

Gila River Basin Native Fishes Conservation Program: Arizona Game and Fish Department Annual Report for June 30, 2014 through June 30, 2015

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*Program
Cooperators:*



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Table of Contents

COOPERATIVE AGREEMENT TITLE	4
FUNDING	4
ADMINISTRATION AND GENERAL ACTIVITIES	4
PRIORITY ACTIONS IDENTIFIED IN COOPERATIVE AGREEMENT APPENDIX	4
Acquire Spikedace, Loach Minnow and Rare Populations of Other Native Fish (Task 3-57 and 3-75g).	4
Muleshoe Ecosystem Stream and Spring Repatriations (Task 3-47 and 3-75f).....	6
Fossil Creek Repatriations (Task 3-75l).....	8
Fresno Canyon Repatriations (Task 4-64b).....	9
Bonita Creek Renovation and Repatriations (Task 4-70b).....	10
Arizona Trout Stream Loach Minnow Repatriations (Task 3-38 and 3-75b).	12
Gila Topminnow Stockings (Task 3-37 and 3-75a).	13
Arnett Creek Repatriations (Task 3-41 and 3-75d).	20
Spring Creek (Oak Creek Drainage) Repatriations (Task 3-111a).....	21
Mineral Creek Drainage Renovation and Repatriations (Task 3-78a).	23
Blue River Native Fish Restoration (Task 3-42 and 3-75e).....	24
Lower San Pedro River Preserve Pond Stockings (Task 3-64 and 3-75j).....	27
Miscellaneous Stock Tank Surveys (Task 4-51).	28
Assess Potential Repatriation Waters (Task 3-84c).	29
Aquatic Research and Conservation Center O&M (Task 3-86).....	32
Transfer Gila Chub and Gila Topminnow to New Mexico.....	34
Fish Health Assessments of Translocation Populations (Task 3-130).	34
LITERATURE CITED	36
APPENDIX 1. POPULATIONS OF THREATENED AND ENDANGERED SPECIES ESTABLISHED UNDER THE GILA RIVER BASIN NATIVE FISHES CONSERVATION PROGRAM	39

COOPERATIVE AGREEMENT TITLE

Central Arizona Project Gila River Basin Native Fishes Conservation Program

FUNDING

Approximately \$380,085 expended during 06/30/14 – 06/30/15.

ADMINISTRATION AND GENERAL ACTIVITIES

Arizona Game and Fish Department's (Department) Gila River Basin Native Fish Conservation Program (Program) staff administered and managed 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 2014, and gave presentations on native fish conservation supported by the Program. Program staff drafted an annual performance report, and completed and submitted SF424 forms to attain funding for the first and second modification to the agreement. Program staff hired two interns for the 2015 field season, and worked toward filling the vacated Program Coordinator position.

Expenditures: Approximately \$33,800

Comments

Program staff inadvertently completed an annual performance report for the period February 6, 2014 through February 4, 2015 (Crowder and Robinson 2015), which was the old reporting schedule in the previous agreement. The correct reporting period, as specified in the May 2014 cooperative agreement award (F14AC00148), is June 30, 2014 through June 30, 2014. To capture all activities in the correct reporting period, the report herein, contains some of the same information from Crowder and Robinson (2015); i.e., information from July 1, 2014 through February 4, 2015.

Gila species identified in this report follow the species descriptions by Minckley and DeMarais (2000)¹. Sites where native fish were repatriated and subsequent monitoring information indicated that the species had established populations are reported in Appendix 1.

PRIORITY ACTIONS IDENTIFIED IN COOPERATIVE AGREEMENT APPENDIX

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. It is essential to acquire individuals from each population as an assurance against extirpation of these distinctive lineages. Intensive, directed efforts to capture individuals, bring them into a holding and propagation facility, build up their numbers, augment source stocks, and replicate

¹ As of March 4, 2015, the Arizona Game and Fish Department recognizes 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.

populations into streams, must occur immediately. The Department will also coordinate with tribes and the State of New Mexico to acquire Spikedace or Loach Minnow from their jurisdictions. 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 \$13,136

Preliminary Results: On November 18, 2014 ARCC acquired 61 Gila River West Fork Loach Minnow. On December 3, 2014, ARCC acquired 48 Loach Minnow and 26 Spikedace from Aravaipa Creek.

Staff from ARCC visited lower Aravaipa Creek (below the fish barriers) in early April 2015, in attempt to collect Spikedace or Loach Minnow to add to the broodstock at ARCC. Unfortunately no Spikedace or Loach Minnow were captured.

During April 27-28, program staff surveyed for Loach Minnow in the upper Blue River between HU Bar Box and McKittrick Creek. Program staff electrofished (single pass) 15 100-m transects that were spaced 1 km apart. Riffles within transects were sampled by a combination of electrofishing and kick seining. Two loach minnow were captured, one in each of two transects. Other species captured include 454 Longfin Dace *Agosia chrysogaster*, 341 Speckled Dace *Rhinichthys osculus*, 83 Desert Sucker *Catostomus clarki*, and 33 Sonora Sucker *Catostomus insignis*.

During June 15-17, 2015, Program staff surveyed upper Eagle Creek between Honeymoon Campground and Dry Prong Creek, primarily to determine presence of Gila chub *Gila intermedia*, but also to attempt to detect Spikedace or Loach Minnow. The overall reach was subdivided into three subreaches (strata), within which random 100-m transects were selected; 11 transects in total. Transects were surveyed using a backpack electrofisher, making a single upstream pass, and stopping at the end of each mesohabitat to process fish and record data. Sixteen chub were captured, but no Spikedace or Loach Minnow. Other species captured included Desert Sucker, Sonora Sucker, Longfin Dace, and Speckled Dace, and nonnative Northern Crayfish *Orconectes virilis*.

Program staff analyzed data and wrote a report summarizing the Spikedace survey in the upper Verde River that was conducted in 2011 (Robinson and Crowder 2015).

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 Department had planned to conduct surveys in the East Fork of the Black River during 2014 to try to find and collect Loach Minnow, but postponed the survey to summer of 2015. The

GRBNFCP is in negotiations with the White Mountain Apache Tribe to acquire White River lineage of Loach Minnow, so it has not yet been decided when or if this loach minnow lineage will be brought into ARCC. 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.

Comments: Status of lineages now at ARCC: 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, and 2013. The GRBNFCP has so far been unable to acquire White River Loach Minnow from the White Mountain Apache Tribe. Additional San Francisco River Loach Minnow need to be brought into ARCC to attain the standard refuge population size (500 reproducing adults). Upper Gila River Loach Minnow are abundant, so have not yet been brought into ARCC.

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

Description: A high priority of the GRBNFCP is to replicate remaining populations of federally-threatened Loach Minnow and Spikedace into suitable protected streams in the Gila River basin. Aravaipa Creek, a tributary to the lower San Pedro River, is host to sizeable populations of both species, and is thus a source for needed population replications. Hot Springs Canyon and Redfield Canyon are partly located on the Muleshoe Ranch Cooperative Management Area and are tributaries to the middle San Pedro River that retain native fish assemblages to the near exclusion of nonnative fishes. Attributes of these streams that help minimize invasions by nonnatives include isolation from the San Pedro River 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 2016. 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, development of translocation protocols (including post-translocation monitoring needs), 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.

Status: Ongoing.

Expenditures: Approximately \$35,828.

Preliminary Results: The annual post-stocking monitoring of native fishes in the Muleshoe Cooperative Management Area waters was conducted during September 15 and October 22, 2014. On September 15, Program and TNC staff surveyed Redfield Canyon by backpack electrofishing three fixed and four randomly selected sites. No Spikedace or Loach Minnow were captured. Fish captured included 187 Gila Chub, 135 Gila Topminnow, 67 Sonora Suckers, two Longfin Dace *Agosia chrysogaster*, and one Speckled Dace *Rhinichthys osculus*. Hot Springs Canyon was surveyed by Program and Bureau of Land Management (BLM) staff on October 22, by backpack electrofishing through three fixed sites and six random sites and one opportune site. Thirteen Spikedace and 67 Loach Minnow were captured. Two Loach Minnow were ≤ 45 mm TL. Spikedace and Loach Minnow were only captured in the upper two reaches. Also captured were 380 Longfin Dace, 382 Speckled Dace, 168 Desert Sucker, 168 Gila Chub, and 29 Sonora Sucker.

On September 23, Program staff collected Gila Topminnow from TNC Lower San Pedro River Preserve near Dudleyville and stocked 1,203 into Wildcat Canyon above the falls, and 1,042 into Bass Canyon about 875 m upstream from the confluence with Hot Springs Canyon. Mortalities during the translocations were minimal: 4 at Wildcat Canyon and 10 at Bass Canyon.

Program staff collaborated with The Nature Conservancy (TNC) in the removal of Green Sunfish *Lepomis cyanellus* from Redfield Canyon on May 26 and 27 2015. In the upper perennial portion of the stream (about 500 m downstream of Swamp Springs Canyon up to the ‘sunfish barrier’) we set 41 collapsible Promar® mini-hoop net sets and 11 collapsible Promar® minnow traps for 2 to 25 hours. We captured 163 Gila Chub and 44 Sonora Sucker, but no Green Sunfish. In the lower portion of the stream (Rock House downstream to Wilderness Boundary) a mini-hoop net and minnow trap were set overnight in a small perennial section about 900 m downstream of the rock house, and five hoop nets were set overnight further downstream close to the Wilderness boundary. We captured and removed 230 Green Sunfish; also captured were two Sonora Mud Turtles *Kinosternon sonoriense*. Size of Green Sunfish ranged from 50 to 207 mm TL.

