Gila River Basin Native Fishes Conservation Program: Arizona Game and Fish Department Annual Report for June 30, 2015 through June 30, 2016

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A Gila River Basin Native Fishes Conservation Program Annual Performance Report; U.S. Fish and Wildlife Service Cooperative Agreement No. F14AC00148. Arizona Game and Fish Department, Phoenix.

Program Cooperators:

Arizona Game and Fish Department Mission

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Acknowledgements

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COOPERATIVE AGREEMENT TITLE
Central Arizona Project Gila River Basin Native Fishes Conservation Program

FUNDING
Reporting period: 06/30/15 – 06/30/16.
About $252,608 of $268,227 expended on native fish conservation activities.
About $329,842 of $1,639,261 expended on ARCC improvements.

ADMINISTRATION AND GENERAL ACTIVITIES
Arizona Game and Fish Department's (Department) Gila River Basin Native Fish Conservation Program (Program) staff administered and managed program projects. Program staff managed data, added annual monitoring and survey datasets into the overall CAP Master Fish Survey dataset, and added data to the stocking dataset. Program staff attended and participated in Gila River Basin Native Fishes Conservation Program (GRBNFCP) technical and policy committee meetings. Program staff attended the Desert Fishes Council annual meetings in November 2015, and gave a presentation on native fish conservation supported by the Program. Program staff drafted annual project and performance reports, Environmental Assessment Checklists, and completed and submitted SF424 forms to attain funding for improvements to the Department's Aquatic Research and Conservation Center (ARCC). Program staff hired one intern for the 2016 field season, and worked toward filling the vacated Program Biologist position. Program staff coordinated with Department staff, other agencies, and private landowners for existing and potential projects.

Expenditures: Approximately $47,423

Obstacles: Funding ran out at the end of March 2016, after which the Department ceased all Program conservation activities.

Comments
Sites where native fish were repatriated and subsequent monitoring information indicated that the species had established populations are reported in Appendix 1. *Gila* species identified in this report follow the species descriptions by Minckley and DeMarais (2000). However, as of March 4, 2015, the Arizona Game and Fish Department recognized Roundtail Chub *Gila robusta*, Headwater Chub *Gila nigra*, and Gila chub *Gila intermedia* as a species complex rather than comprised of the three discrete species. Further, in September 2016, the American Fisheries Society and the American Society of Ichthyologists and Herpetologists reclassified and merged Roundtail Chub, Gila Chub, and Headwater Chub into one species, the Roundtail Chub.

PRIORITY ACTIONS IDENTIFIED IN COOPERATIVE AGREEMENT APPENDIX
Old task numbers are shown at the end of each project title for tracking purposes, because all projects for this reporting period were lumped under Task 3-139 (AZGFD recovery actions). A map of the locations of conservation actions, not including Gila Topminnow stockings, is shown in Figure 1.

No.	Water Name
1	NORTH FORK EAST FORK BLACK RIVER
2	COYOTE CREEK
3	EAST FORK BLACK RIVER
4	BLUE RIVER
5	EAGLE CREEK
6	BONITA CREEK
7	ARAVAIPA CREEK
8	REDFIELD CANYON
9	HOT SPRING CANYON
10	MINT SPRING
11	BASS CANYON
12	SECRET SPRING
13	WILDCAT CANYON
14	MINERAL CREEK
15	SHEEHY SPRING
16	FRESNO CANYON
17	ARNETT CREEK
18	TELEGRAPH CANYON
19	ROCK CREEK
20	FOSSIL CREEK
21	SPRING CREEK
22	ARCC
23	GRAPEVINE CANYON
24	TORTILLA CREEK
25	MESQUITE WASH
26	SOUTH FORK SHEEP CREEK
27	WALKER CREEK

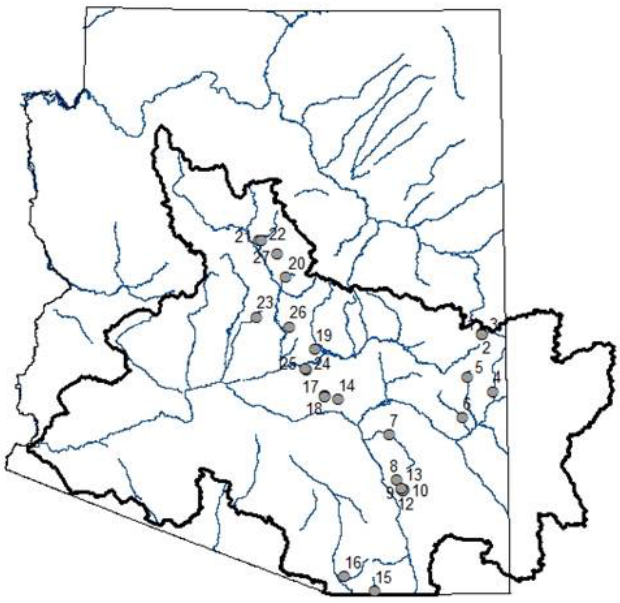

Figure 1. Map showing location of sites monitored, stocked, or surveyed. Gila topminnow stocking sites are shown in a separate map.

Acquire Spikedace, Loach Minnow and Rare Populations of Other Native Fish (Task 3-57 and 3-75g).

Description: The purpose of this task is to acquire Spikedace *Meda fulgida* and Loach Minnow *Rhinichthys cobitis* from all extant lineages and bring them to a facility for propagation and to establish refuge populations. Each population is likely genetically unique (Tibbets and Dowling 1996) and represents a significant remnant of the evolutionary legacy of these declining species. The Department will also coordinate with tribes and the State of New Mexico to acquire Spikedace or Loach Minnow from their jurisdictions. Lineages of other priority species like Gila chub and Gila topminnow may also be brought to the hatchery if deemed necessary. Fish will be transported alive to the Department's Aquatic Research and Conservation Facility (ARCC; formerly Bubbling Ponds Native Fish Conservation Facility). An additional facility may be used if agreed upon by partners.

Status: Ongoing.

Expenditures: Approximately $14,156

Preliminary Results: During July 6-8, 2015, Program staff surveyed East Fork Black River and tributaries for Loach Minnow. From the confluence with Open Draw Wash, they sampled the East Fork Black River up into the North Fork East Fork Black River and stopped 2.2 km upstream of FR249 crossing. They also sampled a 500-m reach of Coyote Creek immediately

upstream from the confluence with East Fork Black River. Riffles were sampled by a combination of electrofishing and kick seining, whereas all other habitat was backpack electrofished. No Loach Minnow were captured in any of the streams. For electrofishing-kick seining within East Fork Black River-North Fork East Fork Black River, they captured 456 Speckled Dace *Rhinichthys osculus*, 50 Desert Sucker *Catostomus clarki*, and 159 Brown Trout *Salmo trutta*. In riffles in Coyote Creek they captured 117 Speckled Dace, 26 Brown Trout, and one Fathead Minnow *Pimephales promelas*. For backpack electrofishing within East Fork Black River-North Fork East Fork Black River, they captured 867 Speckled Dace, 80 Desert Sucker, 172 Brown Trout, three Fathead Minnow, and three Roundtail chub. The Roundtail chub were captured between the Boneyard Creek confluence up to about 1,840 m above the confluence, which was the furthest upstream and highest elevation (2,543 m) they have ever been collected in the Black River drainage. Crayfish were extremely abundant throughout, but were not enumerated.

On November 5, 2015, Program staff electrofished four 100-m transects on several private parcels on Eagle Creek downstream of Honeymoon Campground. No Spikedace or Loach Minnow were captured. Fish captured included 210 Speckled Dace, 105 Longfin Dace *Agosia chrysogaster*, 671 Desert Sucker and 6 Sonora Sucker *Catostomus insignis*; 114 Northern Crayfish were also captured.

On November 10, 2015, Program staff collected 150 Spikedace and 50 Loach Minnow from Aravaipa Creek and transported them to ARCC (Table 1). All fish were collected via seining within a 300-m section of the creek. Loach minnow were very abundant and all 50 individuals were collected within the first 15 seine hauls.

Obstacles: Rarity of Loach Minnow and Spikedace in extant naturally-occurring populations. Because of the rarity, the Department and U. S. Fish and Wildlife Service (USFWS) need to balance protecting the wild populations with removing fish from the wild to support captive broodstock.

The New Mexico Department of Game and Fish decided to implement a strategy whereby spikedace and loach minnow would be translocated from extant populations to new repatriation sites, rather than transporting fish to ARCC for propagation and establishment of refuge populations. Therefore, the New Mexico lineages of spikedace or loach minnow at ARCC will dwindle in size until they no longer exist, unless the policy changes and more fish are brought in.

The GRBNFCP is still in negotiations with the White Mountain Apache Tribe to acquire White River lineage of Loach Minnow; it is still unclear when or if this loach minnow lineage will be established. Also, Loach Minnow and Spikedace may still exist in Eagle Creek on the portion that flows through San Carlos Apache tribal land, and the USFWS is still in negotiations with the Tribe to survey the tribal portion of Eagle Creek to determine if the species still exist.

Table 1. Summary of number of Spikedace and Loach Minnow, of each lineage, brought into the Aquatic Research and Conservation Center from 2007 to 2016.

