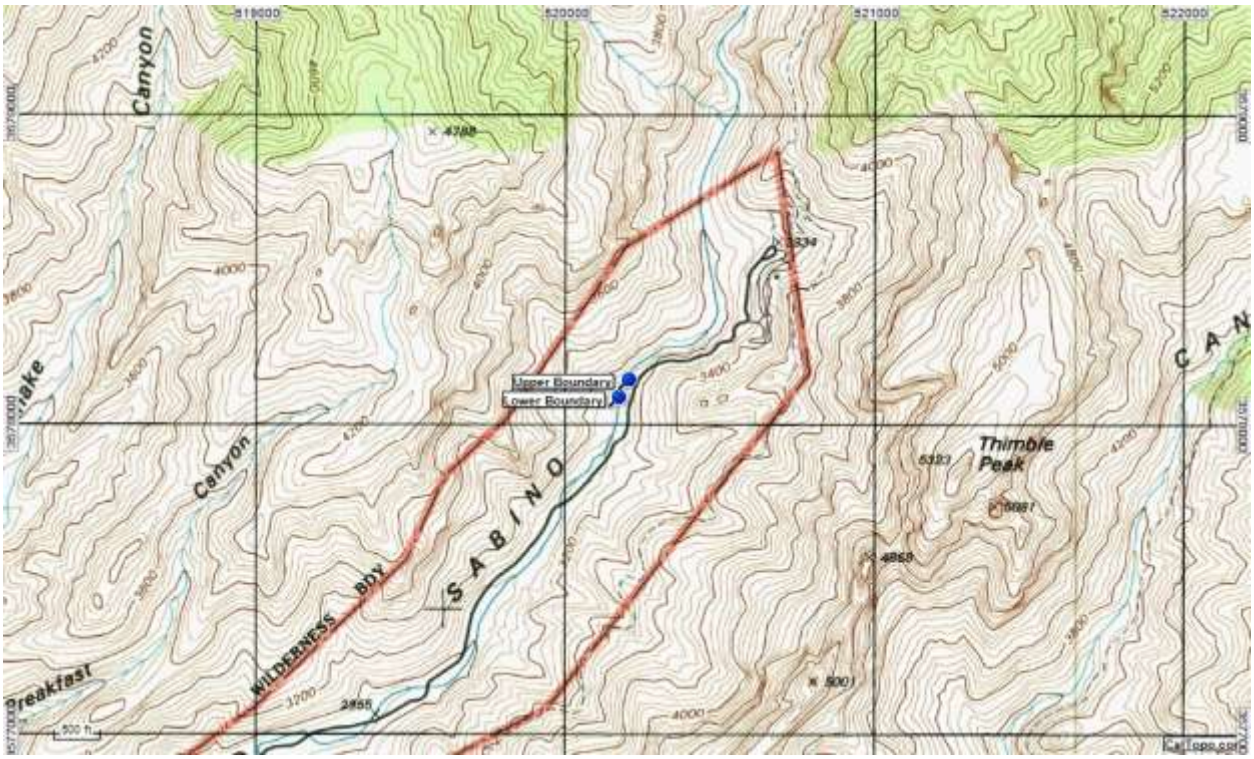


Figure 18. Sabino Canyon – 100m sample site.