Program staff analyzed data and wrote a report summarizing stocking and monitoring activities during 2014 (Love-Chezem et al. 2015a).

Obstacles: Precipitation events in the Muleshoe area raised safety concerns so sampling of Hot Springs Canyon in autumn 2014 was delayed. Additionally, the Program was short-staffed, but all cooperators contributed personnel so we were able to complete the 2014 annual monitoring.

Comments: Did not monitor Gila Topminnow in Secret Spring, 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. These Gila Topminnow populations may count towards recovery of the species. 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 more abundant than they were in 2013, but less abundant than in 2012. However, the presence of Loach Minnow ≤ 45 mm TL and Spikedace < 55 mm TL in 2014 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 3-751).

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. Desert Pupfish were originally considered for repatriation, but the gradient and habitat were considered unsuitable for the species to establish. The Department was tasked with stocking the various fish species, developing a monitoring plan, and monitoring afterwards until it could be determined if the species established or failed to do so.

Status: Ongoing.

Expenditures: Approximately \$26,274.

Preliminary Results: Program staff led annual monitoring activities during July 2014. During July 22-23, Gila Topminnow and Longfin Dace were monitored using collapsible minnow traps, seining, and dip netting. A total of 73 collapsible minnow traps were set in Fossil Creek; 27 in the reach between Fossil Springs Dam and High Falls (Reach 1), 35 in the reach between the falls at Irving and Sally May Wash (Reach 3), and 11 in the reach between Sally May Wash and the constructed fish barrier (Reach 4). Three hundred sixty Gila Topminnow, 870 chub, 808 Speckled Dace, 26 Sonora Sucker, 26 Desert Sucker, and 16 Longfin Dace were captured; 138 Northern Crayfish and 6 Lowland Leopard Frog *Lithobates yavapaiensis* tadpoles were also captured. Gila Topminnow appear to have spread throughout the sampled reaches and increased in abundance in reaches 3 and 4; however they decreased in abundance in Reach 1. Sixteen Longfin Dace were captured in minnow traps, 37.5% of these were <40 mm TL, and the furthest was 1078 m downstream from the stocking location. Longfin Dace also increased in abundance in reaches 3 and 4. For seining, 61 hauls were done in Reach 1, 23 in Reach 3, and 22 in Reach 4. The same species plus Spikedace were captured by seining; 58 Gila Topminnow (reaches 1 and 4), 10 Longfin Dace (Reach 4), and 22 Spikedace (Reach 4). Dip netting was completed in reaches 1 (55 sweeps) and 3 (12 sweeps) with 134 Gila Topminnow, 13 chub, 24 Speckled Dace captured.

Program staff snorkeled to monitor Spikedace and Loach Minnow in July 2014. On July 28, we snorkeled through nine fixed sites in the reach between Fossil Springs and Fossil Springs dam (Reach 0) and 42 fixed sites between Fossil Springs Dam and High Falls (Reach 1), covering about 29% (1,275 m) of the 4,300 m length in the reaches. Spikedace and Gila Topminnow were observed; one observer detected what were classified as Loach Minnow, however identification of these fish was not confirmed. Five Spikedace were observed, all ≥ 40 mm TL. All Spikedace were observed within Reach 1, from 100 m upstream of High Falls to 1 km below Fossil Springs Dam. Fifty-six Gila Topminnow were observed during snorkeling, all within Reach 1.

On July 29, Program staff snorkeled through 48 fixed and one opportunistic sites in the reach from Sally May Wash to permanent barrier (Reach 4) to detect Spikedace that were stocked in that reach during October 2012. Forty-seven Spikedace (8 were ≤ 40 mm TL), 92 Gila Topminnow (29% were < 20 mm TL), and 3 Longfin Dace (all > 40 mm TL) were observed. Spikedace were observed 2.7 km downstream of the 2012 stocking location. Gila Topminnow, which were not stocked in Reach 4, but dispersed down from Reach 3, were found as far down as 700 m upstream of the permanent barrier. Longfin Dace were detected within the uppermost 1 km of the reach.

Since Loach Minnow were not confirmed during July surveys, a more intensive snorkel survey was conducted through nine fixed sites on October 14 from Fossil Springs Dam to Fossil Springs (Reach 0). Surveyors snorkeled for 3.5 hours each, going through 25 m sites, usually 3-abreast. Four Loach Minnow were observed about 90 m downstream from the 2012 stocking location.

The only species stocked into Fossil Creek during 2014 was Razorback Sucker; obtained from The Southwestern Native Aquatic Resources and Recovery Center in April 2014. On November 7, 2014, ARCC staff stocked 2,500 Razorback Sucker fingerlings (< 100 mm TL) into Fossil Creek in the pool below Forest Road 708 bridge. Fish behaved normally upon release.

Program staff led the Fossil Creek Native Fish Workgroup meeting on February 26, 2015. Program staff analyzed data and wrote a report summarizing stocking and monitoring activities during 2014 (Love-Chezem et al. 2015b).

Obstacles: We had planned to stock Loach Minnow and Spikedace in fall 2014; however no Loach Minnow or Spikedace offspring were available from ARCC, so the stocking was canceled. The Program was short-staffed for monitoring, but we were able to coordinate enough personnel to complete the monitoring.

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 1, and have persisted and reproduced in Reach 4, so they can probably be considered to be in the early stage of population establishment. Targeted monitoring for Longfin Dace was not completed every year, but nonetheless the species was detected in 2008, 2009, 2010, 2013, and 2014, but none were detected in 2011, and only a few were detected in 2014 so if a population has established it appears to be small. 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, and four in 2014. 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. However, more fingerling razorback sucker were stocked in November 2014, so they may yet establish.

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 about 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 Gila Chub from Sheehy Spring can be collected and propagated.

Status: Ongoing.

Expenditures: Approximately \$2,389.

Preliminary Results: Program staff coordinated with FWS and the landowner at Sheehy Spring in both 2014 and 2015. The landowner wants to complete a Habitat Conservation Plan before allowing the Department to remove any Gila chub.

Obstacles: Only 90 Gila Chub were captured in Sheehy Spring during annual monitoring in 2014, so a direct translocation from Sheehy to Fresno was decided against in 2014.

Comments: The landowner has indicated support for removing some of the Gila Chub from Sheehy Spring to establish populations elsewhere. However, the landowner wants to develop a Habitat Conservation Plan before allowing any Gila chub to be removed from Sheehy Spring. During monitoring of Sheehy Spring in June 2014 (Timmons et al. 2015), only 90 chub were captured, which concerned the biologists from both FWS and the Department. Department staff outlined four possible courses of action for Sheehy chub and communicated those to the landowner: 1) No action: do not collect any chub from Sheehy and hope that their numbers rebound by next year. 2) Collect as many juvenile chub as possible and take them to ARCC. The fish could be held for two years and allowed to spawn, after which some of the adults and offspring would be returned to Sheehy Spring. The remaining offspring would be released into Fresno Canyon or another captive or wild location. 3) Collect at least 50 juvenile chub from Sheehy and directly translocate them to Fresno Canyon. Repeat the process for several years, to avoid founder-effect problems at Fresno Canyon. If the Sheehy population only has 500 individuals, removal of 50 fish would represent 10% of the population. 4) Collect as many chub as possible from Sheehy and hold them in a closed system, either a suitable stock tank on the landowner's property, a hatchery pond on our facility, or both. Allow these chub to reproduce and then take offspring for translocation to Fresno and return remaining chub to Sheehy (offspring and broodstock alike). The landowner replied that he wanted more information about abundances in past years, and that he wanted to complete a Habitat Conservation Plan before allowing any removal of Gila chub. The third option seems the most preferable, followed by the second. In addition, Department staff recommends that some of the riparian vegetation be trimmed or removed from the spring area to decrease shading and increase access.

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 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. Native species to be repatriated included Spikedace, Loach Minnow, Desert Pupfish and Gila Topminnow. 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.

Native fish species present in Bonita Creek include Gila Chub, Longfin Dace, Speckled Dace, Sonora Sucker, and Desert Sucker. In addition, approximately 4,000 Razorback Sucker were stocked in 1987, but none have been observed since 1991. The reach upstream of the infiltration gallery is occupied by all of the native species and Fathead Minnow *Pimephales promelas*. Below the infiltration gallery and the barrier, nonnative fishes present include Fathead Minnow, Green Sunfish, Smallmouth Bass *Micropterus dolomieu*, Channel Catfish *Ictalurus punctatus*, Black Bullhead *Ameiurus melas*, Yellow Bullhead *Ameiurus natalis*, Red Shiner *Cyprinella lutrensis*, Common Carp *Cyprinus carpio*, and Western Mosquitofish *Gambusia affinis*.

Status: Ongoing.

Expenditures: Approximately \$9,554.