Taxa	Extant Lineage/Stream	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spikedace	upper Gila River, NM	640		148							
	Gila River Forks, NM			17	250	148			XX		
	Eagle Creek (likely extirpated)	0	0							0	
	Aravaipa Creek (& Tribs)	258		220		XX			26	150	
	Verde River (likely extirpated)		0	0		0					
Loach Minnow	upper Gila River, NM	143									
	Gila River Forks, NM			48	100	434			61		
	San Francisco R., NM (& tribs)							41			
	Blue River (& tribs)		50	91		27				0	12
	Eagle Creek (likely extirpated)	0	0							0	
	Aravaipa Creek (& tribs)	254		110		XX			48	50	
	East Fork Black R. (& tribs)	0	0	0						0	

Comments: Status of lineages now at ARCC is the same as in 2015: the facility has Spikedace from three (Aravaipa Creek, upper Gila River, and the Gila River forks) of the five supposedly extant populations. Spikedace have not been detected in the upper Verde River since 1999, even with nearly annual surveys by the Department and U.S. Forest Service. Spikedace have not been captured since 1989 in Eagle Creek even though fixed sites on non-tribal lands are sampled annually by Marsh & Associates. The ARCC also has Loach Minnow from four (Aravaipa Creek, Blue River, Gila River Forks, and San Francisco River) of the eight supposedly extant populations. Loach Minnow have not been detected in Eagle Creek since 1997, even with annual surveys of fixed sites on non-tribal lands. Loach Minnow have not been detected in East Fork Black River drainage since 2005, even with surveys during 2007, 2008, 2009, 2012, 2013, and 2015. The GRBNFCP has so far been unable to acquire White River Loach Minnow from the White Mountain Apache Tribe.

Muleshoe Ecosystem Stream and Spring Repatriations (Task 3-47 and 3-75f).

Description: A multi-agency team developed a management plan for the Muleshoe Ranch Cooperative Management Area and several streams and springs were deemed suitable for establishment of several threatened and endangered fish species. Loach Minnow and Spikedace from Aravaipa Creek, north of the CMA, were to be translocated into Hot Springs Canyon and Redfield Canyons. These two streams are isolated from the San Pedro River, and nonnative fishes therein, by over 8 km of normally-dry streambed and a long reach of ephemeral discharge of the San Pedro River at and upstream from its confluence with Hot Springs Canyon. A barrier was built in Hot Springs Canyon in 2010 and one is scheduled to be built in Redfield Canyon in 2017. Several other waters on the Muleshoe Ranch Cooperative Management Area were targeted for repatriations of Gila Topminnow *Poeciliopsis occidentalis* and Desert Pupfish *Cyprinodon macularius*. The Department was tasked with completing necessary environmental compliance, repatriating Spikedace and Loach Minnow to Hot Springs Canyon and Redfield Canyon and Gila Topminnow and Desert Pupfish to suitable waters, and conducting post-repatriation monitoring to determine if the species establish. The Department will conduct augmentation stockings if necessary to establish populations and to maintain genetic diversity.

Status: Ongoing.

Expenditures: Approximately $17,695.

Preliminary Results: The annual post-stocking monitoring of native fishes in the Muleshoe Cooperative Management Area waters was conducted during October 5-6, 2015. On October 5, Program staff surveyed for Gila Topminnow in Wildcat and Bass canyons. Ten minnow traps were set in Bass Canyon in the reach between the pipeline road and Muleshoe Road, and 9 Gila Topminnow, 2 Longfin Dace, 2 Lowland Leopard Frogs, and 17 Gila Chub were captured. In Wildcat Canyon, nine minnow traps were set in the reach from the pipeline road up to the first tributary, and 58 Gila Topminnow were captured.

Hot Springs Canyon was surveyed by Program, TNC, and Bureau of Land Management (BLM) staff on October 6, by backpack electrofishing through nine 100-m transects (three fixed and six randomly selected). Twenty-four loach minnow and two Spikedace were captured. Five Loach Minnow and one Spikedace were ≤45 mm TL. Spikedace and Loach Minnow were only

captured in the upper two reaches. Also captured were 196 Longfin Dace, 149 Speckled Dace, 88 Desert Sucker, 140 Gila Chub, 66 Sonora Sucker, 5 Desert x Sonora hybrids, and 1 Gila Topminnow. The topminnow likely washed down from Bass or Wildcat canyons.

Department and TNC staff attempted to survey Redfield Canyon on October 7, 2015. They hiked in, but then because of widespread thunderstorms, canceled the sampling for safety reasons.

Two stockings were completed during the performance period. On October 5, 2015, Program staff set five minnow traps in Secret Spring and captured 810 Gila Topminnow and one Desert Pupfish. The Gila Topminnow were translocated to Bass Canyon and 798 were stocked about 630 m upstream of Muleshoe Road crossing; 12 died during the translocation. On October 27, 2015, Program staff collected 175 Desert Pupfish from TNC Lower San Pedro River Preserve and transported and stocked 166 to Mint Spring on Muleshoe Ranch CMA; nine died during the translocation.

The annual removal of Green Sunfish *Lepomis cyanellus* from Redfield Canyon, scheduled for early June 2016, was not performed because of lack of funding.

Program staff began drafting an annual report, but funding ran out and did not complete it by the end of the performance period.

Obstacles: Thunderstorms in the Muleshoe area raised safety concerns so sampling of Redfield Canyon in October 2015 was canceled. Funding ran out in April 2016 and a new agreement with Bureau of Reclamation (Reclamation) was not in place by the end of the performance period, so some tasks were not completed (see above).

Comments: Did not monitor Gila Topminnow in Headquarters Spring, Secret Spring, or Swamp Springs Canyon, or Cherry Spring Canyon because those populations are considered established and hence will be monitored by the Department's regional or Nongame Branch staff. However, program staff did set minnow traps in Secret Spring for the translocation to Bass, and did capture over 800 Gila Topminnow. The Department's Aquatic Wildlife Branch staff monitored Gila Topminnow in these sites during June 2016 and captured 531 in Swamp Spring Canyon, 151 in Headquarters Spring (observed thousands) and 94 in Secret Spring, but none in Cherry Spring Canyon (Ross Timmons, Arizona Game and Fish Department; personal communication). The Cherry Spring population is either very rare or extirpated, and may have failed because the site is highly shaded by riparian trees. The Gila topminnow at the other locations may count towards recovery goals. Spikedace and Loach Minnow were last stocked in Hot Springs Canyon in 2011 and in Redfield Canyon in 2010. In Hot Springs Canyon, Spikedace and Loach Minnow were less abundant than they were in 2015. However, the presence of Loach Minnow and Spikedace ≤45 mm TL indicates that both species spawned since they were last stocked. Neither Spikedace nor Loach Minnow were captured in Redfield Canyon in 2012-2014 so it is unclear if they persist there.

Fossil Creek Repatriations (Task 3-75l).

Description: In 2005, salvaged native fish were returned to Fossil Creek after the 2004 chemical treatment, and full flows were returned to the stream. The objective of this task was to stock and establish a suite of threatened and endangered fish species in Fossil Creek. A working group developed a list of potential species to stock, with the final determination being that federally threatened Spikedace and Loach Minnow, endangered Gila Topminnow and Razorback Sucker *Xyrauchen texanus*, and non-listed Longfin Dace would be stocked. Razorback Sucker were stocked with the goal of having them grow out in the stream and disperse into Fossil Creek, because it seemed unlikely that there was suitable habitat in Fossil Creek for the species to establish. The Department was tasked with stocking the various fish species, multiple times if necessary, and monitoring afterwards until it could be determined if the species established or failed to do so.

Status: Ongoing.

Expenditures: Approximately $14,156.

Preliminary Results: Program staff conducted annual monitoring August 3-4, 2015. Program staff conducted snorkel surveys for Spikedace in reaches 1 and 4, for Loach Minnow in reaches 0 and 1, and for Razorback Sucker and Longfin Dace in reaches 3 and 4. A total of 116 sites (9 in Reach 0, 40 in Reach 1, 20 in Reach 3, and 47 in Reach 4) were snorkeled through. Two hundred thirty-one Spikedace were observed in Reach 4 (39.01 fish/h ± 8.06), of which 41 (18%) were <40 mm TL. No Spikedace were observed in any of the other reaches. Sixty-three Gila Topminnow were observed in Reach 1 and 8 in Reach 4. Longfin Dace were only observed in Reach 3 and 4, where 25 and 58 were seen respectively. No Loach Minnow or Razorback Suckers were detected in any reaches. Chub, Speckled Dace, and Desert Sucker were observed throughout all four reaches, and crayfish were observed in reaches 3 and 4

Program staff led the Fossil Creek Native Fish Workgroup meeting on February 25, 2016. Program staff analyzed data and drafted a report summarizing stocking and monitoring activities during 2015; the report was not finalized during the performance period.

Obstacles: We had planned to stock Loach Minnow in fall 2015; however no Loach Minnow offspring were available from ARCC, so the stocking was canceled.

Comments: Of the five species stocked into Fossil Creek since 2007, Gila Topminnow are reproducing, persisting from year to year, and have expanded their distribution throughout reaches 1 through 4, and so are considered established, and the population can probably count towards recovery. Spikedace appear to have reproduced and persisted in Reach 4, so they can probably count towards recovery. Targeted monitoring for Longfin Dace was not completed every year, but nonetheless the species still continues to be detected in reaches 3 and 4, albeit in low numbers. Loach Minnow do not appear to have established a population, or if they have, they are extremely rare; only five were detected (during all types of monitoring) in 2008, two in 2009, none in 2010, one in 2011, none in 2013, four in 2014, and none in 2015. Since 2007, over 3,000 sub-adult and adult Razorback Sucker have been stocked. Razorback Sucker was detected during monitoring in 2008 and 2009, but not since. More fingerling razorback sucker were stocked in November 2014, but none were detected in 2015.

Fresno Canyon Repatriations (Task 4-64b).