Romero Canyon

August 11, 2015

UTM 12S Lower Boundary: 511540E, 3586855N Upper Boundary: 511665E, 3586581N

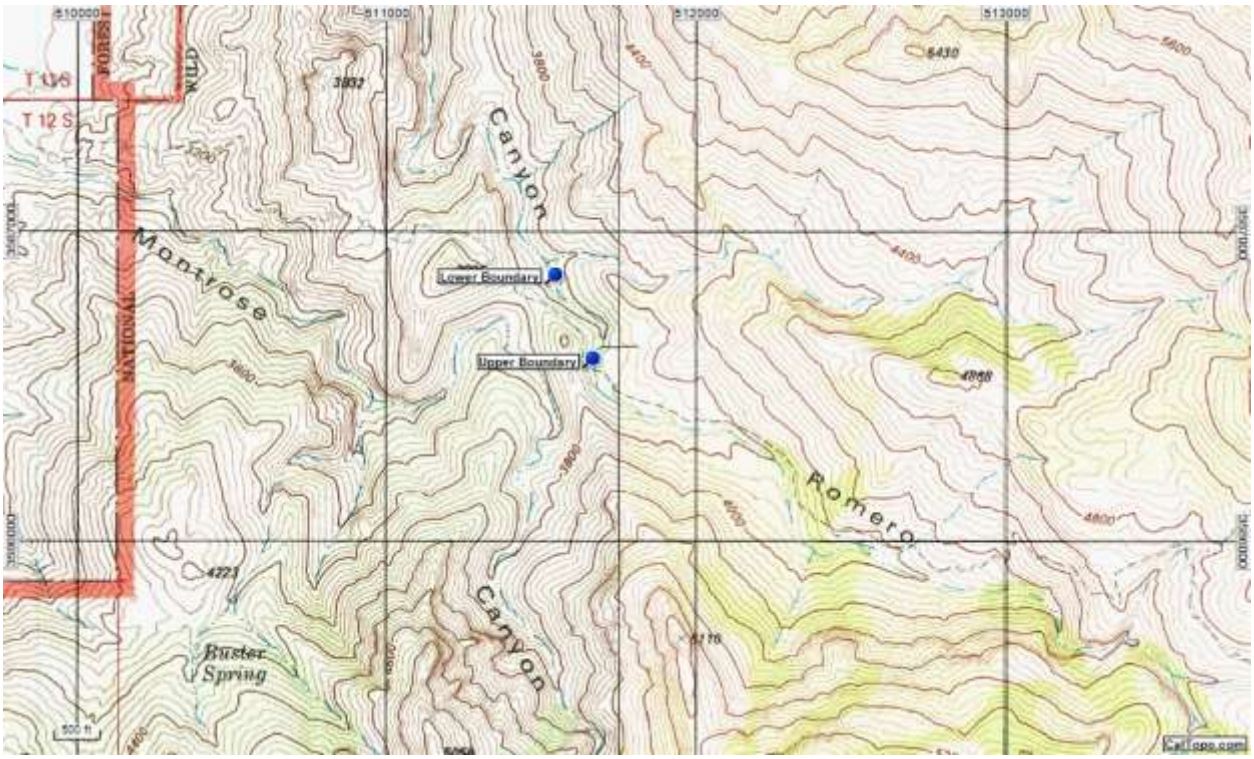


Figure 19. Romero Canyon – 500m sample site.

Red Tank Draw

August 24, 2015

UTM 12S Lower Boundary: 435023E, 3840274N Upper Boundary: 435289E, 3840561N

Figure 20. Red Tank Draw – 500m sample site.

Redrock Canyon-Cott Tank Canyon

September 16, 2015

UTM 12S Lower Boundary: 435249E, 3837293N Upper Boundary: 435673E, 3837424N

Figure 21. Redrock Canyon, Cott Tank Canyon – 500m sample site.