Preliminary Results: On November 13, 2014, Bureau of Reclamation (Reclamation), USFWS, BLM and Program staff participated in native fish stockings in upper Bonita Creek. Six hundred-eighty Desert Pupfish were stocked into a beaver pond in upper Bonita Creek near where the road ends (about 1.3 km downstream from the San Carlos Reservation Boundary); an additional three fish died during the transport. Six hundred sixty-three Gila Topminnow were stocked into a beaver pond in upper Bonita Creek about 120 meters on the other side of the valley from where the Desert Pupfish were stocked; an additional three fish died during the transport. An additional 385 Gila Topminnow were stocked into a beaver pond in upper Bonita Creek near the confluence with Midnight Canyon; fish behaved normally upon release and there were no mortalities. Two hundred eighty-eight Loach Minnow were stocked into a riffle in Bonita Creek downstream of Midnight Canyon; fish behaved normally upon release and there were no mortalities. No Spikedace were available from ARCC for stocking in 2014.

Program staff coordinated with BLM regarding post-stocking monitoring and augmentation stockings planned for 2015.

Obstacles: Program staff did not participate in BLM's 2015 annual monitoring and the Program was short-staffed for stocking activities, but cooperators contributed personnel.

Too few upper Gila River lineage of Spikedace were produced at ARCC, so none were available for stocking into upper Bonita Creek during autumn 2014.

Eradication of nonnative fish from the previously treated reach is likely only possible with complete drying or another chemical treatment. There may be local public opposition to a second renovation.

Comments: BLM conducted their annual monitoring in April 2015 and captured seven Loach Minnow at their Midnight Canyon monitoring site. Therefore, at least some of the Loach Minnow stocked during November 2014 over-wintered.

BLM continues to lead efforts to remove Green Sunfish and other nonnative fish predators from the treated reach. Over 10,000 Green Sunfish have been removed, but they remain abundant in the lower portion of the reach, and there appears to be a shift towards smaller fish. Green Sunfish abundance appears to have decreased in the upper portion of the treated reach (Blasius and Conn 2015). However, the habitat is complex with numerous beaver ponds, so it is unlikely Green Sunfish and other nonnative fishes can be eradicated from the previously treated reach of Bonita Creek by trapping or other fishing gears. A second Bonita Creek renovation is on the nonnative fish control projects list for the Department, but it has not yet been scheduled.

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 perform repatriation stockings of native non-game 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. Source populations should be the geographically nearest downstream neighbors to the repatriation stream, and number of individuals removed should not obviously deplete the source. 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.

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. Therefore, this may be an opportunity to either partner with the Department's CAMP or let them be fully responsible for repatriation of Loach Minnow to Black River drainage Apache Trout streams (e.g., 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 renovate 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, may allow this species to achieve recovery. Many sites were identified as suitable for repatriation efforts and are identified in the draft revised recovery plan and in the 2003 Gila Topminnow and Desert Pupfish status report (Voeltz and Bettaso 2003). The Department focus is on the sites recommended for stocking identified in the recovery plan and status report and 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. Gila Topminnow repatriation sites are often suitable for Desert Pupfish, because the two species utilize some of the same habitats. Desert Pupfish will be stocked into some of the repatriation sites if habitat is judged suitable.

Status: Ongoing.

Expenditures: Approximately \$54,936.

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 reports for

five topminnow stocking projects that were completed in 2014 (Frear et al. 2014a, b, and c; Frear et al. 2015a; Love-Chezem et al. 2015c, d).

New stockings. Gila Topminnow were stocked into two new locations during the reporting period. On September 24, 2014 Program and USFS staff stocked 817 Gila Topminnow (middle Santa Cruz lineage) into Sheepshead Canyon in Yavapai County. Three hundred thirty-four topminnow were stocked into the upper pool immediately below the dry waterfall (the upstream end of the perennial water). An additional 483 topminnow were stocked into another pool about 575 m downstream, immediately above a diversion. Fish behaved normally upon release. There were 10 mortalities. The Gila Topminnow were acquired from the Phoenix Zoo, and were collected the morning of September 24.

On October 2, 2014 Program staff stocked 512 Gila Topminnow into Gaucho Tank on Las Cienegas National Conservation Area. Fish behaved normal upon release. There were an additional 22 topminnow that died during the translocation process. Fish were acquired from Cienega Creek near the Gardner Canyon confluence.

Augmentation stockings. Gila Topminnow augmentation stockings were completed at three locations during the reporting period.

On October 1, 2014, Program staff stocked 710 Gila Topminnow into two locations in Murray Spring in the San Pedro Riparian National Conservation Area about midway from the upstream start of perennial water and the pipeline waterfall: 214 into one pool and 496 into a second pool. All topminnow behaved normal upon release. There were no mortalities of Gila Topminnow during the entire translocation process. The topminnow stocked were Cottonwood Spring lineage and were acquired from ARCC; ARCC staff delivered the topminnow to Department headquarters on September 30, and then Program staff transported the fish to Murray Spring on October 1.

Also on October 1, Program staff collected Desert Pupfish from Robbins Butte Wildlife Area ponds (Twin Tanks and Cottonwood Tank). Program staff only had a small seine and minnow trap, and had difficulty collecting sufficient numbers of fish >20 mm TL, so some pupfish <20 mm TL were collected. Later the same day, Program staff stocked 298 Desert Pupfish into Murray Spring, all into a pool in the upstream end of the perennial reach, about 40 m downstream of the upstream-most cut in the railroad bed. Fish behaved normally upon release. However, during the translocation process, there were 188 mortalities, virtually all of which were < 20 mm TL. Most of the pupfish stocked were >20 mm TL.

Also on October 1, 2014, Program staff stocked 177 Desert Pupfish into Cottonwood Tank at Las Cienegas National Conservation Area. Fish behaved normal upon release. However, there were 91 mortalities, most of which again were fish < 20 mm TL. The habitat in Cottonwood Tank looked excellent for pupfish (lots of open water but also fair amount of *Chara* and other submerged aquatic vegetation).

On October 20, 2014, Program staff collected Gila Topminnow (middle Santa Cruz River lineage) from the Phoenix Zoo and stocked 166 into Rock Spring near Sunflower. One

additional fish died during the translocation process. Fish behaved normally upon release. Program staff observed evidence of flooding: debris was about 1 m high around trees near the stream. Before stocking, Program staff observed about 20 Longfin Dace and a few Gila Topminnow, and about 10 Sonora Mud Turtles, two of which were fighting over a crayfish. Only three crayfish were observed.

On June 29, 2015, program staff acquired Gila Topminnow (middle Santa Cruz lineage) from the Phoenix Zoo and stocked them into Sheepshead Canyon after the monitoring was completed. A total of 241 Gila Topminnow were stocked into the upper pool and 270 into the lower pool. Two additional fish died during the translocation process.

Post-stocking monitoring. Several sites previously stocked were monitored during the reporting period. All of the sites that were augmented were monitored earlier in the year. 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.

Usery Mountain Regional Park pond. On July 14, Program staff set four collapsible minnow traps in Usery Mountain Regional Park pond and captured 839 Gila Topminnow. Gila Topminnow is now considered established in the pond. A completion report was written (Frear et al. 2014b).

Buckhorn Spring. On August 11, 2014 Program staff set nine collapsible minnow traps at Buckhorn Springs and captured 512 Gila Topminnow. Twenty percent (106) of the topminnow were <20mm TL. Gila topminnow is now considered established in Buckhorn Spring. A completion report was written (Frear et al. 2014a).

San Pedro Riparian National Conservation Area (RNCA). Three sites on San Pedro RNCA were monitored on August 18, 2014. At Little Joe Spring 10 traps were set for about 1.83 h; traps were pulled early because of numerous lightning strikes from an approaching thunderstorm. Five hundred fifty-three Desert Pupfish were captured, 15% of which were <20 mm TL, which indicates they reproduced. The pond looked great and Program staff expect there to be thousands of fish by next year. No additional augmentations for population establishment are planned. A summary report of monitoring activities was completed in February 2015 (Love-Chezem et al. 2015b).

At Horse Thief Draw, Program and BLM staff performed 14 seine hauls, but captured only three male Gila Topminnow. The wash had recently flooded, and all pool habitat was full of sand, essentially creating a long run. The lower stocking pool that used to have an earthen-clay waterfall was completely gone as was the waterfall. The system had head-cut all the way up to the pool where a temperature logger had been installed years ago. The upper end of the head-cut was an earth-clay waterfall about 1.25 m tall. The habitat above the waterfall was filled in with sediment. Further upstream, the uppermost plunge pool below the 2-3 m tall waterfall was completely full of sediment and dry (it was dry last year too). Program staff recommends that this site be abandoned and no longer stocked with Gila Topminnow or Desert Pupfish. The system is too flashy, and

sufficient habitat is not available. Additionally Marcia Radke from BLM was present during the monitoring, and did not observe any water umbel.

At Murray Spring, Program staff set 21 minnow traps above the waterfall-barrier at the pipeline crossing and captured two Desert Pupfish (>20 mm TL) and 46 Longfin Dace. Also above the waterfall barrier, they captured 18 Gila Topminnow (14 were <20 mm TL) in six dip net sweeps and 12 longfin dace in one seine haul. About 5 Gila Topminnow and over 50 longfin dace were also observed near traps throughout the reach above the barrier. Below the barrier, Program staff performed four seine hauls and captured three Longfin Dace and three Northern Crayfish, and observed one Green Sunfish. There was evidence of recent flooding, as most of the cattails were bent downstream, and some debris was wrapped around trees about 1.25 m above the stream. Many of the pools had filled in with sediment, and there were only about 10 left, only one of which was large (20 x 1 m, and 1.25 m deep). Most of the topminnow were captured and observed in the large pool. Occasionally there are flash floods in this system, but the riparian vegetation is dense, which slows the speed of floods, and provides refuge for fish. Program staff recommended an augmentation stocking, which was completed and is described above.