Description: Fresno Canyon is a tributary to Sonoita Creek which is a tributary of the Santa Cruz River about 24 km northeast of Nogales, Arizona. Fresno Canyon is within the Sonoita Creek State Natural Area and is managed by Arizona State Parks. From the confluence of Coal Mine Canyon there is a 600-m perennial section that contains Gila Topminnow, Sonora Mud Turtles, and Canyon Treefrogs *Hyla arenicolor*. The Department chemically renovated Fresno Canyon in 2007 to eradicate Green Sunfish, and afterwards restocked Gila Topminnow, although there was also natural dispersal of topminnow from Coal Mine Canyon into Fresno Canyon. The renovated stream was also deemed suitable for establishment of Gila Chub. Gila Chub is planned to be stocked as soon as they can be acquired from Sheehy Spring.

Status: Ongoing.

Expenditures: Approximately $1,416.

Preliminary Results: Program staff coordinated with FWS and the landowner at Sheehy Spring in both 2015 and 2016 about removal of Gila Chub from Sheehy Spring and starting a refuge population at the Aquatic Research and Conservation Center, or a direct translocation to Fresno Canyon. The land owner did not want to make any decisions until after the Habitat Conservation Plan was in place.

Obstacles: Low numbers of Gila Chub in Sheehy Spring and a long process to complete a Habitat Conservation Plan. During annual monitoring of fish in Sheehy Spring by Department and FWS staff, only 90 Gila Chub were captured in in 2014, 65 in 2015, and 29 in 2016. Also, the landowner wants to complete a Habitat Conservation Plan before allowing the Department to remove any Gila Chub from Sheehy Spring. The plan has been in the works for many years, and may be finalized in 2016.

Comments: Hopefully the HCP will be finalized by 2017, and we will then be able to remove Gila Chub from Sheehy Spring and repatriate them to Fresno Canyon and other locations.

Bonita Creek Renovation and Repatriations (Task 4-70b).

Description: Bonita Creek is a tributary to the Gila River, near Safford, Arizona. Bonita Creek drains south off of the San Carlos Apache Indian Reservation and the lower portion is within the Gila Box. Perennial flow begins about 29 km upstream from the mouth, although intermittency is common downstream. Safford has an infiltration gallery and associated transmission pipeline on Bonita Creek to supply municipal water for the city and the surrounding communities. The gallery system is located about 5.6 km above the mouth of Bonita Creek, and a small portion of the stream above and below the infiltration gallery dike is typically dry.

In 2008, a barrier was constructed 2.1 km upstream from the Gila River confluence; a chemical treatment of a 4.25 km perennial section between the barrier and the infiltration gallery was performed; the salvage and return of native fishes was completed and the repatriation of additional species was initiated. Threatened and endangered species stocked in the renovated reach were Spikedace, Loach Minnow, Gila Topminnow, and Desert Pupfish. The same four species were also to be stocked into the perennial portion of Bonita Creek upstream of the

infiltration gallery. The Department was tasked to continue to stock Spikedace, Loach Minnow, Gila Topminnow, and Desert Pupfish in upper Bonita Creek and participate in monitoring after stocking until it is determined whether or not the species establish or fail to do so. The Department is also tasked to consider a second chemical renovation of the treated reach, and if the decision is made to move forward, to complete the necessary paperwork and implement the treatment.

Status: Ongoing.

Expenditures: Approximately $8,494.

Preliminary Results: Program staff coordinated with BLM regarding post-stocking monitoring and augmentation stockings planned for 2015; the monitoring and stocking results are presented below.

During September 8-9, 2015, Program staff monitored locations in upper Bonita Creek where Gila Topminnow, Desert Pupfish, and Loach Minnow were stocked. At the Reservation boundary area, staff set 10 traps into the beaver pond where Gila Topminnow were stocked and 10 into the beaver pond where Desert Pupfish were stocked. No topminnow or pupfish were captured or observed. At the Midnight Canyon area, 10 traps were set in the beaver pond where Gila Topminnow were stocked and 143 topminnow were captured.

For the Loach Minnow monitoring downstream of the Midnight Canyon confluence, we had planned to electrofish three 100-m transects (one fixed and two random). However, our electrofisher malfunctioned, so we only completed one of the random sites and 84 m of the second random site. Fish captured by electrofishing include, 54 Gila Chub, 47 Speckled Dace, 76 Desert Sucker, 94 Sonora Sucker, 33 Gila Topminnow, 1 Longfin Dace, and 3 Fathead Minnow. We also opportunistically performed four electrofishing-kick seines in riffles between the two random transects before the electrofisher malfunctioned, and captured 35 Speckled Dace, 7 Gila Chub, 7 Desert Sucker, 9 Sonora Sucker, and 1 Longfin Dace. In the fixed transect, and other locations upstream of the upper random transect, staff performed 21 kick seines in riffles. In eight kick seines in the fixed site Program staff captured 1 Loach Minnow, 72 Speckled Dace, 8 Longfin Dace, 6 Gila Chub, 10 Desert Sucker, and 5 Sonora Sucker. The Loach Minnow was 50 mm TL, and was captured about 200 m upstream of the socking location.

On November 10, 2015, Program staff stocked 345 Desert Pupfish and 998 Gila Topminnow into the same beaver ponds near the reservation boundary where they were stocked in 2014. Additionally, 11 Desert Pupfish and 7 Gila Topminnow died during the translocation.

Obstacles: More Loach Minnow could have been stocked, but too few were available at ARCC, and were instead to be stocked into the Blue River. In addition, there is disagreement between Department staff and BLM and FWS staff regarding the suitability of habitat between Red Knolls and Midnight Canyon for Loach Minnow or Spikedace.

Comments: Program staff did not participate in BLM's 2016 annual monitoring, which was performed in April. However, BLM staff communicated that they captured two Loach Minnow

at the BLM Midnight Canyon monitoring site. Therefore, at least some of the Loach Minnow stocked during November 2014 have persisted for 1.5 years.

BLM continues to lead efforts to mechanically remove nonnative piscivorous fish from the treated reach. Numbers of Green Sunfish have decreased, but the complex habitat makes eradication by mechanical means unlikely. However, abundance of nonnatives may be controlled with mechanical methods.

Arizona Trout Stream Loach Minnow Repatriations (Task 3-38 and 3-75b).

Description: A suite of native fishes including Apache Trout *Oncorhynchus apache*, Gila Trout *Oncorhynchus gilae* (also present in New Mexico), chubs of the Genus *Gila*, Speckled Dace, Loach Minnow, Spikedace, Desert Sucker and Sonora Sucker occupied various high elevation cold-water streams in the Gila River basin in eastern Arizona. A management strategy for the native trouts was developed incorporating the placement of fish barriers on selected streams, renovation upstream to remove all fishes, and restocking with pure strains of the native trout. However, this approach did not always accommodate repatriation of other native species, which were largely extirpated by earlier human impacts or the combined prior stream management for nonnative trout and subsequent management for native trout. A fully restored native fish community upstream from barriers in these streams would include the native trout plus the native minnows and suckers.

The Department will repatriate native fishes into eastern Arizona streams that are managed for Apache Trout. Priority stream sites are those with suitable habitat, fish barriers planned or in place, and which are occupied by or scheduled for stocking with native trout. Loach Minnow is the priority species to stock, followed by chubs, Speckled Dace, Desert Sucker, and Sonora Sucker. Multiple stockings into each repatriation stream should be performed for at least three consecutive years or until the desired populations are established, and beyond that for genetics management. The Department will also monitor fish after stocking to determine if populations establish.

Status: Ongoing.

Expenditures: None.

Preliminary Results: No work was completed on this task during the reporting period.

Obstacles: Same as previous report. Finding Loach Minnow in the Three Forks area and acquiring Loach Minnow from East Fork White River. Agreement with Apache Sitgreaves National Forest regarding suitable streams to stock Loach Minnow into once we do find and propagate Three Forks Loach Minnow.

Comments: The Department's Conservation and Mitigation Program (CAMP) is tasked with establishing two Loach Minnow populations. They have two stream renovations on schedule with planned post-renovation stockings of Loach Minnow: West Fork Black River and Bear Wallow Creek. However, there may be other opportunities to establish Loach Minnow in the lower reaches of native trout streams. For example, the Department plans to eradicate nonnative

trout from Marijilda Creek in the Pinaleno Mountains and subsequently stock Gila Trout. The lower portion of the stream is low enough in gradient, and has riffles, so may be suitable for Loach Minnow, and is within historical range.

Gila Topminnow Stockings (Task 3-37 and 3-75a).

Description: A primary goal of the Gila Topminnow draft revised recovery plan (Weedman 1999) is to repatriate Gila Topminnow into suitable sites throughout its historical range. Isolated habitats still exist that have the potential for successful repatriation efforts that, with long-term management, will likely allow this species to achieve recovery. The Department will focus on sites identified as suitable for repatriation in the draft revised recovery plan and in the 2003 Gila Topminnow and Desert Pupfish status report (Voeltz and Bettaso 2003). The Department will stock about six, but no less than four, sites with Gila Topminnow each year. Gila Topminnow stocks used will be in accordance with the draft revised recovery plan. Desert Pupfish will be stocked into some of the repatriation sites if habitat is judged suitable.

Status: Ongoing.

Expenditures: Approximately $21,234.

Preliminary Results: Program staff coordinated with appropriate agency, nongovernmental organizations, and private individuals relative to old and new Gila Topminnow repatriation sites. Program staff also entered and analyzed data and drafted reports. Program staff wrote a summary report of all topminnow stocking project activities that were completed during the performance period (Mosher et al. 2016). A map of locations where Gila Topminnow stockings or monitoring occurred is presented in Figure 2.