Redrock Canyon-The Falls

September 17, 2015

UTM 12S Lower Boundary: 529884E, 3490407N Upper Boundary: 530621E, 3489631N

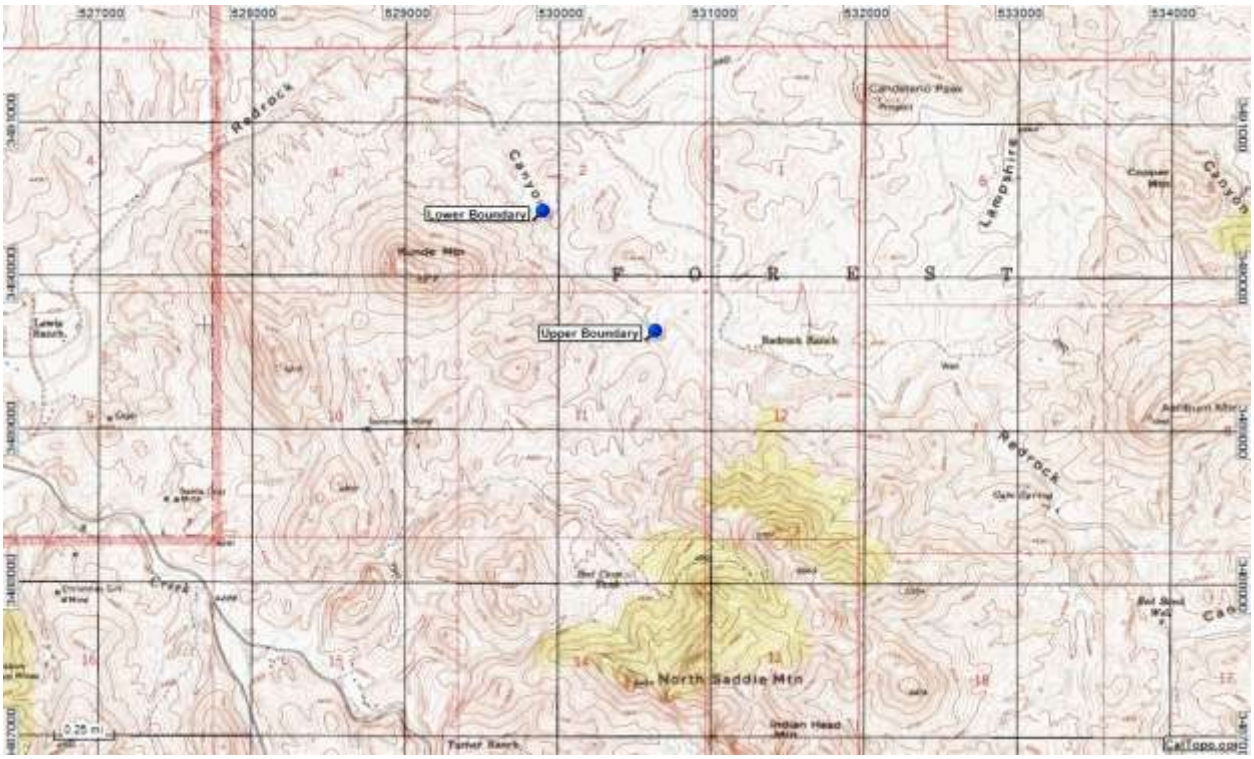


Figure 22. Redrock Canyon, The Falls – 500m sample site.

Redrock Canyon-Pig Camp

September 17, 2015

UTM 12S Lower Boundary: 528691E, 3491434N Upper Boundary: 529049E, 3491291N

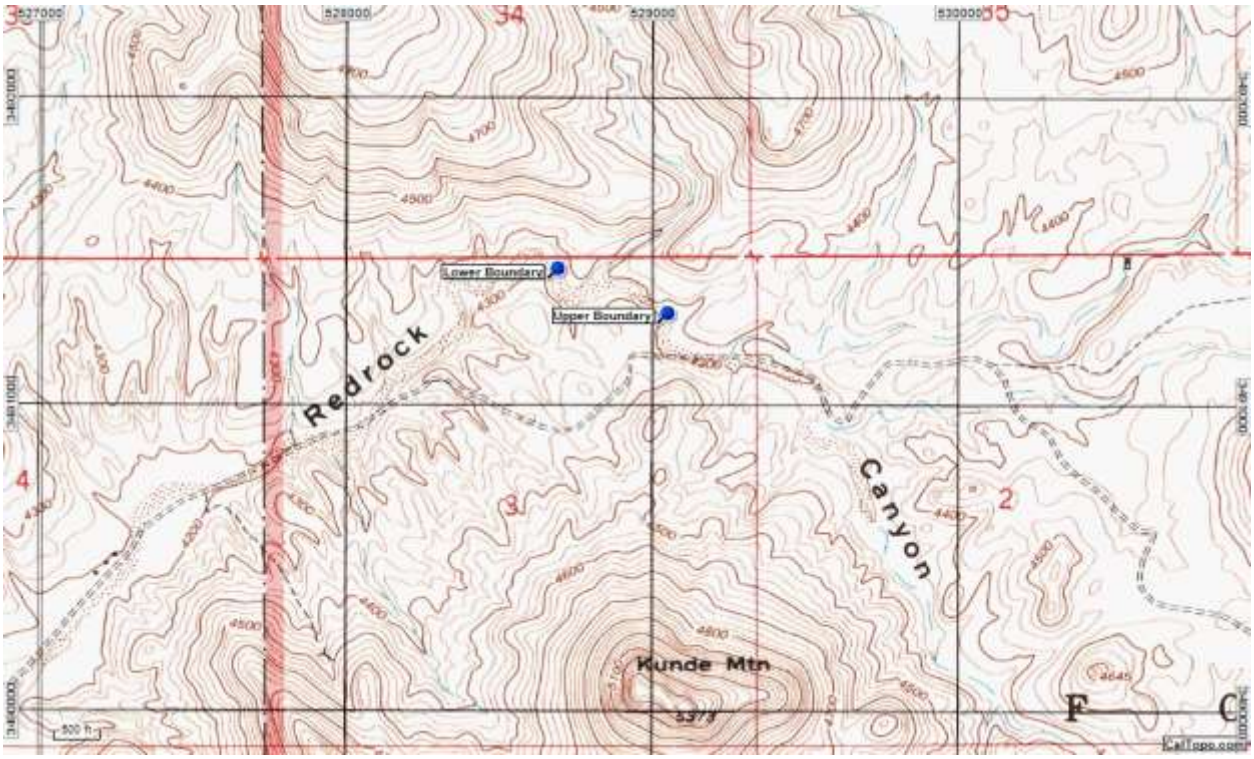


Figure 23. Redrock Canyon, Pig Camp – 500m sample site.

T4 Spring-Babocomari Ranch

September 29, 2015

UTM 12S Lower Boundary: 549830E, 3499871N Upper Boundary: 549758E, 3500258N

Figure 24. T4 Spring, Babocomari Ranch – 500m sample site.