Ben Spring in the San Pedro RNCA was not monitored this year because Gila Topminnow likely failed to establish there (only 10 topminnow were captured in 2012, and none were captured or observed in 2013). Not enough surface water persists at the site during drought periods and it is in a system that experiences flash flooding, so no additional stockings are recommended. The site should probably be visited one or two more times to confirm that no Gila Topminnow persist.

Las Cienegas National Conservation Area (NCA): Eleven sites on Las Cienegas NCA were monitored on August 4-5, 2014, and August 18-19, 2014. A summary report of monitoring and stocking activities was completed in February 2015 (Love-Chezem et al. 2015b).

On August 19, at Nogales Spring, four traps were set in each of the three lower pools (a total of 12 traps), and three Gila Topminnow >20 mm TL were captured in the uppermost of those pools. The traps were only set for about 1.3 h because an intense thunderstorm started and staff decided to get back to the highway before any flash flooding occurred. There was evidence of a small flood (debris piled a foot above the water), but all vegetation was intact and the pools still looked good. We recommend one more augmentation stocking at this site.

At Little Nogales Spring on August 19, Program staff set five traps in the upper stocking site; no fish were captured or observed. Similar to Nogales Spring, traps were only set for 1.25 h because an intense thunderstorm started and staff had to evacuate. Program staff observed more evidence of flooding and the lower stocking pool was completely filled with sand and was dry except for two small puddles. This system appears to be prone to flash flooding and does not have any refuge areas for Gila Topminnow, which is likely why they did not persist. Program staff recommends that this site not be stocked

with any more Gila Topminnow, but other native species like Longfin Dace should be considered.

Road Canyon Tank was monitored on August 5 and 18. On August 5, Program staff inadvertently set only one trap in the pond that was stocked with fish and 10 traps in the adjacent pond that was not stocked. In the one trap in the pond that was stocked with fish, eight Desert Pupfish (all > 20 mm TL) and 147 Gila Topminnow (51 were < 20 mm TL) were captured. Program staff also performed 13 dip nets sweeps in the pond that was stocked, and captured 288 Gila Topminnow (180 were < 20 mm TL). In the adjacent pond, two Chiricahua Leopard Frogs and no fish were captured. During the August 18 monitoring, nine traps captured 4,019 Gila Topminnow (401 \leq 20 mm TL) and 20 Desert Pupfish (all > 20 mm TL). Even though both species were first stocked in 2012, they both have reproduced and both species can be considered established. Further augmentations are not recommended at this time. Two adult and 12 tadpole Chiricahua Leopard Frogs *Lithobates chiricahuensis* were captured during the August 18 monitoring.

At Empire Tank on August 4, 2014, Program staff set 10 minnow traps and captured 959 Gila Topminnow (312 \leq 20 mm TL) and 40 Desert Pupfish (9 \leq 20 mm TL). Program staff also captured six Chiricahua Leopard Frog tadpoles and observed many more adult frogs in the tank margins and associated wetland. Empire Tank was stocked in July 2013, but Gila Topminnow and Desert Pupfish have obviously reproduced because two size classes of both species were captured. Therefore, both are likely establishing populations in Empire Tank, and additional augmentations for the purposes of population establishment are not warranted at this time.

At Cottonwood Tank on August 5, Program staff set 12 minnow traps and captured four Desert Pupfish, two of which were \leq 20 mm TL. Since only four Desert Pupfish were captured one year post stocking, Program staff recommended an augmentation stocking, which was completed and is described above. Cattle breached the fence at Cottonwood Tank and may have affected water quality, which may affect the abundance of Desert Pupfish. Additional post-stocking monitoring is planned for the next reporting period.

Program staff monitored Cieneguita Wetland ponds #1 (Egret), #3 (Crescent), and #4 (Heart) on August 4, 2014. We set 10 minnow traps in each pond, and performed one dip net sweep in Crescent Pond, and two dip net sweeps in Heart Pond. In Egret Pond we captured 2,452 Gila Topminnow (479 \leq 20 mm TL; but 633 were not classified to size class). In Crescent Pond we captured 1,108 Gila Topminnow (403 \leq 20 mm TL) and 354 Desert Pupfish (114 \leq 20 mm TL) in traps, and 140 Gila Topminnow and one Desert Pupfish in dip net sweeps. In Heart Pond we captured 328 Desert Pupfish (91 \leq 20 mm TL) in traps and 34 Desert Pupfish (3 \leq 20 mm TL) in dip nets. Gila Topminnow were initially stocked in 2013, but both size classes were captured in both Egret and Crescent ponds and so the species is likely in the process of establishing populations in those ponds. Similarly, Desert Pupfish were initially stocked in 2013, and both sizes classes were captured in Crescent and Heart ponds, so they are likely in the process of establishing populations in these ponds. Additional augmentations of topminnow or pupfish for the purposes of establishing populations are not warranted at this time.

At Cinco Canyon Tank on August 5, Program staff set 10 traps and captured 264 Desert Pupfish (95 \leq 20 mm TL). More Desert Pupfish were captured than stocked (n= 250) in 2013 and since both size classes of Desert Pupfish were captured, Desert Pupfish can be considered to be in the process of establishing a population in Cinco Canyon Tank. Additional stockings of Desert Pupfish for the purpose of establishing a population are not warranted.

In July 2014, BLM notified Program staff that Gila Topminnow were observed in Gaucho Tank. Neither Department staff nor any other agency reported stocking Gila Topminnow into Gaucho Tank. Therefore, during the annual monitoring at Las Cienegas NCA in August 2014, Program staff visited Gaucho Tank to confirm that the fish were Gila Topminnow. Program staff set three minnow traps and captured 57 Gila Topminnow. Program staff, cooperating agencies, and staff from nongovernmental organizations that work in the Las Cienegas NCA discussed how Gila Topminnow might have gotten into Gaucho Tank, and perhaps the most likely explanation was that they were inadvertently moved in aquatic plant masses that were translocated from Empire Tank. The Department and cooperating agencies were concerned that the introduced population in Gaucho Tank might become genetically bottlenecked, so Program staff collected Gila Topminnow from Cienega Creek and stocked 512 into Gaucho Tank on October 2, 2014.

Spring Water Wetland was monitored on August 5. Program staff set 10 traps and captured 8,070 Gila Topminnow (1,922 \leq 20 mm TL, 1373 \geq 20 mm TL, and 5,267 unclassified). Bureau of Land Management staff visited Spring Water Wetland in spring 2014, and noticed water levels had dropped since autumn 2013 when 674 topminnow were stocked. However, the drop in water levels did not appear to negatively impact Gila Topminnow because we captured over 8,000 individuals in August 2014. Gila Topminnow appear to be in the process of establishing a population in Spring Water Wetland, and no further augmentations are needed at this time.

Sheepshead Canyon. On June 29, 2015 Program staff monitored the Gila Topminnow population in Sheepshead Canyon. Ten collapsible minnow traps were set for 2 h in the upper stocking pool and two Gila Topminnow (one $<$ 20 mm TL) and two Sonora Mud Turtles were captured. Program staff also observed about 10-20 large Gila Topminnow swimming in the center of the pool. In the lower stocking pool we set four minnow traps and captured eight Northern Crayfish but no fish; no fish were observed either. We also set one minnow trap in the pool immediately below the lower stocking pool, but did not capture any fish in it; this pool was only about 1 m wide and 1.75 m long and only about 15 cm deep, which was substantially less water than in May 2014. Program staff also walked between the two stocking pools and looked for any other pools that might hold fish; the vast majority of this stretch is soggy cienega with surface water only about 1-2 cm deep. We found a pool about 6 m long by 2 m wide and 1 m deep, that was located about 120 m upstream of the lower stocking pool. We dip netted through this pool but did not catch any fish, nor were any observed.

Rock Spring. On August 12, 2014, Program and USFS staff, and local ranch owner and USFS permittee monitored Rock Spring, located in Maricopa County, near Sunflower, Arizona. Ten collapsible minnow traps were set for 2 hours and four dip net sweeps were performed below the dam and five above the dam. Seventy-one Gila Topminnow (four <20 mm TL) and 59 Longfin Dace were captured, all below the dam. A summary report of monitoring activities was completed in February 2015 (Frear et al. 2015b).

On June 30, 2015 Program staff monitored Rock Springs. Five collapsible minnow traps were set for two hours and six dip net sweeps were performed. Fifty-three Gila Topminnow (26 were ≤ 20 mm TL), 13 Longfin Dace, two Sonora Mud Turtles, and one Lowland Leopard Frog tadpole were captured. Some of the Gila Topminnow females that were capture were fat and assumed to be gravid. Rock Spring was originally stocked in July 2013, and was augmented in October 2014. Although reproduction was evident (small-sized fish captured), relatively few topminnow were captured in 2014, so it is still unclear if they will establish a population at this site.