New stockings. Gila Topminnow were stocked into two new locations during the reporting period. Program staff stocked 501 Gila topminnow (Cienega Creek lineage) into Clyne Pond within Las Cienegas National Conservation Area (LCNCA) on August 19, 2015. Forty-four additional topminnow died during the translocation. Also on August 19, Program, FWS, and USFS staff stocked 510 Gila Topminnow (Cienega Creek lineage) into Sabino Canyon in the upper portion of the recreation area. An additional 16 topminnow died during the translocation. Gila Topminnow for both stockings were acquired from Cienega Creek and Road Canyon Tank on LCNCA.

Augmentation stockings. Gila Topminnow augmentation stockings were completed at three locations during the reporting period. On August 19, 2015 Program staff stocked 612 Gila Topminnow into Nogales Spring. Topminnow were acquired from Road Canyon Tank on LCNCA. This was the third stocking of Gila Topminnow into Nogales Spring. On August 25-26, Program Staff stocked 558 Gila Topminnow into Swimming Pool Tank and 554 into Stop Sign Tank within Robbins Butte Wildlife Area. The topminnow were Sharp Spring lineage and were acquired from Buckhorn Spring, AD Wash, and Arizona State University Animal Care Facility. For these last two stockings, 19 topminnow died during the translocations.

Desert Pupfish augmentation stockings were also completed in three of the ponds on LCNCA ON August 19, 2016. The Desert Pupfish were acquired from Robbins Butte Twin Tank,

No.	WaterName
1	LITTLE JOE SPRING
2	BEN SPRING
3	MURRAY SPRING
4	HORSE THIEF DRAW
5	ROAD CANYON TANK
6	CLYNE POND
7	EMPIRE TANK
8	COTTONWOOD TANK
9	GAUCHO TANK
10	CINCO CANYON TANK
11	SPRING WATER WETLAND
12	CIENGUITA EGRET POND
13	CIENGUITA CRESCENT POND
14	CIENGUITA HEART POND
15	BILL'S WILDLIFE POND
16	LITTLE NOGALES SPRING
17	NOGALAS SPRING
18	SABINO CANYON
19	INTERNATIONAL WILDLIFE MUSEUM
20	PATURE 9 TANK
21	ROBBINS BUTTE-SWIMMING POOL TANK
22	ROBBINS BUTTE-STOP SIGN TANK
23	HORSESHOE RANCH POND
24	HIDDEN WATER SPRING
25	WALNUT SPRING #392
26	SHEEPSHEAD CANYON

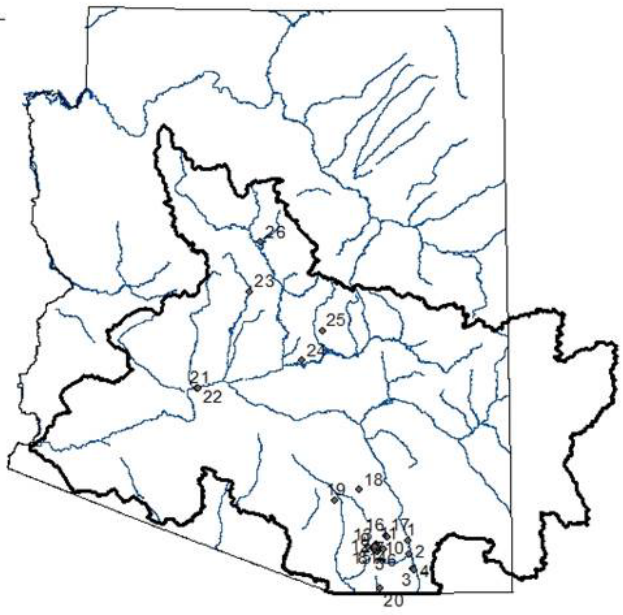

Figure 2. Map showing locations where Gila Topminnow were stocked or monitored during July 2015 through June 2016.

Cottonwood Tank, and TNC's Lower San Pedro River Preserve. Program staff stocked 99 Desert pupfish into Cieneguita Wetland Egret Pond, and 99 Desert pupfish into Cieneguita Wetland Heart Pond. Two additional fish died during the translocation. Program staff also stocked 365 Desert Pupfish into Gaucho Tank on August 19, 2016. The pupfish were acquired from Robbins Butte Twin Tank, Cottonwood Tank, and TNC's Lower San Pedro River Preserve. Four additional fish died during the translocation. Note that this was the first time that the Department stocked Desert Pupfish into Gaucho Tank, and that the species was first reported there during monitoring on July 14, 2015.

Post-stocking monitoring. Several sites previously stocked were monitored during the reporting period. For sites that were planned to be augmented (see section above), monitoring was done before more fish were stocked. When minnow traps (collapsible Promar® or metal cylindrical) were used for monitoring, they were baited with dry dog food (Gravy Train®) and set for at least two hours. Monitoring information during the performance period was previously reported by Mosher et al. (2016), and that information is summarized below in Table 2.

Table 2. Total number and mean catch per unit effort (CPUE) of Gila Topminnow and Desert Pupfish captured in minnow traps (MT) or by dip nets (DN) during post-stocking monitoring at sites within the Gila River Basin during July 2015 through June 2016. Catch per unit effort (CPUE) for minnow traps was calculated as the number of fish/hour; CPUE for DN was calculated as the number of fish/m^2. N represents the number of minnow traps set or dip net sweeps.

				Gila Topminnow		Desert Pupfish	
Site	Date	N	Gear	#	CPUE (±SE)	#	CPUE (±SE)
Las Cienegas NCA							
Empire Tank	7/13/15	10	MT	1533	58.09 (13.83)	153	5.75 (1.98)
Cottonwood Tank	7/13/15	10	MT	-	-	851	28.32 (8.85)
Gaucho Tank	7/14/15	10	MT	1145	44.61 (2.84)	25	0.98 (0.27)
Road Canyon Tank	7/14/15	10	MT	4498	124.66 (21.22)	33	1.03 (0.85)
Cinco Canyon Tank	7/14/15	10	MT	-	-	23	1.09 (0.40)
Cieneguita Wetland – Egret Pond	7/14/15	5	MT	518	26.05 (18.89)	114	10.23 (9.99)
		10	DN	250	154.82 (39.11)	1	0.54 (0.54)
Cieneguita Wetland – Crescent Pond	7/14/15	6	MT	1016	54.91 (26.41)	2	-
Cieneguita Wetland – Heart Pond	7/14/15	7	MT	-	-	31	2.19 (0.83)
Spring Water Wetland	7/14/15	10	MT	1028	43.02 (11.11)	-	-
Little Nogales Spring	7/15/15	6	MT	0	0.00 (0.00)	-	-
Nogales Spring	7/15/15	5	MT	0	0.00 (0.00)	-	-
San Pedro Riparian NCA							
Little Joe Spring	7/13/15	10	MT	-	-	259	13.89 (2.69)
		6	DN	-	-	0	0.00 (0.00)
Murray Spring	7/13/15	10	MT	8	0.27 (0.20)	5	0.26 (0.12)
Horse Thief Draw	7/13/15	4	MT	0	0.00 (0.00)	0	0.00 (0.00)

Obstacles: Stocking of Gila Topminnow and Desert Pupfish into Maternity Pond, Oil Well pond, and Bill's Tank on Las Cienegas National Conservation Area were postponed because BLM staff indicated that improvements (water delivery system, deepening, etc.) to the ponds were not yet complete.

Indian Creek, Sycamore Creek, and Little Sycamore Creek on Prescott National Forest were not stocked because Prescott National Forest still wanted the Department to wait until after ESA section 7 consultations to revise grazing allotments were completed.

Comments: Note that some Gila Topminnow stockings were part of other tasks and are reported under those specific tasks.

Desert Pupfish were first detected in Guacho Pond during monitoring in July 2015. It is possible that desert pupfish (and Gila Topminnow) were unintentionally introduced in 2014 when aquatic vegetation was translocated into the pond to benefit Chiricahua leopard frog reintroduction.

During the next reporting period we hope to stock Gila Topminnow into at least six new sites: Indian Creek, Sycamore Creek, and Little Sycamore Creek in Prescott National Forest; Walker Creek in Coconino National Forest; Hidden Water Spring and possibly Cottonwood Creek on Tonto National Forest; and several new sites at Las Cienegas NCA (Maternity Well Pond, Oil Well Pond, Bill's Tank). The portions of Indian Creek, Little Sycamore Creek and Sycamore Creek identified to receive Gila Topminnow are currently occupied and managed for Gila Chub. Additional Section 7 consultation for ongoing grazing activities at these locations should be relatively straightforward. An EA and BO have been completed for the additional sites on Las Cienegas NCA, and Program staff also completed internal environmental compliance for any future stocking activities within the NCA.

Arnett Creek Repatriations (Task 3-41 and 3-75d).

Description: Arnett Creek and its tributary Telegraph Canyon are on the Tonto National Forest in Pinal County near Superior, Arizona. Arnett Creek has been the subject of efforts to repatriate native fishes since the 1990's when a barrier and chemical renovation were completed. In February of 1999, 23 Longfin Dace, 13 Desert Sucker, and one Sonora Sucker from the Gila River were stocked into the creek above the barrier. These fish did not establish, likely because too few were stocked, and they were stocked into what turned out to be an ephemeral reach. During the drought of the late-1990s through mid-2000s, much of the system dried leaving only about 100 m of wetted habitat in each stream. Also, the habitat in Telegraph Canyon and Arnett Creek was re-evaluated by Department and USFS staff in 2007 and deemed suitable only for Longfin Dace and Gila Topminnow. The Department was to obtain stocks of the species and transport and stock those fish into Arnett Creek and Telegraph Canyon. The Department stocked longfin Dace into Arnett Creek and Telegraph Canyon in July 2007, and they still persisted in 2016. The Department has coordinated with FWS and Tonto National Forest regarding stocking of Gila Topminnow, and will do so after all planning and any necessary compliance is completed. Choice of lineage of Gila Topminnow will be based on the draft revised recovery plan (Weedman 1999).