Lower Cienega Creek-Below Quarry 1

October 08, 2015

UTM 12S Lower Boundary: 535096E, 3541976N Upper Boundary: 535013E, 3542004N

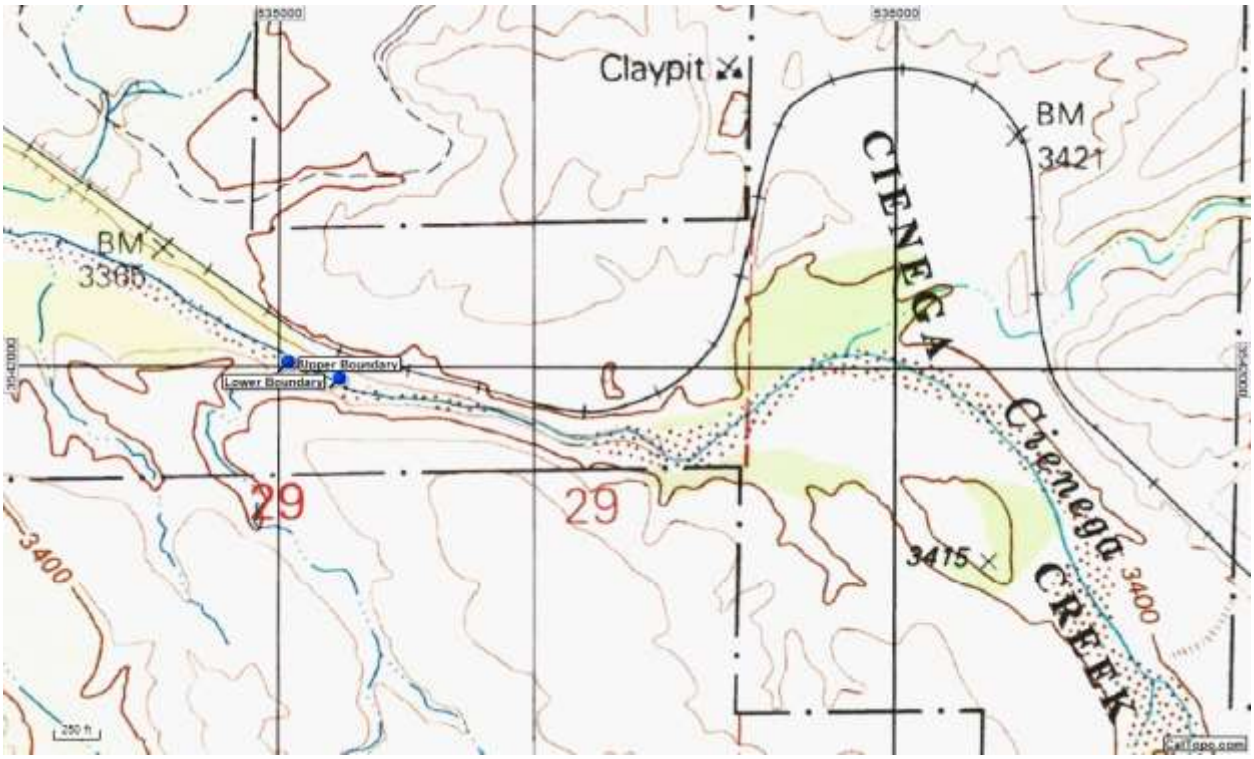


Figure 25. Lower Cienega Creek, below quarry 1 – 100m sample site.