Walnut Spring. On July 19, 2014, Program staff monitored Gila Topminnow in Walnut Spring while a Boy Scout troop removed Red Swamp Crayfish, *Procambarus clarkii* from the spring and thinned out blackberries and other shrubs around the tank. Program staff set 10 minnow traps for 2 h and captured 410 Gila Topminnow. Nine of the Gila Topminnow were ≤ 20 mm TL. In addition, hundreds of Gila Topminnow of both size classes were observed schooling around the traps. Also captured were an estimated 315 Red Swamp Crayfish, which were removed from the tank; about 300 were caught in five traps that were set on the substrate in shallow water by cattails, and 15 were caught in floating traps that were set in deep, open water. During two subsequent crayfish trapping events on August 18, 2014 and November 8, 2014, 790 crayfish were removed and 126 Gila Topminnow (89 ≤ 20 mm TL) were captured. Cattails were cut back in the spring pond during removal efforts to create more open water habitat for the fish.

On June 30, 2015, Program staff again monitored Walnut Spring. Eight collapsible minnow traps were set for one hour and three dip net sweeps were performed. Minnow traps were set for one hour to reduce the number of Gila Topminnow mortalities caused by Red Swamp Crayfish. A total of 622 Gila Topminnow (185 were <20 mm TL) and 114 Red Swamp Crayfish were captured. In addition, thousands of Gila Topminnow of both size classes and sexes were observed during the one hour set time. Gila topminnow were first stocked in October 2012 and were augmented in July 2013. Because there is evidence that the fish are reproducing and abundance has increased, this population can be considered established. A summary report of the attempted establishment was completed (Frear et al. 2014c).

Obstacles: During 2014 the Program was short-staffed for monitoring and stocking activities, but cooperators contributed personnel for some of the activities.

Program staff did not augment Nogales Spring because the UTV keys were accidentally left in the office, which was not discovered until Program staff arrived at Cienega Creek to collect the fish. Access through private property had been blocked by a locked gate, and the alternate route

to Nogales Spring was not considered passable by truck. Therefore, the Gila Topminnow augmentation of Nogales Spring was postponed until summer 2015.

Several sites on Las Cienegas National Conservation Area that BLM and the Department hoped to stock with Gila Topminnow were not physically ready to receive fish, so the stockings had to be postponed.

The portion of Sabino Canyon identified as a stocking location for Gila Topminnow went dry in 2014; therefore Gila Topminnow were not stocked into Sabino Canyon. The Environmental Assessment and associated Section 7 consultation did not identify the stocking of Gila Topminnow further upstream, so stocking of topminnow into that site is postponed until the USFS consults further with the USFWS.

Comments: During the next reporting period we hope to stock Gila Topminnow into at least six new sites: Sabino Canyon in Coronado National Forest, Indian Creek, Sycamore Creek, and Little Sycamore Creek in Prescott National Forest, Spring Creek and Walker Creek in Coconino National Forest, Cottonwood Creek on Tonto National Forest, and several new sites at Las Cienegas NCA (Bills Tank, Maternity Well, Cinco Windmill Tank, Clyne Pond, Apache Spring 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 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. BLM will need to improve the tanks and habitats of the sites before stocking and those locations will be evaluated in 2015-2016. A barrier was constructed in Spring Creek (tributary to Oak Creek; see Miscellaneous Actions) in early 2015, and plans are to stock Gila Topminnow in summer 2015.

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 proposed. An Environmental Assessment was developed which outlined five alternatives, and the four action alternatives identified repatriations of different combinations of native fish species (Longfin Dace, Desert Sucker, Gila Chub and Gila Topminnow). Alternative C was selected which specified that only Longfin Dace and Desert Sucker would originally be stocked, but the site would be evaluated within nine years of implementation to determine if the habitat could support Gila Topminnow and Gila Chub. A barrier was constructed by the USFS, using Reclamation and other funds, and was improved to remedy some design weaknesses. The system was renovated in 1996 and again in 1997 to remove nonnative fish. 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. Therefore it was determined that there was not enough habitat for Desert Sucker, so the decision was made to not stock this species. 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. Choice of lineage of Gila Topminnow will be based on the draft revised recovery plan (Weedman 1999) and those of other species will be based on any existing genetic information or on use of stocks from the closest population to Arnett Creek.

Status: Ongoing.

Expenditures: \$1,194.

Preliminary Results: Some sporadic coordination with Tonto National Forest staff to assess the status of the Forest's Section 7 consultation with USFWS.

Obstacles: Tonto National Forest has other priorities for its staff.

Comments: No progress has been made on the Section 7 consultation regarding ongoing activities in the grazing allotment.

As mentioned in the last report, there is another short section of perennial water in Arnett Creek near Highway 177, just upstream of a private parcel and about 8 km upstream of where Longfin Dace were stocked. This upper section apparently has never been surveyed, so it probably should be surveyed before topminnow are stocked. There is also an ephemeral pond at the southeastern edge of the Perlite Mine that may need to be surveyed, although fish were not observed along the shore during several previous visits to Arnett Creek. The locations where Longfin Dace were stocked into Arnett Creek and Telegraph Canyon should be resurveyed in 2015 to ensure the species has persisted in both locations.

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, and Northern Crayfish. However, Oak Creek contains numerous nonnative fishes including Channel Catfish, Green Sunfish, Rainbow Trout, Brown Trout, Largemouth Bass *Micropterus salmoides* Smallmouth Bass, and Rock Bass *Ambloplites rupestris*. In 2011, USFWS and Department staff surveyed upper Spring Creek to determine fish species present and evaluate the potential for native fish repatriations. No nonnative fish were detected and the habitat was deemed suitable for Spikedace and Gila Topminnow. Also in 2011, Program staff visited lower Spring Creek to find a purported fish barrier and to survey fish. Program staff found a 0.5 m-high concrete diversion about 1 km upstream of Oak Creek. Above the diversion Program staff captured Gila chub, Speckled Dace, Longfin Dace, Desert Sucker, Sonora Sucker, and Northern Crayfish. Downstream of the diversion Program staff captured the same species plus Green Sunfish. The diversion therefore appeared to act as a barrier to upstream movement

of nonnative fishes from Oak Creek. However, the barrier was too low to be an effective barrier at high flows. Therefore, Program staff recommended the barrier be improved or a new one built.

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 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 \$10,748.

Preliminary Results: Program staff conducted three days of Green Sunfish removal from July through September 2014; four other days of removal were conducted May thru June 2014. Hoop nets and Promar® mini-hoop nets were used to capture fish on July 9, July 10, and September 4. One Green Sunfish was captured on July 7, none on July 10 and two on September 4. All three Green Sunfish were captured in the lower USFS section upstream of the diversion. Other species captured include 242 Gila Chub, 27 Speckled Dace, 18 Sonora Mud Turtles, and 1,653 Northern Crayfish.

On April 15, 2015 Department staff sampled the lower USFS portion of Spring Creek to remove Green Sunfish. Staff set 25 collapsible minnow traps but did not capture any Green Sunfish. Aquatic species captured included 83 Gila chub, 19 Speckled Dace, 1 Desert Sucker, 2 Sonora Mud Turtles, and 39 Northern Crayfish.

On May 11, 2015 Department and USFWS staff stocked 221 Spikedace (Aravaio Creek lineage) into Spring Creek in the upper USFS portion of the stream. Fish were in good condition and behaved normally upon release.

Obstacles: Much of the stream is on private land, and coordination for access to monitor for the presence of nonnative Green Sunfish has been good with the exception of one landowner; the one landowner has not returned phone calls or emails, so Department staff has not been able to gain access to that parcel.

Comments: Region II CAMP personnel will be continuing nonnative Green Sunfish removal in Spring Creek, Program staff will assist when opportunities are available. In June 2015 the Department's 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, so the species has at least persisted one month after stocking. Program staff hopes to stock Gila Topminnow during summer 2015.

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 (constructed in 1971; Robinson 2008a) 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 entire drainage above Big Box Dam reservoir could be managed as a native fishery, or certain portions of the drainage could be managed for native fish. If the entire drainage is targeted for native fish management, then Green sunfish and other nonnative fishes will need to be eradicated from Big Box Dam reservoir, Devils Canyon, and the lowest portion of upper Mineral Creek. A first and probably easiest step would be to augment or re-establish Gila Chub into upper Mineral Creek, because eradication of Green Sunfish would not be required because a series of small waterfalls limit the upstream movement of Green Sunfish and Fathead Minnow, and only Longfin Dace are found upstream of the waterfalls.

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. All sources of stock should adhere to the “closest geographic neighbor” criterion whenever possible. 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 project; Government Springs Ranch and ASARCO Ray Mine.

Comments: Program staff asked USFWS to write a letter to landowners regarding the status of Gila Chub. The USFWS wrote a letter stating that Gila Chub were still considered extant in Mineral Creek, and therefore if Gila Chub are stocked into the stream it would be an augmentation and nothing would change in regard to landowner ESA compliance. The letter seems to have satisfied the Government Spring Ranch manager. Based on the 2013 habitat survey, Program staff thinks there is sufficient habitat for Gila Chub. Program staff will continue to try to get the State land Department to approve of the Gila chub augmentation, and then 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 robusta*, Gila Trout, Razorback Sucker, Flannelmouth Sucker *Catostomus latipinnis*, Gila Topminnow, and Colorado Pikeminnow *Ptychocheilus lucius* 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. Threats to the continued existence of these species have not been alleviated, and with the possible exception of Gila Trout, reductions in abundance and range continue. Repatriation of fish to suitable habitat is among alternatives available for management of imperiled native fishes. 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 objectives that the Department is responsible for include the repatriation of Roundtail Chub and Spikedace, and other species as appropriate, into the lower Blue River, control or eradication of nonnative piscivorous fishes from the lower Blue River, and post-stocking monitoring to evaluate the success of the repatriations and control efforts. Activities to accomplish these objectives include coordination and communication with partners (USFWS, NMDGF, and USFS), identification of lineages, source populations, and numbers of each species to be stocked, transportation and stocking of fish, and reporting results. Lineages and source populations will

be those recommended by recovery or multi-agency conservation teams. 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 \$53,741.