Status: Ongoing.

Expenditures: $3,539.

Preliminary Results: Program staff coordinated with Tonto National Forest and FWS staff and reached consensus to move forward with the project. Program staff visited Arnett Creek and Telegraph Canyon on July 22, 2015, and confirmed that Longfin Dace were still present in the streams. On September 23, 2015 Program staff surveyed a short (about 200 m) perennial section of Arnett Creek just upstream of a private parcel and adjacent to Highway 177; Tonto NF staff had suggested that Green Sunfish could be in this section. Program staff found that water in this section was very shallow (the two deepest areas were only 0.2 m deep), and did not observe any fish. On October 28, 2015 Program, FWS, and Tonto NF staff visited Arnett Creek and Telegraph Canyon to discuss stocking of Gila Topminnow into the two streams. During the first half of 2016, program staff coordinated with FWS and Tonto NF about fish stocking, fencing,

and invasive plant removal, and reviewed and commented on the draft Biological Assessment and Evaluation and the draft Biological Opinion.

Obstacles: The ESA Section 7 consultation process for ongoing livestock grazing may take longer than expected, so it is unclear if it will be completed by early November 2016. If the process is complete before early November, then Gila Topminnow will be stocked into Arnett Creek. If not, then the stocking will be postponed until 2017.

Removal of the invasive oleander from Telegraph Canyon may delay the stocking of Gila topminnow in that stream until after the application of herbicides.

Comments: At long last, the cooperating agencies are again moving forward with this project. Gila Topminnow should be stocked during the next rating period.

Spring Creek (Oak Creek Drainage) Repatriations (Task 3-111a)

Description: Spring Creek is a tributary to Oak Creek within the Verde River drainage, about 10 km northeast of Cottonwood, Arizona. The terminal 5.5 km of Spring Creek is perennial, and is the project area. Land in the project area is owned by USFS (Coconino National Forest-Redrock District) and private individuals. Spring Creek contains designated critical habitat for Gila Chub and Northern Mexican Gartersnake *Thamnophis eques*. Aquatic species reported from Spring Creek include Gila Chub, Speckled Dace, Longfin Dace, Sonora Sucker, Desert Sucker, Northern Mexican Gartersnake, Lowland Leopard Frog, and nonnative Green Sunfish, Smallmouth Bass *Micropterus dolomieu*, and Northern Crayfish. However, Oak Creek contains numerous nonnative fishes including Channel Catfish *Ictalurus punctatus*, Green Sunfish, Rainbow Trout, Brown Trout, Largemouth Bass *Micropterus salmoides*, Smallmouth Bass, and Rock Bass *Ambloplites rupestris*. A small 0.5 m-high concrete diversion about 1 km upstream of Oak Creek was somewhat of a barrier at preventing most of the nonnatives from moving into upper Spring Creek, but Green Sunfish were detected upstream in 2015.

Goals of the Spring Creek native aquatic species restoration project included construction of a fish barrier to protect upstream native fish populations, control or eradication of Green Sunfish, and establishment of Spikedace, Gila Topminnow, and possibly Loach Minnow. Green Sunfish removal began in 2014. Barrier construction was completed during spring 2015. The Department was tasked with continued mechanical removal of Green Sunfish, stocking the identified native species, post-stocking monitoring, and reporting. Lineages of fish will be selected based on recommendations from recovery plans or teams, or personnel from FWS, Department, Reclamation, and other cooperating agencies. Multiple stockings will likely be performed at annual or shorter intervals, or until the desired populations are established, with subsequent augmentations for genetics management. Populations will be monitored for at least three years following the last stocking event to evaluate if the species have established populations.

Status: Ongoing

Expenditures: Approximately $8,494.

Preliminary Results: On August 12th, 2015, Program staff stocked 672 Gila Topminnow into Spring Creek about 100 m above Willow Point Road. No fish died during the translocation, and fish behaved normally upon release. Gila Topminnow were of the Lower Santa Cruz-Peck Canyon lineage and were acquired from the Phoenix Zoo.

On September 17, 2015 Program staff conducted the first post-stocking monitoring in Spring Creek. Three 100-m transects were electrofished. Within the upper section of Coconino NF property, staff sampled a fixed transect encompassing the stocking location upstream of Willow Point Road, and a randomly selected transect. Within the lower section of Coconino NF, program staff sampled one randomly selected transect. Four Spikedace and four Gila Topminnow were captured; three of each species in the fixed site and one of each species in the upper random site. Other species captured included 178 Speckled Dace, 127 Gila Chub, 30 Desert Sucker, 23 Longfin Dace, and 4 Northern Crayfish.

Obstacles: Much of the stream is on private land, and coordination for access to survey for fish or remove Green Sunfish has been good with the exception of one landowner that owns the section of private property between the two Coconino FS sections. That landowner has not returned phone calls or emails, so Department staff has not been able to gain access or survey that parcel.

Comments: Spikedace were stocked on May 11, 2015, and were reported in last year's annual report.

The Department's Region II CAMP personnel are continuing nonnative Green Sunfish removal in Spring Creek; Program staff assist when opportunities are available. In June 2015, Region II CAMP staff electrofished both USFS portions of Spring Creek and did not capture any Green Sunfish upstream of the new barrier, but did capture one below (between the diversion dam and the new barrier). They also captured 25 Spikedace in the upper USFS section, but that was only one month after stocking. During March 23-24, 2016 they electrofished both Forest sections and captured one Spikedace in the lower Forest section, and 14 Gila Topminnow in the upper Forest section (AZGFD 2016). They also captured 309 Speckled Dace, 157 Gila Chub, 104 Desert Sucker, 25 Longfin Dace, and one Green Sunfish, the latter of which was captured downstream of the fish barrier.

Mineral Creek Drainage Renovation and Repatriations (Task 3-78a).

Description: Mineral Creek is a tributary to the Gila River in Pinal County, Arizona on the southwestern edge of the Pinal Mountains. Mineral Creek is impounded by Big Box Dam upstream of ASARCO Ray Mine. Fish species reported from Mineral Creek include native Gila Chub, Longfin Dace, and Desert Sucker, and nonnative Green Sunfish, Fathead Minnow *Pimephales promelas,* Western Mosquitofish *Gambusia affinis,* and Black Bullhead *Ictalurus melas*. Devils Canyon is a tributary to Mineral Creek immediately above Big Box Dam, and fish species reported there were Green Sunfish and Fathead Minnow. Gila Chub were first detected in Mineral Creek in 1993, and the last time they were detected was 2000. No fish were detected in the upper portion of the stream (upstream of Box Dam reservoir) during two surveys in 2002 and one in 2006. The reasons for the apparent disappearance of the fish are undetermined. After

the survey in 2006, the Department stocked longfin dace into upper Mineral Creek downstream of Government Springs Ranch to augment or re-establish the species.

The Department was tasked to complete its internal EAC, acquire suitable stocks to serve as sources for the repatriations, and stock Gila Chub and Longfin Dace to Mineral Creek. Opportunity for repatriation of additional native species such as Loach Minnow, Gila Topminnow, Desert Pupfish, Spikedace, Desert Sucker, Sonora Sucker, and Speckled Dace should be pursued as appropriate. In addition, the Department will attempt to eradicate nonnative fish species from the Devils Canyon drainage upstream of five falls, and if feasible and if cooperation with other agencies is gained, remove nonnative fish from Big Box Dam reservoir and the short reaches of Devils Canyon and Mineral Creek upstream to the first waterfall in each. After eradication of nonnative fish, native fish species will be stocked, with preference given to Gila Chub and Gila topminnow, but other species mentioned for upper Mineral Creek will also be considered.

Status: Ongoing.

Expenditures: None.

Preliminary Results: No work was completed on this task during the reporting period.

Obstacles: The State Land Department, under the direction of its last Commissioner in 2014, refused to allow the Department to perform any species translocations onto state land. Other stakeholders have also been hesitant to fully support the Mineral Creek project: Government Springs Ranch and ASARCO Ray Mine. The Department Executive staff is coordinating with the new State Land Department commissioner with regard to wildlife releases on state land.

Comments: Program staff is waiting on Department executive staff to finish discussions with State Land Department to determine whether or not the project can move forward. If approval is gained, then Program staff will complete the Department's EAC and stock the appropriate lineage of Gila Chub. If Gila Chub establish (will take several years to determine) and become dispersed throughout the perennial section, then consideration should be given to repatriation of Loach Minnow, Gila Topminnow, and possibly Spikedace.

Blue River Native Fish Restoration (Task 3-42 and 3-75e).

Description: The Blue River drainage in Arizona and New Mexico is occupied by Loach Minnow, Speckled Dace, Longfin Dace, Desert Sucker, and Sonora Sucker. The connectedness, size, and complexity of the system suggests that other species such as Spikedace, Gila Chub, Roundtail Chub, Gila Trout, Gila Topminnow also possibly occurred in Blue River but were extirpated by the same factors that eliminated them from many other habitats in the Gila River basin. Several fish barriers are planned for the drainage that will assist these efforts. Wild fish from nearby sites are available to support such stockings, which are a high priority for species recovery.