Lower Cienega Creek-Below Quarry 2

October 08, 2015

UTM 12S Lower Boundary: 535178E, 3541952N Upper Boundary: 535582E, 3541866N

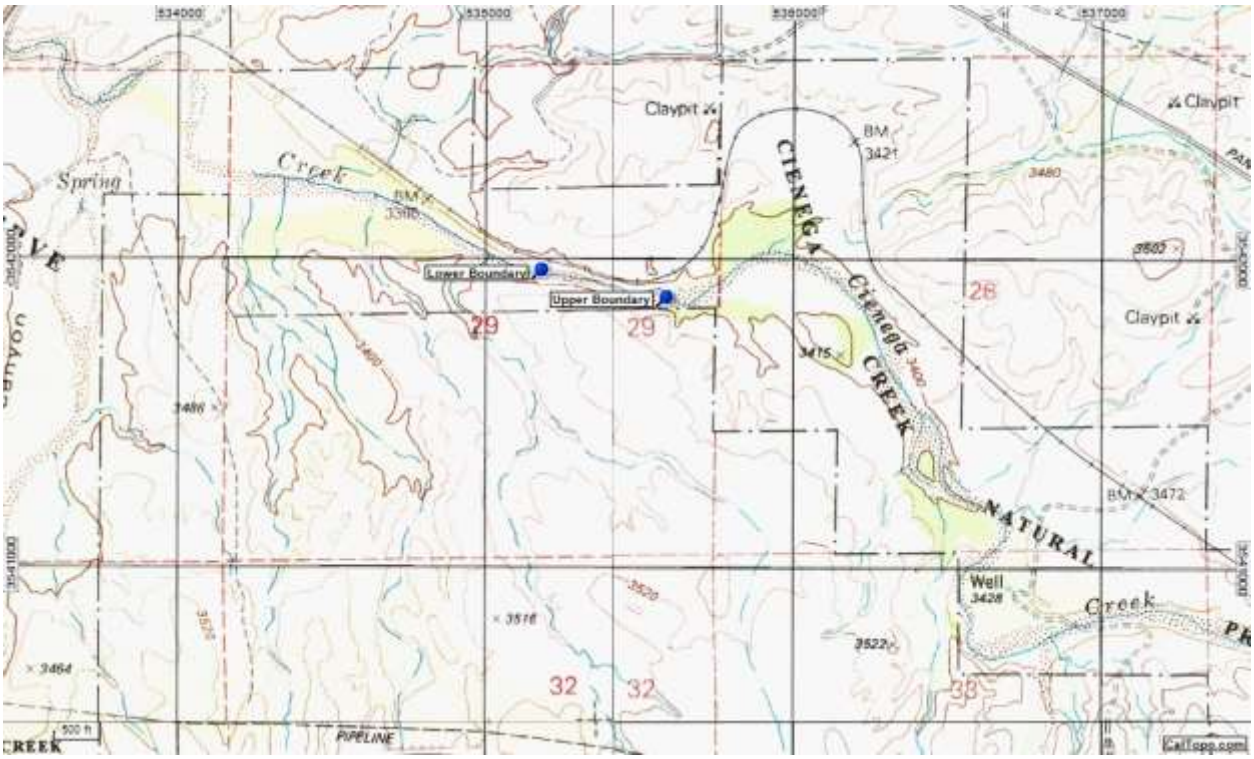


Figure 26. Lower Cienega Creek, below quarry 2 – 500m sample site.

Lower Cienega Creek-Above 3 Bridges

October 08, 2015

UTM 12S Lower Boundary: 533541E, 3542702N Upper Boundary: 533772E, 3542528N

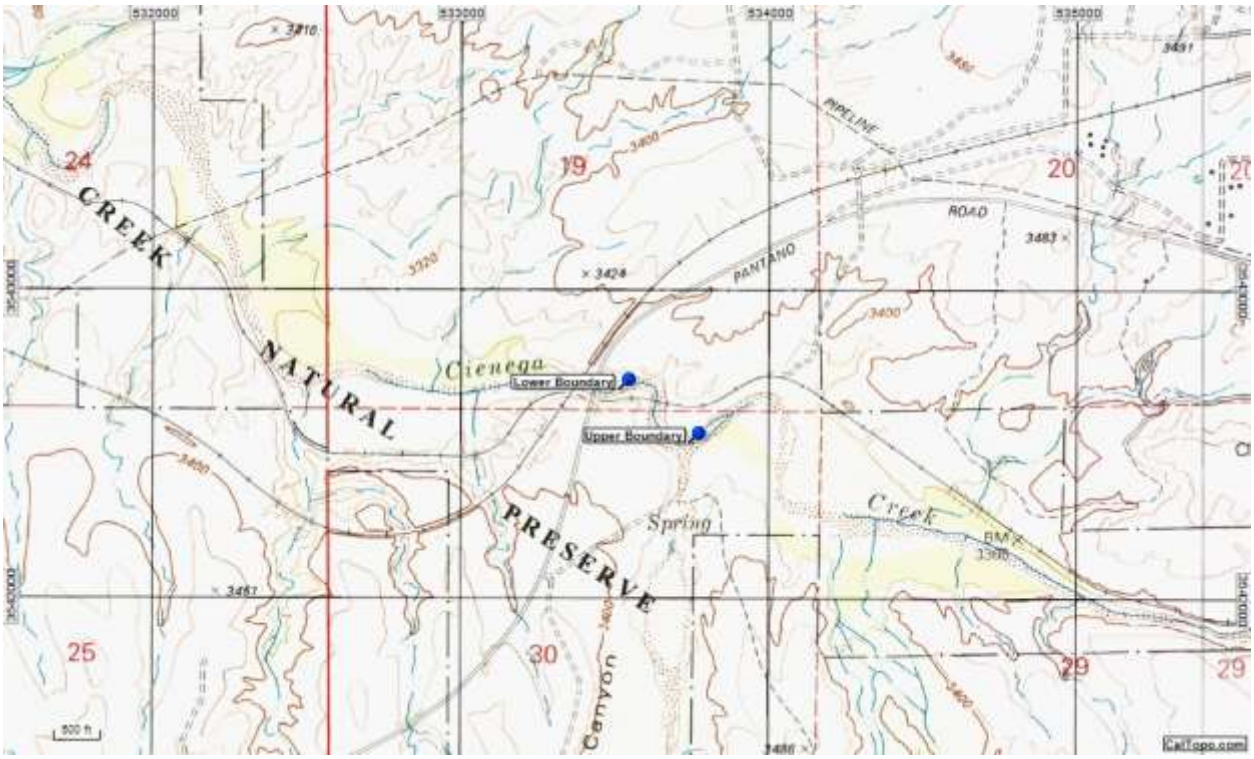


Figure 27. Lower Cienega Creek, above 3 bridges – 500m sample site.