Preliminary Results: Program staff analyzed data and drafted a report that summarizing monitoring activities during 2014 (Robinson et al. 2015). 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.

During June 30 through July 2, 2014, Department staff conducted the annual snorkeling and spearfishing to capture catfish and carp. No Channel Catfish or any other large-bodied piscivorous fish were detected. During the snorkeling, Green Sunfish were observed in four pools; six in two pools in Reach 1, one in a pool in Reach 4, and one in a pool in Reach 6. Seven Spikedace were observed in three pools; four individuals in Reach 4 and three individuals in Reach 3.

Also during June 30 through July 2, 2014, Department staff set traps in 83 pools throughout all six reaches between the constructed barrier and Fritz Ranch in an effort to remove Green Sunfish. Ten Green Sunfish were captured: seven in Reach 1, two in Reach 3, and one in Reach 6. Size of Green Sunfish ranged from 108 to 198 mm TL. Additional species captured included: one 55 mm TL Spikedace in Reach 4, 27 Roundtail Chub (15 in Reach 1, six in Reach 2 and six in Reach 3), 1,077 Longfin Dace, 69 Speckled Dace, 161 Desert Sucker, 189 Sonora Sucker, 79 Fathead Minnow, 17 Red Shiner, 21 Sonora Mud Turtles, 339 Northern Crayfish, and nine Lowland Leopard Frog tadpoles.

As part of the above mentioned effort to remove Green Sunfish, Department Region I Fisheries staff performed single pass electrofishing upstream of Fritz Ranch to Horse Canyon on June 30 and July 1. The crew shocked for a total of 10,483 seconds and electrofished 936 meters of the 3.3 km reach. No Green Sunfish were captured. Species captured included: 239 Longfin Dace, 24 Speckled Dace, 26 Desert Sucker, 243 Sonora Sucker, and one Fathead Minnow.

During October 27-29, 2014, Department staff conducted the annual post-stocking monitoring for Spikedace and Roundtail Chub. We electrofished 12 reaches and set 24 hoop nets (baited with dry Gravy Train dog food, and set overnight) throughout reaches 2 thru 6. Captured fish included 14 Spikedace, 48 Roundtail Chub, 2 Loach Minnow, 121 Speckled Dace, 586 Longfin

Dace, 79 Desert Sucker, 132 Sonora Sucker, 32 Fathead Minnow, 5 Green Sunfish, and 9 crayfish. Of the 14 Spikedace that were captured, seven were <45 mm TL. Of the 48 Roundtail Chub captured, 47 were <100 mm TL. All five Green Sunfish were captured in Reach 3. Overall catch rates of fish were higher than 2013, possibly because a 5,000 cfs flood in September 2013 may have displaced or killed fish. Flows in 2013 and 2014 appeared to be similar, and were estimated to be between 25-30 cfs based on on-site observations; the gage malfunctioned in 2013 because of the before mentioned flood, and the gage did not appear to be recording correctly in 2014 (readings were 1-2 cfs).

During April 27-28, 2015, Program staff performed a Loach Minnow survey in the Blue River between HU Bar Box and McKittrick Creek. We surveyed 15, 100-m segments (transects) spaced 1 km apart. Sampling was single-pass electrofishing, but in riffles, we used a combination of electrofishing and kick seining. We captured two loach minnow, one in a transect near the mouth of Tornado Canyon, and the second in a transect near the mouth of Raspberry Creek. Also captured were 454 Longfin Dace, 341 Speckled Dace, 83 Desert Sucker and 33 Sonora Sucker.

During June 1-3, 2015, Program staff set 60 Promar mini-hoop nets and 36 hoop nets within pools in all six reaches between the Barrier and Fritz Ranch in an effort to remove Green Sunfish. Nine Green Sunfish were captured and removed; no other Green Sunfish were observed. Seven of the Green Sunfish were removed from Reach 1, one from Reach 2, and one from Reach 4. Size of Green Sunfish ranged from 120-210 mm TL.

During June 22 – 24, 2015, Program staff conducted another annual mechanical removal of piscivores between Fritz Ranch and the constructed fish barrier. We snorkeled through 88 pools and one run over 1 m in depth, and visually surveyed 18 other pools and one run that were shallow, clear and had no cover. Pool 1, closest to the barrier, was dry. No Channel Catfish or any other large-bodied nonnative piscivorous fish were observed. Seven Green Sunfish were observed, all in Reach 1. We also observed hundreds of Spikedace (both < 40 mm and > 40 mm TL), Roundtail Chub (multiple size classes), Longfin Dace, Speckled Dace, Desert Sucker, and Sonora Sucker. No Loach Minnow were observed.

Trends: The number of Channel Catfish captured during annual removal efforts (snorkeling-spear fishing) has decreased each year: 70 were removed in 2009, 7 in 2012, 3 in 2013, 0 in 2014, and 0 in 2015. Therefore, Channel Catfish may be eradicated, but at least one more survey will be necessary to be more confident in that conclusion.

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. Subsequently, during monitoring in November 2012, we captured 106 Green Sunfish and they were distributed throughout reaches 2-5. After that, based on annual monitoring, Green Sunfish abundance decreased; six were captured in 2013 and five in 2014. 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 and 8 in 2014. Also, during the June 2014 Green Sunfish removal effort, 10 individuals were removed, and during the June 2015 effort, nine sunfish were removed. During the annual monitoring and the Green Sunfish removal

efforts, all captured sunfish were removed from the river. However, during the snorkeling, not all observed sunfish were removed because that effort is targeted at removing catfish and spearing is not very effective at capturing Green Sunfish. Therefore, it is possible that our removal efforts, combined with natural flooding events, has resulted in a reduction of the Green Sunfish population in the lower Blue River.

Spikedace appear to be in the process of establishing 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, and 13 in 2014. Size of Spikedace captured during the annual monitoring in 2013 ranged from 47 to 85 mm TL, and in 2014 from 31 to 67 mm TL, so the species obviously reproduced. Further evidence that Spikedace reproduced and are increasing in abundance comes from the annual snorkeling in June 2015, when over 900 were observed and at least 471 of those were < 40 mm TL.

Roundtail chub also appear to be in the process of establishing 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 November 2012, three in 2013, and 48 in 2014. Chub caught in the 2014 annual monitoring ranged from 44 to 214 mm TL, with 47 being < 100 mm TL. In addition, during the piscivore removal effort (snorkeling) in 2015, over 700 roundtail chub were observed, and at least two of those were < 50 mm TL. However, the high numbers of Roundtail chub observed in June 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 monitoring activities, but it was able to recruit personnel for the activities. The community of Blue, and possibly other local communities, may have concerns with and may oppose chemical methods to control nonnative fish. The USFS does not currently support chemical control efforts.

Comments: We are cautiously optimistic that our nonnative fish control efforts are working, and that Roundtail Chub and Spikedace have established populations. The October 2014 fish health assessment of Speckled Dace from Blue River detected *Lernaea*, but no other parasites, pathogens, or viruses of concern.

Lower San Pedro River Preserve Pond Stockings (Task 3-64 and 3-75j).

Description: Reclamation rehabilitated two groundwater-supplied ponds on The Nature Conservancy's Lower San Pedro River Preserve for use as native fish and waterfowl habitat. The purpose of this project was for the Department to complete the necessary environmental compliance, identify appropriate stock, acquire and stock individuals of Gila Chub, Desert Pupfish, and Gila Topminnow into the refuge ponds. Gila Chub were to come from extant San Pedro River basin populations, while suitable source stocks of pupfish and topminnow had not been specifically determined. Razorback Sucker, Gila Chub, Desert Pupfish, and Gila Topminnow were stocked into the ponds. Razorback Sucker was removed, but the other three species remain.

Status: Completed.

Expenditures: Approximately \$10,748.

Preliminary Results:

Program staff analyzed data and wrote a completion report summarizing stocking and monitoring activities during 2009-2014 (Frear et al. 2015a).

The ponds were monitored on July 17, 2014; 24 hoop nets and 10 mini-hoop nets were set in the western pond. No Gila Chub were caught in the mini hoop nets but 373 were captured in the large hoop nets with a mean catch rate of 12.1 ± 4.56 fish/h. About 58% (218) of the chub were <50 mm TL. Seven seine hauls were also performed in the western pond and 12 Gila Chub (0.05 fish/m² \pm 0.04) and 128 Gila Topminnow (0.96 fish/m² \pm 0.25) were captured. In the eastern pond nine minnow traps were set and 1,193 Desert Pupfish were caught (58.5 fish/h \pm 16.97). No *Lernaea cyprinacea* were observed on any of the fish captured.

Obstacles: None.

Comments: This project should be considered completed and removed from the task list. Gila Topminnow, Desert Pupfish, and Gila Chub are established in the ponds and should persist barring any environmental catastrophe. The populations should be monitored by regional Department, Nongame Fish Program, or TNC personnel. Occasionally individual Gila Chub from O'Donnell Creek, IWM, or T4 Spring should be stocked to maintain genetic variability similar to the source populations. Similar augmentations of Gila Topminnow and Desert Pupfish should occasionally be completed for genetic management of the 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 eliminate this potential avenue of nonnative fish contamination and 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 \$8,360.