The Blue River Native Fish Restoration Project is being implemented by Reclamation, the Department, USFS, and USFWS with the goals to protect and restore the entire assemblage of

native fishes within the Blue River drainage and benefit their conservation status within the Gila River Basin (Reclamation 2010). The major components of the project are construction of a fish barrier, mechanical removal of non-native fishes, and repatriation and monitoring of federally listed warm-water fishes in the Blue River. Reclamation constructed a fish barrier in 2012 about 1 km upstream from the confluence with the San Francisco River.

The Department was to repatriate Roundtail Chub and Spikedace, and other species as appropriate, into the lower Blue River, control or eradicate nonnative piscivorous fishes from the lower Blue River, and monitor to evaluate the success of the repatriations and control efforts. Lineages and source populations will be those recommended by recovery or multi-agency conservation teams or plans. Multiple stockings will likely be performed at annual or shorter intervals, or until the desired populations are established, with subsequent augmentations for genetics management. Populations will be monitored for at least three years following the last stocking event to evaluate if the species have established populations.

In the results described below, the six reaches in the lower Blue River were: 1 = Barrier to Pat Mesa, 2 = Pat Mesa to Cienega Creek, 3 = Cienega Creek to Mud Springs, 4 = Mud Springs to Juan Miller Rd, 5 = Juan Miller Rd to Fritz Canyon, and 6 = Fritz Canyon to Fritz Ranch.

Status: ongoing.

Expenditures: Approximately $21,234.

Preliminary Results: Program staff analyzed data and drafted a report summarizing monitoring activities during 2015 (Robinson and Love-Chezem 2016) and submitted the draft to the Arizona members of the GRBNFCP Technical Committee. Below is a brief synopsis of the activities that occurred within the reporting period. Activities are reported by date, and then at the end of the Results section, a brief discussion of trends is reported.

Annual monitoring, which consisted of electrofishing 12 200-m transects and setting 24 hoop nets, was completed during September 28-30, 2015. During electrofishing, Program staff captured 194 Sonora Sucker, 117 Speckled Dace, 92 Desert Sucker, 77 Longfin Dace, 27 Spikedace, 14 Roundtail Chub, 10 Loach Minnow, 9 Fathead Minnow, and 9 Northern Crayfish. The hoop nets captured 89 Roundtail Chub, 39 Sonora Sucker, 37 Desert Sucker, 20 Longfin Dace, 4 Spikedace, 2 Fathead Minnow, 1 Speckled Dace, and 26 Northern Crayfish. No Green Sunfish were captured during annual monitoring.

Length frequency analysis of Spikedace, Loach Minnow, and Roundtail Chub captured during monitoring indicates that all three species reproduced. Of the 31 Spikedace captured, four (13%) were < 40 mm TL. Two of the 10 loach minnow captured were ≤ 40 mm TL. Of the 103 Roundtail Chub captured, six (6%) were less than 100 mm TL.

During October 13-14, 2015, Program staff surveyed for Loach Minnow between Fritz Ranch and HU Bar Box. Staff electrofished 13 100-m transects, spaced 1 km apart, and captured three Loach Minnow (all > 60 mm TL): one just upstream of Horse Canyon, a second just downstream of Little Blue Creek, and the third near HU Bar cabin. Other species captured included 1,438

Longfin Dace, 990 Speckled Dace, 641 Desert Sucker, 169 Sonora Sucker, 4 Fathead Minnow, and 12 Northern Crayfish. No Green Sunfish were captured.

On December 22, 2015, staff from ARCC stocked 296 spikedace into the pool near the USGS stream flow gage downstream of Juan Miller crossing. Fish behaved normally upon release, and there were no mortalities.

Program and Department staff performed the annual snorkeling to remove large piscivores and hoop netting to remove Green Sunfish during June 20 – 21, 2016. For snorkeling, 108 locations between the fish barrier and Fritz Ranch were visited. The four lowermost pools were dry, seven locations that were previously pools were filled in with sediment and were shallow and no observations were recorded, and 28 locations were clear enough and shallow enough to observe fish from shore so were not snorkeled through. The remaining 69 pools were snorkeled through. No catfish were observed. One Green Sunfish was observed in Pool 58 in Reach 4. Staff were unable to capture the Green Sunfish. About 2,580 Spikedace and 847 Roundtail Chub were observed; numbers of these species were estimated. The presence of other species was recorded and included Speckled Dace, Longfin Dace, Desert Sucker, Sonora Sucker, and Northern Crayfish.

For the Green Sunfish removal, five hoop nets and five Promar® mini-hoop nets were set in Reach 1 in pools 009 thru 013, 015, 018, 102, 151, and an unrecorded location. One Green Sunfish (245 mm TL) was captured in Pool 012. Other species captured include 56 Spikedace, 50 Sonora Sucker, 21 Desert Sucker, 11 Roundtail Chub, 17 Fathead Minnow, 119 Northern Crayfish, and 1 Sonora Mud Turtle.

During the same June 20-21, 2016 trip, Department staff collected fin clips from 20 Spikedace for genetic analysis. Department staff seined two pools in Reach 3 and captured 8 Spikedace in Pool 300 and 88 in Pool 65.

Trends: The number of Channel Catfish captured during annual removal efforts (snorkeling-spear fishing) has decreased and none have been captured or observed for the last three years: 70 were removed in 2009, 7 in 2012, 3 in 2013, 0 in 2014, 0 in 2015, and 0 in 2016. The amount of effort was similar among years: all pools between Fritz Ranch and the constructed fish barrier were visited and snorkeled through unless they lacked sufficient water. Therefore, Channel Catfish are either eradicated or extremely rare.

Green Sunfish abundance appears to have decreased since November 2012. Green Sunfish were first detected in the Blue River in June 2012, when one individual was captured in Reach 1. During annual monitoring from 2012 through 2015, numbers of Green Sunfish captured has decreased: 106 in 2012, 6 in 2013, five in 2014, and 0 in 2015; each year 12 transects were electrofished and 24 hoop nets set. Also, observations of Green Sunfish during the annual large-bodied piscivore removal efforts (snorkeling and spear fishing) indicate that abundance decreased: 37 were observed in 2013, 8 in 2014, 7 in 2015, and 1 in 2016. Also, during the annual Green Sunfish removal efforts (trapping), 10 individuals were removed in 2014, 9 in 2015, and 1 in 2016. Therefore, it appears that our removal efforts, combined with natural

flooding events, have resulted in a reduction of the Green Sunfish population in the lower Blue River.

Spikedace appear to have established a population in the lower Blue River. In June 2012, 539 spikedace were stocked. During annual monitoring, 16 Spikedace were detected in 2012, 6 in 2013, 13 in 2014, and 31 in 2015. Percent of spikedace captured that were ≤ 45 mm TL (putative young-of-year) was 0% in 2013, 54% in 2014, and 31% in 2015, so the species obviously reproduced each year. Also, an estimated 927 Spikedace were observed during annual snorkeling in 2015, and an estimated 2,580 were observed during 2016. Also during June 2016, 96 were seined in just three hauls, in an effort to collect fin clips.

Roundtail Chub also appear to have established a population in the lower Blue River. In June 2012, the Department stocked 222 Roundtail Chub. During annual monitoring, 44 Roundtail Chub were detected in 2012, 3 in 2013, 48 in 2014, and 103 in 2015. Percent of chub captured during annual monitoring that were ≤ 100 mm TL was 0% in 2013, 98% in 2014, and 46% in 2015, so they apparently reproduced. In addition, during the piscivore removal efforts (snorkeling), over 700 Roundtail Chub were observed in 2015 and 847 were observed in 2016. However, the high numbers of Roundtail Chub observed in June 2015 were undoubtedly related to the fact that ARCC stocked 876 on April 30, 2015; about half were age-3 and half age-2.

Obstacles: The Program was short-staffed for field activities during the reporting period, but it was able to recruit personnel for the activities.

Comments: We are cautiously optimistic that our nonnative fish control efforts are working, and that Roundtail Chub and Spikedace have established populations.

Miscellaneous Stock Tank Surveys (Task 4-51).

Description: All stock tanks within stream systems that have been or are planned to be protected against upstream invasions of nonnative fishes by emplacement of low-head fish barriers need to be surveyed because they may be sources of nonnative fishes into the streams. It is important to identify locations with nonnative fish so that they can be eliminated, and thus help secure the drainages for native fish recovery. The Department was provided funds to locate stock tanks in these drainages, determine which tanks are perennial, and then conduct fish and amphibian surveys of the perennial tanks using appropriate gear. A report detailing all methods and results will be provided which will include the list of tanks recommended for removal of nonnative aquatic vertebrates.

Status: Ongoing.

Expenditures: Approximately $1,416.

Preliminary Results: On February 22, 2016 program staff visited Cooks Mesa Tank #1, which is in the Grapevine Canyon drainage, of the New River watershed. The tank was about 1 foot deep at the time of the survey and staff estimated that it would dry in the summer so did not sample by seining. No fish were observed. The tank was assessed to ensure no nonnative fish were

upstream of the potential Gila Topminnow and Gila Chub establishment site in Grapevine Canyon.

Obstacles: None.

Comments: No other tanks were investigated during the rating period.

Assess Potential Repatriation Waters (Task 3-84c).

Description: As conservation or control projects under the Department's portion of the GRBNFCP are finished, new projects must be added to implement actions that will help recover the five endangered fish species identified in the GRBNFCP Strategic Plan: Gila Topminnow, Gila Chub, Spikedace, Loach Minnow, and Razorback Sucker. The Department was provided funds to evaluate new or previously identified sites that might be suitable for conservation and recovery efforts for the five species. The Department will coordinate with federal and state agencies and private land owners and evaluate waters if given access. If necessary, sites deemed suitable for conservation efforts will have project descriptions written and submitted to the CAP technical committee for approval. Project descriptions will not be written for projects that are only targeted at Gila Topminnow repatriations, because these will simply be added to the Gila Topminnow stocking task (3-75).