AD Wash

November 02, 2015

UTM 12S Lower Boundary: 368447E, 3761700N Upper Boundary: 368435E, 3761629N

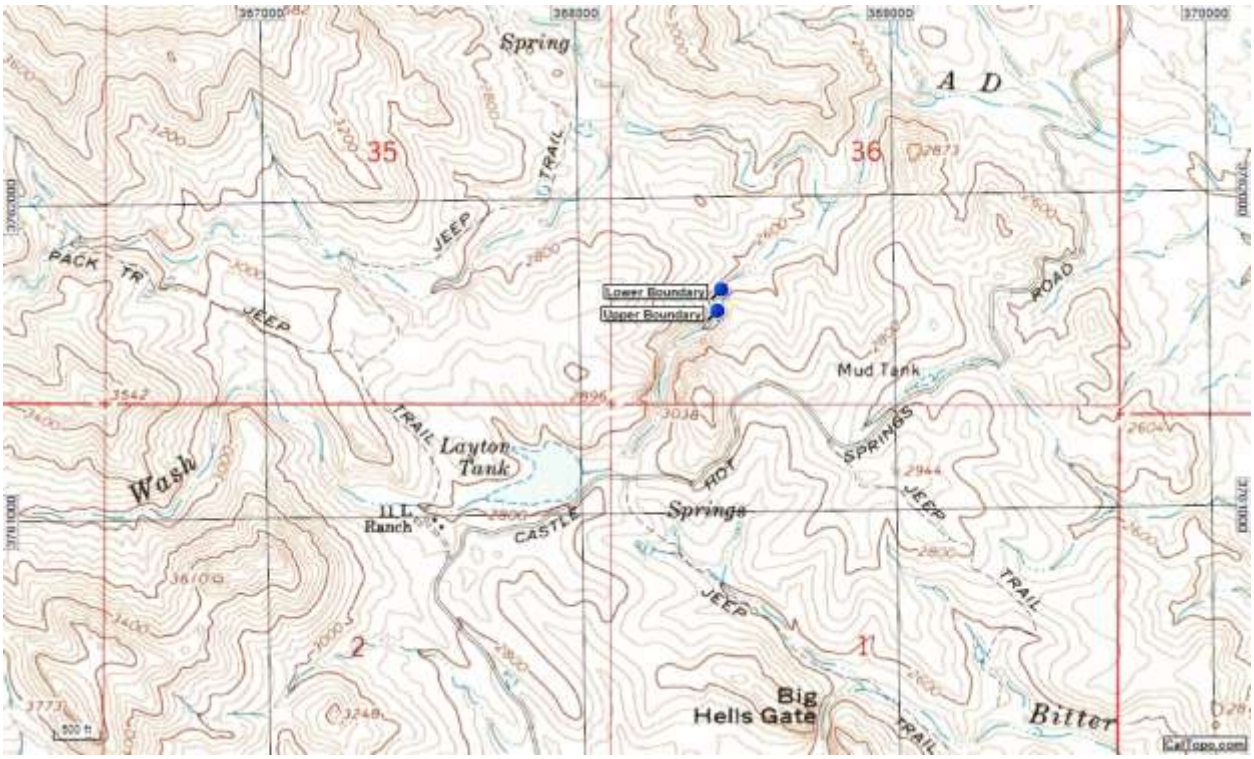


Figure 28. AD Wash – 100m sample site.

Webber Creek-Below Camp Geronimo 1

November 09, 2015

UTM 12S Lower Boundary: 466399E, 3806638N Upper Boundary: 466131E, 3806773N

Webber Creek-Below Camp Geronimo 2

November 09, 2015

UTM 12S Lower Boundary: 466820E, 3805628N Upper Boundary: 466707E, 3805986N

Webber Creek-Below Camp Geronimo 3

November 09, 2015

UTM 12S Lower Boundary: 467548E, 3805012N Upper Boundary: 467168E, 3805278N

Figure 29. Webber Creek, below Camp Geronimo 1, 2 and 3 – 500m sample sites.