Preliminary Results: Program staff analyzed data and wrote a report summarizing Mineral Creek drainage fish and stock tank surveys (Crowder et al. 2015).

Program staff finalized a report summarizing stock tank monitoring activities in the Blue River drainage during 2012 and 2013 (Crowder et al. 2014).

Obstacles: Could not get permission to access two of the ponds on private land near the Blue River.

Comments: All of the tanks in the Mineral Creek and Devils Canyon drainage have now been surveyed. Fish were captured in two of the tanks, both in the Devils Canyon drainage. Western Mosquitofish were captured in East Fork Tank. Mosquitofish and Bluegill were captured in Headquarter Tank. These two tanks should be targeted for eradication efforts to eliminate them as sources of nonnative fish to the Devils Canyon drainage.

All of the tanks in the Blue River drainage have been surveyed except two, for which access was denied. Four tanks in the drainage, and the Joy's hatchery had fish. Lazy YJ Ranch Tank had Longfin Dace, Sonora Sucker, and Razorback Sucker or Razorback-Sonora Sucker hybrids. Tanks 30 and 31 had Fathead Minnow. Mesa Tank had Western Mosquitofish. Rainbow Trout, Sonora Sucker, and Northern Crayfish were captured at the Joy's hatchery. Rainbow Trout are not of concern because they already inhabit the Blue River and are a sport fish there. Mosquitofish and Fathead Minnow at the three locations are not of great concern. However, if the amount of effort required is not too great, and the risk of reinvasion low, then consideration should be given to drying the three tanks to eradicate these potential sources of nonnative fish to the Blue River.

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 (i.e., potential Gila Topminnow repatriation sites identified in the draft recovery plan or in Voeltz and Bettaso 2003) 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 (3-37).

Status: Ongoing.

Expenditures: Approximately \$19,108.

Preliminary Results: Program staff visited Copper Creek, tributary to Bishop Creek (tributary to the Agua Fria River) in October 2014 to assess suitability for Gila Chub and Gila Topminnow. Four large pools were observed, which could provide habitat for probably less than 200 Gila chub. Both the reach surveyed, and another reach from that down to the waterfall near Copper Spring should be surveyed during low water to re-assess suitability for Gila Chub and Gila Topminnow.

Program staff visited Indian Creek and Reimer Spring in the Agua Fria drainage on Prescott

National Forest on March 10, 2015 to assess the suitability for Gila Topminnow. Indian Creek was previously visited in 2008, and was deemed suitable for topminnow, but a more formal habitat evaluation was desired because of reported sedimentation after the Cave Creek Complex fire. We walked approximately 700 m of Upper Spring in Indian Creek. About 220 m had surface water, with 4 pools and 2 glides (62 m) that were appropriate habitat for Gila Topminnow. One pool was 0.6 m deep and contained 10-20 chub; we placed a temperature logger in this pool. Throughout the wetted section we saw a variety of fish, there was also a good amount of aquatic vegetation and insects. The fence on the upstream end of the enclosure was down. In Middle Spring of Indian Creek we hiked 825 m. There was 165 m of surface water, with about 3 large pools. There were longfin dace and suckers, and many larval fish present in the pools, so there likely is some perennial water at this location. We recommend that Gila Topminnow be stocked into Upper Water Spring of Indian Creek in 2015.

Also on March 10, 2015, we walked 880 m of Reimer Spring. There was about 250 m of surface water within a fenced area (excluded livestock from the stream) and the surface water continued downstream of the enclosure. There were 9 pools (the lower few are likely not perennial) which comprised about 61 m of the habitat in the enclosure. Several pools were greater than 0.5 m deep. No fish were observed, but there were abundant aquatic insects throughout much of the wetted reach as well as aquatic vegetation (*Chara* and watercress). Water quality was well within the range for Gila Topminnow. There was debris on some trees in the upper wetted portion, which was evidence of flooding events. The upstream fence line was down. We recommend that Gila Topminnow be stocked into Reimer Spring in 2015.

On March 17, Program staff evaluated Seven Springs, north of Carefree, AZ. This was stocked with Gila Topminnow in 1964, 1974, and 1980, but they were last captured in 1991, and since then has been recommended for topminnow repatriation. Program staff backpack electrofished from the Forest Road 24 crossing upstream until the creek went dry. The only fish species captured was Longfin Dace which were abundant (over 600 captured), as were crayfish. No nonnative fish species were captured or observed in Seven Springs Wash. Within the 1.6 km surveyed, there were 15 pools in the lower section, and 37 shearwater zones. Glides were the most common habitat (38%) followed by pools (23%). Based on the habitat, there is likely suitable habitat for Gila Chub, Gila Topminnow, and Spikedace. There is also potential habitat for suckers and Speckled Dace. However because of crayfish and limited riffle habitat (9%, most of which was embedded), the location does not appear very suitable for Loach Minnow.

Program staff evaluated upper Lime Creek on Tonto National Forest on March 18, 2015. They began where Lime Creek crosses FR24, and hiked downstream to the confluence with Long Canyon; this confluence is about 4.2 km upstream of Lime Spring where Gila Topminnow were stocked in the past. Surface water was first noted about 150 m downstream of the powerlines and continued downstream to about 500 m upstream from the confluence with Long Canyon; but there were two short dry sections within the wetted reach. There was about 1.3 km of surface water that was likely perennial. Staff set five nets throughout the habitat where fish were seen (downstream of Cougar Canyon) and only Longfin Dace were captured, although some fish, that may have been Desert Suckers, were observed. Staff also observed a frog egg mass and a frog, which was likely a Lowland Leopard Frog. There were six pools upstream of Little Cougar Canyon that looked perennial, two of which could hold large numbers of chub. About 160 m

upstream of Little Cougar Canyon there was a 5-m sloping waterfall, between the fourth and fifth downstream pools, that likely is a fish barrier. In the perennial reach, there were a total of 25 pools that appeared to be suitable habitat for chub; 18 had depths > 1m. In the lower portion of the perennial reach there were some cobble riffles that looked suitable for Loach Minnow and some sheer zones below small falls that looked like good habitat for Spikedace. However, this section of stream should be revisited during the dry season to determine how much of this habitat is perennial. Several of the pools in the lower perennial section of the stream appeared suitable for Gila Topminnow. Staff also walked up Little Cougar Canyon and Cougar Canyon to determine suitability for Gila Topminnow. Little Cougar did not appear to have enough water to support Gila Topminnow. Cougar Canyon seemed to have potential Gila Topminnow habitat but the gradient and narrowness indicated that it is likely prone to flash flooding. Staff walked about 850 m up Cougar Canyon until they encountered a 15-m waterfall, which had water coming over it and a pool at the base.

Program staff visited Towel Creek, near Fossil Creek, on March 23, 2015 to evaluate it for suitable Gila Topminnow habitat. From Fossil Creek Rd near Needle Rock, it was about a 3 mile hike to the confluence of Towel Creek and Brushy Prong. There were four pools that looked to be perennial near the Brushy Prong confluence; they had watercress and algae instream and irises along the bank. There was flowing water below the pools, but it did not look perennial. Between the tributary that contains Towel Spring down to the confluence with Brushy Prong, the gradient is about 8.7%. Given the high gradient, it seems likely that any stocked Gila Topminnow would get washed downstream. Therefore we do not recommend the site for Gila Topminnow, but it is likely suitable for longfin dace or speckled dace.

Program staff visited Rock Creek and Cottonwood Creek, both tributaries to Lake Roosevelt on March 24, 2015 to evaluate the suitability for Gila Topminnow or other native fishes. Program staff first walked from FR 445 up Fox Gulch, a tributary to Rock Creek. Water was flowing from the road crossing up to Fox Gulch Spring, but based on the lack of aquatic vegetation, appeared to be seasonal; no fish were observed. Staff then went to the Big Oak Flat area and hiked up Rock Creek. From the Forest Trail 123 trailhead, they hiked upstream about 1.6 km; no fish were observed. There was a 2-m tall waterfall about 380 m upstream, with a large pool below it that looked suitable for chub. There were several other pools upstream that were smaller, but still looked suitable for chub. The gradient looked too high for Gila Topminnow, but we recommend the site be visited during a drier time of year and evaluated again for other native fishes. Staff then walked along Rock Creek from Three Bar cabin downstream to the confluence with Baldy Canyon; there was about 700 m of surface flow beginning near the cabin downstream to about 400 m upstream from the confluence with Baldy Canyon. The habitat was mostly a shallow run with the substrate mostly sand, but there were a couple pools near the downstream end. The habitat did not look suitable for Gila Topminnow, but did appear suitable for Longfin Dace.

Program staff visited Cottonwood Creek just south of the community of Roosevelt. Staff took FR 341 south from the community of Roosevelt until the road crosses Cottonwood Creek and then parked. There appeared to be perennial water at the road crossing and downstream about 65 m; filamentous algae, *Chara*, and aquatic vegetation were present. They hiked upstream about 580 m. The canyon became very narrow about 100 m up from the road, but the stream was

bounded by what appeared to be a thick stand of Giant Cane *Arundo donax*, although it was possibly *Phragmites*. The vegetation would likely slow any floods and provide refuge for fish. There were several deep pools along the way, and the stream was slow moving. There was an old cement diversion dam, below which was a large pool. No fish were observed. The gradient from the road crossing up to the first tributary on the left was about 7%. Although the gradient is high, we recommend it be considered for Gila Topminnow establishment.