Status: Ongoing.

Expenditures: Approximately $10,617.

Preliminary Results: Program staff visited Grapevine Canyon, tributary to New River on Tonto National Forest, on February 22, 2016 to assess suitability for Gila Chub and Gila Topminnow. There appeared to be about 530 m of perennial habitat, beginning about 580 m upstream of the confluence with New River; however, flows are likely reduced during summer. Within the perennial reach, there were 26 pools, 8 cascades, and 4 runs. Substrate was primarily bedrock mixed with cobble and boulder. Pools comprised the majority of the habitat surveyed (50%), followed by cascades (42%), and runs (8%). The largest pool detected was located at the top of the perennial reach and is roughly 7m x 8m with a depth of 2 m. Program staff determined that there is suitable habitat for Gila Chub and topminnow; however, pools are typically isolated from one another by bedrock/boulder falls, which could potentially restrict movement of these species between pools.

On March 7, 2016, Program staff assessed habitat for Gila Topminnow, Gila Chub, and Loach Minnow in Tortilla Creek, tributary to Canyon Lake in Tonto National Forest, from the confluence with Mesquite Creek to about 4.8 km upstream. Surface flows were present throughout the survey reach; however, the majority of the reach likely goes dry during summer. About 4.25 km upstream from the confluence with Mesquite Creek is a 370 m reach that appeared to be perennial. Within the perennial reach, there were 7 pools, 6 runs, and 2 cascades. Substrate was primarily bedrock and gravel/sand. Run habitat likely turns marshy during dryer months and cattails and common reed were present within the streambed. The largest pool was roughly 10 m x 10 m with a max depth of 3 m; there was also a long, channel-like pool that measured 20 m x 0.5 m with a max depth of 0.9 m. About 30 Fathead Minnow were observed

within the perennial reach – these were the only fish seen during the survey. One Sonora Mud Turtle was detected 0.6 km upstream the confluence of Mesquite Creek. Staff determined that there is suitable habitat for Gila topminnow, and possibly Gila Chub, depending upon the extent of the perennial water during dryer months. Staff did not detect suitable habitat for loach minnow within Tortilla Creek.

On March 14-15, 2016, Program staff assessed habitat for Gila Topminnow and Gila Chub in South Fork Sheep Creek, tributary to Sheep Creek which flows into the Verde River just upstream from Bartlett Reservoir on Tonto National Forest. They assessed habitat below the Tournament Canyon confluence to about 1.7 miles downstream. Surface flows were present throughout most of the survey reach; however, the entire reach likely goes dry during summer except for a few small pools towards the top of the reach. Traps were set in these perennial pools; however, no fish were captured. Furthermore, no fish were observed during the survey. We also did not detect any natural barriers that would prevent upstream movement of fish. Canyon tree frogs were abundant throughout the survey reach and one Gila monster and one Black-necked Gartersnake were detected. Although not the focus of the survey, upper South Fork Sheep Creek below Upper Sheep Creek Spring at 1,322 m elevation appears to have perennial pools that may be suitable for Gila Topminnow and Gila Chub depending upon shade, and the extent of the perennial water during dry periods.

On April 5, 2016 Program staff visited Walker Creek, tributary to Wet Beaver Creek on Coconino National Forest, to assess suitability of habitat for Gila topminnow and to discuss the possibility of stocking Gila Topminnow with the owner of a ranch. The portion of the stream upstream of the ranch is on Coconino National Forest, is occupied by Gila Chub, and was deemed suitable for Gila Topminnow. Staff talked to the landowner about the possibility of enrolling the ranch under the Topminnows and Pupfish Safe Harbor Agreement. The landowner was open to the idea, and staff began drafting a Certificate of Inclusion.

Obstacles: None.

Comments: Most of the site evaluations were completed during winter or early spring, before our normal stocking and monitoring season. If habitat appears perennial and suitable, the site is visited again during the driest time of year (May through early July) to determine if the water is indeed perennial and the extent of suitable habitat.

Aquatic Research and Conservation Center O&M (Task 3-86).

Description: The Department's Aquatic Research and Conservation Center's (ARCC; formerly Bubbling Ponds Native Fish Conservation Facility) main purpose is to acquire and hold samples of rare populations of Loach Minnow, Spikedace, and other native fishes of concern for maintenance and propagation. Reclamation funded the construction of the facility, and is funding an improvement to the facility in 2015-2019. Annual funding is provided to the Department to support facility operations and for one half-time manager and one half-time culturist to clean tanks, feed fish, and propagate and maintain brood stock and progeny.

Status: Ongoing.

Expenditures: O&M: approximately $75,655.
Improvements: approximately $329,842.

Preliminary Results:
ARCC continues to maintain three lineages of Spikedace, four lineages of Loach Minnow, one lineage of Desert Pupfish, and one lineage each of Roundtail Chub, Woundfin, and Gila Topminow. The number of offspring produced and available for stocking during the performance period was low (Table 3): about 100 Spikedace, 418 Blue River Loach Minnow, 138 Gila Forks Loach Minnow, 274 Aravaipa Creek Loach Minnow, ~75 San Francisco River Loach Minnow, 1,194 Roundtail Chub, and less than 10 Desert Pupfish. Two major O&M changes this year: 1) we dramatically increased the amount of nutrient-fortified frozen blood worms fed to spawning brood stocks over winter and during spawning and 2) we spawned spikedace in circular cage tanks to accommodate construction. Spikedace did not spawn well in circular tanks (as expected; raceway spawning will resume in 2017), but loach minnow spawned better than many years past.

During August 2015 there was a massive die-off of Aravaipa lineage of Spikedace broodstock; about 70 fish remain. At the time of the die-off they also had about 35 of 2014 offspring, and about 75 F1s from 2013 to be added to the brood stock. The Department's fish pathologist conducted autopsies and detected pathogenic bacteria (*Flexibacter columnare*) that can cause rapid die offs, and fungal pathogens. The die-off was likely caused by a variety of factors.

On November 14, 2015, Program staff salvaged 110 Desert Pupfish and 87 Gila Chub from the ponds at International Wildlife Museum in Tucson and transported them to ARCC where they were held until the end of the reporting period.

Table 3. Summary of number of broodstock (top) and number of offspring produced (bottom in italics) for each species and lineage held at the Aquatic Research and Conservation Center, from 2007 through 2016.

Taxa	Extant Lineage/Stream	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Spikedace	upper Gila River, NM	640							380	392	531
			(740)	*(165)*	*(2555)*						
	Gila River Forks			17	267				250	204	138
		NA	*NA*	*(0)*	*(379)*		*(287)*	*(477)*	*(XXX)*		*(0)*
	Aravaipa Creek & tribs								480	412	262
		(100)	*(1650)*	*(410)*	*(5993)*				*(200)*		*(120)*
Loach Minnow	upper Gila River, NM	143							NA	NA	NA
	Gila River Forks								57	81	96
		NA	*NA*	*(0)*	*(0)*				*(250)*		*(220)*
	San Francisco River, NM & tribs								27	119	215
		NA	*NA*	*NA*					*(500)*		*(26)*
	Blue River & tribs	71							180	245	214
			(670)	*(22)*	*(164)*				*(500)*		*(426)*
	Aravaipa Creek & tribs	254							340	316	297
		(1004)	*(3250)*	*(274)*	*(1623)*				*(0)*		*(265)*
Roundtail chub	Eagle Creek								85	85	101
									(1500)	*(XXX)*	*(0)*

On December 22, 2015 ARCC staff stocked 296 spikedace (Gila River lineage) into the Blue River near Juan Miller Crossing. No fish died during the translocation.

ARCC improvements during the performance period included construction of a new sump for collecting and screening all effluent, construction of a new cage with concrete trough (tank installation continues), re-routing of the main hatchery power line, and construction of new plumbing to accommodate future construction plans. Twenty new 15' long raceways and sumps will be installed before the 2017 spawning season.

Obstacles: A variety of obstacles resulted in low numbers of individuals in refuge populations and low numbers of offspring produced. Die-offs of fish as a result of pathogen infestations, resulted in few fish available for stocking. The extant lineages of Spikedace and Loach Minnow are rare, which makes it difficult to collect sufficient numbers of fish from the extant populations to maintain refuge populations and broodstock at ARCC. Existing tank systems are not sufficient to hold over 500 individuals for broodstock and their offspring, of all targeted lineages. Staff is only partly funded by CAP, and so has to devote time to non-CAP projects.

Comments: The facility continues to maintain populations of Spikedace (Aravaipa, Gila River, and Gila Forks lineages), Loach Minnow (Aravaipa, Blue River, San Francisco, and Gila Forks lineages), Woundfin, Roundtail Chub (Eagle Creek and Little Colorado River lineages), Desert Pupfish (Santa Clara Sough lineage) and Gila Topminnow (Cottonwood Springs).

Transfer Gila Chub and Gila Topminnow to New Mexico

Description: In 2007 there was only one known population of Gila Chub, and no populations of Gila Topminnow, in New Mexico. Stocking Gila Chub and Gila Topminnow within historical range are recovery actions. New Mexico Game and Fish Department (NMGFD) requested the Department provide them with Gila Chub and Gila Topminnow for stocking into several locations in New Mexico. Locations included Burro Cienega, a fishless stream that drains south out of the Big Burro Mountains into a closed basin near Lordsburg; TNC Gila River Farm near Cliff; Redrock Wildlife Area north of Lordsburg; and Mule Creek a tributary to the San Francisco River near the Arizona border. The Department agreed to provide New Mexico with Gila Chub and Gila Topminnow after completing the necessary compliance. Funding was provided to the Department to complete the necessary compliance, collect the fish, prophylactically treat them to remove parasites if necessary, and then transfer them to NMGFD.