Babocomari River-Below Bridge Crossing 1

November 16, 2015

UTM 12S Lower Boundary: 555036E, 3500063N Upper Boundary: 554613E, 3500141N

Babocomari River-Below Bridge Crossing 2

November 16, 2015

UTM 12S Lower Boundary: 557077E, 3500066N Upper Boundary: 556737E, 3499793N

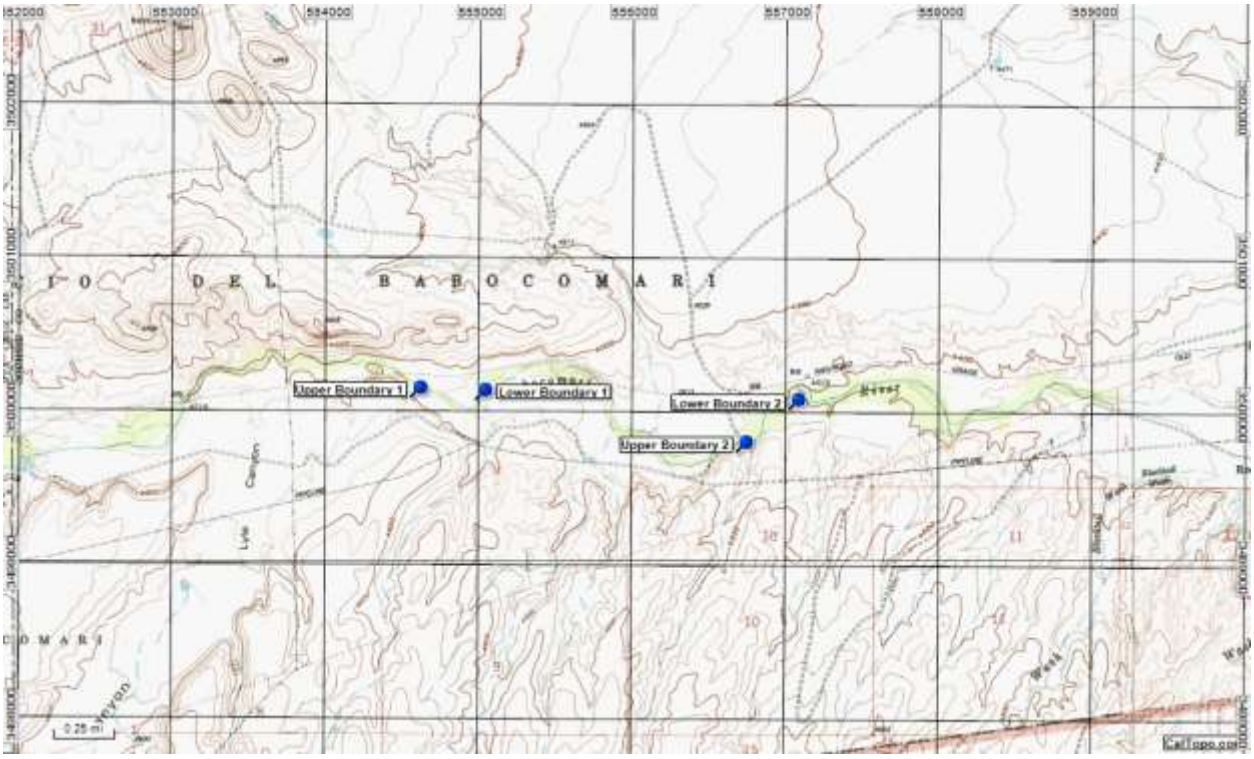
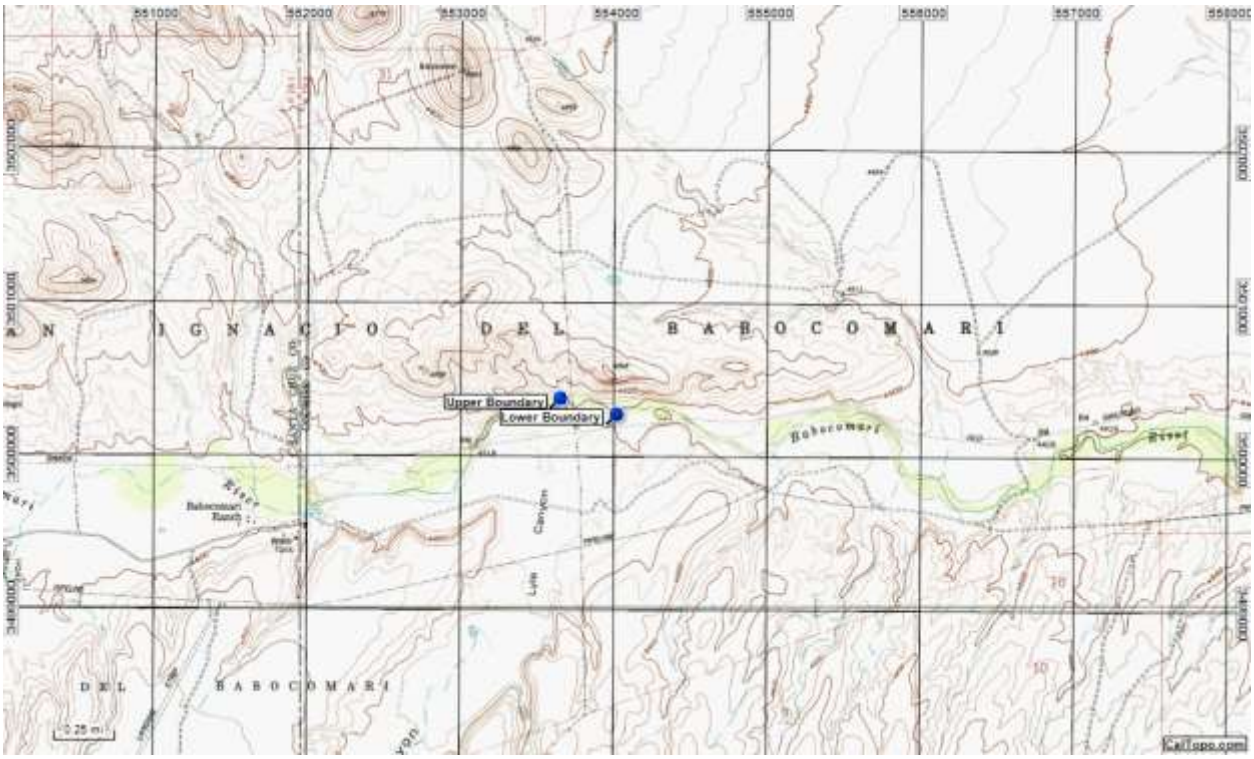