Status: Ongoing

Expenditures: None.

Preliminary Results: No work was done on this project because New Mexico Department of Game and Fish (NMDGF) staff found Smallmouth Bass, Green Sunfish, and Black Bullhead in Mule Creek on February 23, 2016. Therefore, they postponed plans for additional Gila Chub stockings until after the nonnative fish could be removed.

Obstacles: The invasion of nonnative fish.

Comments: Once NMDGF eradicates the nonnative fish, then more Gila Chub can be stocked. The NMDGF previously committed to at least one more stocking of Gila Chub, with a goal of having a founder population (total number stocked across all stockings) of at least 500 individuals. Gila Chub have now been stocked three times into Mule Creek (118 in June 2012, 119 in November 2013, and 60 in October 2014).

Fish Health Assessments of Translocation Populations (Task 3-130).

Description: The translocation and stocking of native fishes is one the Department's main roles in implementing the GRBNFCP. However, any time a translocation is done, there is an inherent risk in transporting unwanted parasites or pathogens into the repatriation site which then could negatively affect the fish or amphibian assemblage. The Department ensures that fish health assessments are performed on both donor sites and recipient sites so that unwanted parasites and pathogens are not transported into locations where they do not already exist. At a minimum, fish health assessments are needed every three years (although annually is preferable) to have reasonable confidence that a specific site is free of any parasites or pathogens of concern.

The Department was tasked to develop a list of sites where fish stockings are planned for the year, and a list of donor sites from which to collect the fish for translocation. The Department will coordinate with the landowners and its Fish Health Lab as necessary. The Department will collect samples and submit them to the appropriate fish health lab for analysis. The Department will use funds supplied through its cooperative agreement to pay for the fish health assessments. Results will be reported to the GRBNFCP as they become available.

Status: Ongoing

Expenditures: Approximately $7,028.

Preliminary Results:

On October 11, 2015, Program staff collected 60 Lognfin Dace from Sonoita Creek and delivered them to the Department's Fish Pathology lab in Phoenix. The Department's fish pathologist examined the fish for parasites and bacteriology and did not detect any. Samples were sent to Washington Aquatic Disease Diagnostic Laboratory (WADDL) for viral analysis; and no viruses of concern were detected. This health assessment was done in preparation of translocating desert sucker and Speckled Dace from Sonoita Creek to Sabino Canyon.

On October 28, 2015 Program staff collected 60 Gila Chub from Bass Canyon, tributary to Hot Springs Canyon, and delivered them to the Department's Fish Pathology lab in Phoenix. The Department's fish pathologist examined the fish for parasites and bacteriology and did not detect any. Samples were sent to WADDL for viral analysis; and no viruses of concern were detected. This health assessment was done in preparation of translocating Gila Chub from Bass Canyon to Mineral Creek.

On May 31, 2016, program staff collected 60 Longfin Dace from Hidden Water Spring and delivered them to the Department's Fish Health Lab. The fish were examined and no parasites,

bacteria or viruses of concern were detected. The assessment was done in preparation of translocating Gila Topminnow into Hidden Water Spring and translocating longfin dace from Hidden Water Spring to Rock Creek in Three Bar Wildlife Area.

On June 30, 2016, Program staff collected 60 Gila Topminnow from Walnut Spring (site #392) on Tonto National Forest northeast of Punkin Center, and delivered them to the Department's Fish Health Lab. The fish health assessment was completed and will be reported during the next performance period.

Obstacles: None.

Comments: The Department hired a new Fish Health Specialist in 2015, and in 2016 completed building and out-fitting a laboratory for fish health assessments. All assessments will now be done by the Department's Fish Health Specialist which will save time and costs, and alleviate the need to coordinate assessments with Southwestern Native Aquatic Resources and Conservation Center (SNARCC) or WADDL.

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APPENDIX 1. POPULATIONS OF THREATENED AND ENDANGERED SPECIES ESTABLISHED UNDER THE GILA RIVER BASIN NATIVE FISHES CONSERVATION PROGRAM

Appendix 1. Populations of threatened and endangered species tentatively considered established under the Gila River Basin Native Fishes Conservation Program, as of June 30, 2016. Gila Topminnow and Desert Pupfish site numbers are given where known. Established means the populations are reproducing to the point that they are self-sustaining. Topminnow and pupfish begin reproducing during their first year of life, so populations that have increased in numbers and continue to persist for three years after the final stocking can probably be considered established. However, a longer time-frame is necessary for the other species because they do not begin reproduction until age-1 or age-2. Spikedace, Loach Minnow, and Longfin Dace can probably be considered established if there is evidence of reproduction and increase in population over three years after the final stocking. For chub it is probably necessary to monitor for 4-5 years after the final stocking before a relatively confident assessment of establishment can be made. The population size was estimated based catch during the most recent monitoring and size of stream or pond.

Species	Metapopulation	Lineage	Replicated Locations	Year replicated	Population Size
Gila Topminnow	Bylas Spring Complex	Bylas Spring	Swamp Spring (#406; Muleshoe Ranch CMA)	2007-2008	1000-5000
			Redfield Canyon (#211; Muleshoe Ranch CMA)	~2009	1000-5000
			Secret Spring (#331, Muleshoe Ranch CMA)	2007	1000-5000
			Headquarters Spring (#407; Muleshoe Ranch CMA)	2008	500-1000
			Burro Cienega, NM	2008	1000-5000
			TNC Lower San Pedro Preserve's west pond	2006	5000-10000
			Howard Well (#83)	2008	1000-5000
			Bonita Creek (#414)	2010	10000-15000
			Kei Sundt pond (#XXX)	2012	500-1000
	Upper Santa Cruz	Sharp Spring	Fossil Creek (#280)	2007-2010	5000-10000
			Morgan City Wash (#383)	2009	500-1000
			Chalky Spring (#310)	2009	0-100
			Page Springs Hatchery SRP Topminnow Pond (#158)	2009	5000-10000
			Buckhorn Spring (#298)	2011	1000-5000
			San Rafael Cattle Company Pasture #2 Pond	2012	500-1000
	Lower Santa Cruz	Peck Canyon	Rock Spring (#243)	2013	250-500
			Phoenix Zoo Ranarium (#119)	2012	1000-5000
	Monkey&Cottonwood Spr	Monkey Spring	Cottonwood Spring (#415; Goldfield Mountains)	2008	250-500
			Usery Mountain Regional Park Pond (#233)	2011	500-1000
	Redrock Canyon	Redrock Canyon	Walnut Spring (#392)	2012	500-1000
	Cienega Creek	Cienega Creek	Road Canyon Tank (#420; Las Cienegas NCA)	2012	1000-5000

			Spring Water Wetland (#XXX; Las Cienegas NCA)	2013	5000-10000
			Empire Tank (#XXX; Las Cienegas NCA)	2013	1000-5000
			Egret Pond (#XXX; Las Cienegas NCA)	2013	1000-5000
			Crescent Pond (#XXX; Las Cienegas NCA)	2013	1000-5000
Desert Pupfish	Santa Clara/El Doctor		Secret Spring (#XXX; Muleshoe Ranch CMA)	2007-2011	100-250
			Howard Well (#83)	2008-2009	100-250
			Larry & Charlie Tank (#408; Muleshoe Ranch CMA)	2009	100-250
			Nursery Tank (#398; McDowell Mnt. Regional Park)	2010	1000-5000
			Pemberton Pond (McDowell Mountain Regional Park)	2009	100-250
			Robbins Butte Wildlife Area Cottonwood Tank (#391)	2010	1000-5000
			Robbins Butte Wildlife Area Twin Tanks (#391)	2009	1000-5000
			Spur Cross Ranch Cons. Area Solar Oasis pond (#413)	2009	500-1000
			TNC Lower San Pedro Preserve's east pond (#390)	2009	5000-10000
			Kei Sundt Pond	2010	100-500
			Crescent Pond (#XXX; Las Cienegas NCA)	2013	500-1000
			Heart Pond (#XXX; Las Cienegas NCA)	2013	500-1000
			Empire Tank (#XXX; Las Cienegas NCA)	2013	500-1000
			Road Canyon Tank (#420; Las Cienegas NCA)	2012	500-1000
			Cottonwood Pond (#XXX; Las Cienegas NCA)	2013	500-1000
			Cinco Canyon Tank (#XXX; Las Cienegas NCA)	2013	1000-5000
			Little Joe Spring (#XXX; San Pedro Riparian NCA)	2013	1000-5000
Longfin Dace		Hassayampa River	Arnett Creek	2007	500-1000
		Hassayampa River	Telegraph Canyon	2007	500-1000
		Tangle Creek	Fossil Creek	2008-2009	1000-5000
		Coal Mine Canyon	Fresno Canyon	2008	1000-5000
Loach Minnow		Aravaipa Creek	Hot Springs Canyon	2007-2011	250-500
Spikedace		Aravaipa Creek	Hot Springs Canyon	2007-2011	100-250
		Aravaipa Creek	Fossil Creek	2007-2012	1000-5000
		Upper Gila River	Blue River	2012	1000-5000
Roundtail chub		Eagle Creek	Blue River	2012	1000-5000
Gila Chub		O'Donnell Creek	TNC Lower San Pedro Preserve's west pond	2010-2011	1000-5000