Figure 30. Babocomari River, below bridge crossing 1 and 2 – 500m sample sites.

Babocomari River-Above Bridge Crossing

November 16, 2015

UTM 12S Lower Boundary: 554007E, 3500259N Upper Boundary: 553639E, 3500359N



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FISH MONITORING OF SELECTED STREAMS

WITHIN

THE GILA RIVER BASIN

2015

Annual Report

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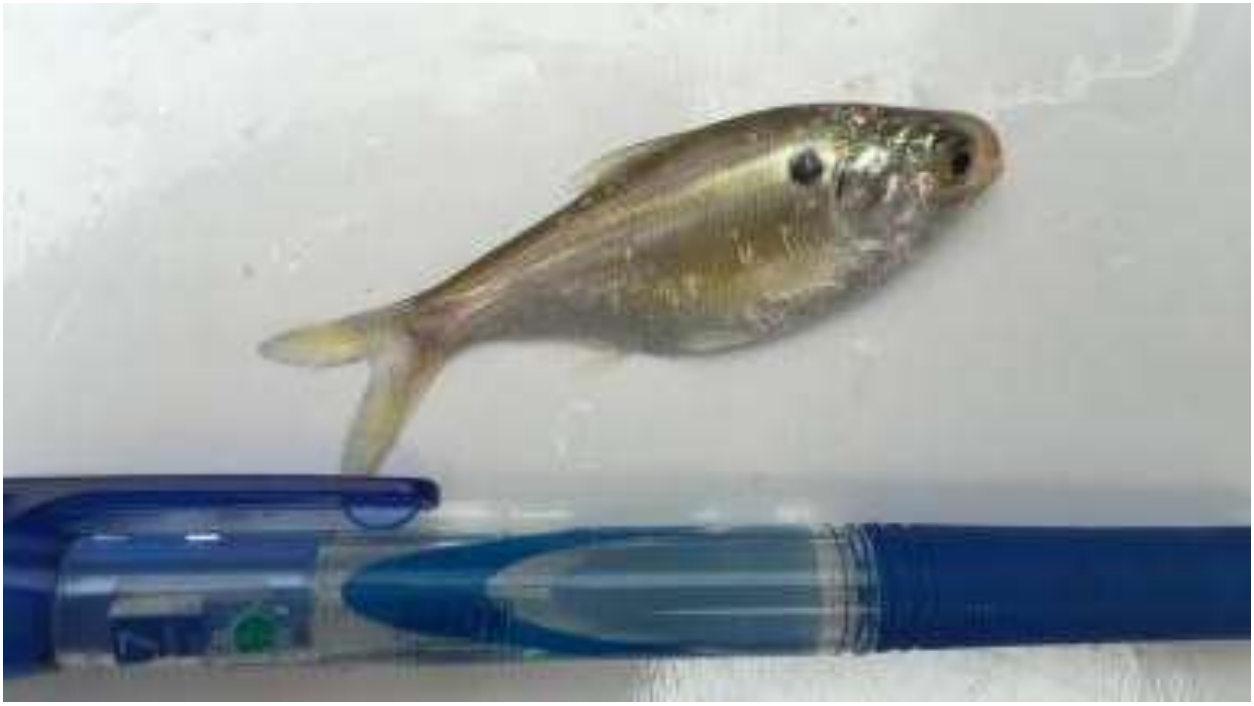

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