On April 21, 2015 Program staff visited Turkey Creek in the Black Canyon drainage to evaluate its suitability for Gila Chub or Gila Topminnow. The crew hiked from the Crown King Road crossing downstream to about 970 m upstream of the confluence with Poland Creek. Water began about 1.6 km below the road crossing and extended about 4 km downstream. About 3.2 km below the road crossing there was a small waterfall, below which there were Green sunfish in four pools; none were observed upstream. The habitat above the waterfall was mostly sandy bottom runs and glide. Also observed were a Narrow-headed Gartersnake and a Lowland Leopard Frog. Staff does not recommend the site for Gila Topminnow. The only species recommended is longfin dace.

Program staff visited Little Ash Creek in the Agua Fria drainage on April 22, 2015 to evaluate its suitability for native fishes. Program staff evaluated a 700 m section from the confluence with Yellow Jacket Wash downstream, and then about 600 m below that, a second section about 900 m long. Of the 1.3 km surveyed 47% was pool, 28% glide, and 21% run. Substrates were 24% silt and 25% cobble. Although they did not do an intensive fish survey, they did capture Green Sunfish, Fathead Minnow, Bullfrogs, and crayfish by dip netting. Longfin Dace and Desert Sucker have been reported from the stream as recently as October 2014. If the nonnative fishes could be removed, the stream is likely suitable for Gila Chub and Gila Topminnow.

Also on April 22, 2015, Program staff visited Wilson Spring. Wilson Spring is located east of Interstate 17 just downstream of Hog Basin and is a tributary to Cienega Creek in the Agua Fria drainage. About 550 m downstream of FR 68D, there is a large pool (20 x 25 m and over 2 m deep) at the base of a huge cliff (waterfall when water is flowing). The water was fairly cold (10.5 C), no fish were observed, and the pool looked like it may not be perennial. Below this pool, there was no surface flow for about 1 km downstream until arriving at Wilson Spring. At Wilson Spring staff performed some dip netting and captured a young-of-year and adult Green Sunfish. They also observed several Canyon Tree Frogs. Wilson Spring may be suitable for Gila Topminnow if Green Sunfish could be eradicated and if there is a barrier downstream. In the drainage upstream of Wilson Spring, there is one know tank (Hog Basin Tank) which should be surveyed to determine if it is occupied by Green Sunfish or other fish species.

Obstacles: None.

Comments: Most of the site evaluations were completed during winter or early spring, before our normal stocking and monitoring season.

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 special concern for maintenance and propagation. Reclamation funded the construction of the facility, and is funding an improvement to the facility in 2015-2016. Annual funding is provided to the Department to support facility operations and for one full-time and one half-time technician to clean tanks, feed fish, and propagate and maintain brood stock and progeny.

Status: Ongoing.

Expenditures: Approximately \$80,327.

Preliminary Results: Aquatic Research and Conservation Center staff continued to maintain holding facilities, and move fish into propagating tanks, move offspring into grow-out tanks, and in general care for Spikedace, Loach Minnow, Gila Topminnow, Woundfin, and Eagle Creek Roundtail Chub. Staff continued to develop new spawning techniques for Spikedace, Loach Minnow, and Roundtail Chub to improve number of offspring produced and adult contribution. Numbers of individuals of each species lineage being held at the center were:

Species	Lineage	Refuge size (#)	Last collection (Year)
Spikedace	Aravaipa	412	2014
Spikedace	Gila mainstem	392	2009
Spikedace	Gila Forks	204	2014
Loach Minnow	Aravaipa	316	2014
Loach Minnow	Gila Forks	81	2014
Loach Minnow	Blue River	245	2013
Loach Minnow	San Francisco	119	2012
Roundtail Chub	Eagle Creek	85	2013
Woundfin	Virgin River	278	2014*
Gila Topminnow	Cottonwood Springs	120	2012
Desert Pupfish	Santa Clara	75	2014*

*Asterisk indicates transfer from SNARRC/Dexter National Fish Hatchery rather than a wild collection.

Obstacles: Rarity of extant lineages that are targeted to be held at ARCC, which makes it difficult to collect sufficient numbers of fish from the extant populations to maintain refuge populations and broodstock. Also, the existing tanks 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 related 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), and Gila Topminnow (Cottonwood Springs and mixed lineages).

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: Approximately \$11,943.

Preliminary Results: In November 2014, the Gila Chub that were collected from Harden Cienega in May 2014 and held at ARCC were stocked into Mule Creek. Forty-nine Gila Chub died while being held and treated for pathogens and parasites at ARCC. On November 14, 2014, ARCC staff transported 60 Gila Chub (and Loach Minnow for Bonita Creek) to a staging area near Safford airport. A helicopter transported the Gila Chub via 55-gallon drums to a location where personnel from NMDGF as well as Department staff transferred the fish to buckets, hiked them to the stocking locations, and stocked 60 Gila Chub into Mule Creek. All fish looked healthy and behaved normally upon release. There were no mortalities associated with the stocking and transport activities.

On April 8-9, 2015, Program staff collected Gila Chub from the lower reaches of Harden Cienega Creek and moved 102 upstream to above the waterfalls and near the confluence of Prospect Draw. Fish behaved normally upon release. The translocation was done to expand the range of Gila Chub in Harden Cienega Creek. The collection of chub for translocation to New Mexico was postponed until autumn 2015.

Obstacles: The Program was short-staffed for collecting and stocking activities, but the program was able to recruit personnel for the activities. The remote location of Harden Cienega Creek and logistical challenges prevented Program staff from being able to collect more Gila Chub before the helicopter arrived.

Comments: Gila Chub have now been stocked three times into Mule Creek (118 in June 2012, 119 in November 2013, and 60 in October 2014). New Mexico has 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.

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 Gila River Basin Native Fish Conservation Program. 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 two years is sometimes 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, its Fish Health Lab, USFWS Fish Health Labs or other fish health labs 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 \$8,000.

Preliminary Results:

On August 26, 2014, Program staff collected 60 Longfin Dace from Tangle Creek. The fish were processed by SNARCC staff on-location and transported to the laboratory for further testing. Asian tapeworm (*Bothriocephalus acheilognathi*) was identified by microscopic examination of the intestines. No targeted bacterial or viral pathogens were isolated from the fish examined.

On August 27, 2014, Program staff visited Aravaipa Creek to collect longfin dace for a fish health assessment. However, the stream was flooding so the sampling was cancelled.

On October 27, 2014 Program staff collected 50 Speckled Dace from the lower Blue River for a USFWS fish health analysis. The SNARCC analysis detected *Lernaea* but no other parasites, pathogens, or viruses of concern.

On May 26, 2015, Department staff collected 60 Desert Pupfish from the smaller pond and 60 Gila Topminnow from the larger pond at TNC Lower San Pedro River Preserve. The live fish were sent to SNARCC for a fish health analysis. No *Lernaea* or any other parasites or pathogens of concern were detected.

On June 17, 2015, Program staff collected 59 Speckled Dace from Eagle Creek upstream of the Honeymoon Campground and shipped them live to SNARCC. The SNARCC reported that no survey targeted parasites were observed, nor were any targeted bacterial or viral pathogens isolated.

Obstacles: SNARCC did not always have time and monetary resources to perform the fish health assessments.

Comments: The Department hired a new Fish Health Specialist in 2015, and in 2016 will complete building and out-fitting a laboratory for fish health assessments. Once the laboratory is up and running, all assessments can be done by the Department's Fish Health Specialist which will save time and costs, and alleviate the need to coordinate assessments with SNARCC or Washington Aquatic Disease Diagnostic Laboratory (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, 2015. Gila Topminnow and Desert Pupfish site numbers are given where known. Established means the populations 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.

Species	Metapopulation	Lineage	Replicated Locations	Year replicated		
Gila Topminnow	Bylas Spring Complex	Bylas Spring	Swamp Spring (#406; Muleshoe Ranch CMA)	2007-2008		
			Cherry Spring (#405; Muleshoe Ranch CMA)	2007-2008		
			Secret Spring (#331, Muleshoe Ranch CMA)	2007		
			Headquarters Spring (#407; Muleshoe Ranch CMA)	2008		
			Burro Cienega, NM	2008		
			TNC Lower San Pedro Preserve's west pond	2006		
			Howard Well (#83)	2008		
			Bonita Creek (#414)	2010		
			Kei Sundt pond (#XXX)	2012		
			Upper Santa Cruz	Sharp Spring	Fossil Creek (#280)	2007-2010
					Morgan City Wash (#383)	2009
					Chalky Spring (#310)	2009
					Page Springs Hatchery SRP Topminnow Pond (#158)	2009
Buckhorn Spring (#298)	2011					
Monkey & Cottonwood Springs	Monkey Spring	Cottonwood Spring (#415; Goldfield Mountains)	2008			
		Spur Cross Ranch Conservation Area's Solar Oasis pond (#413)	2009			
		Usery Mountain Regional Park Pond (#233)	2011			
Redrock Canyon	Redrock Canyon	Walnut Spring (#392)	2012			
Cienega Creek	Cienega Creek	Road Canyon Tank	2012			
Desert Pupfish	Santa Clara/El Doctor	Howard Well (#83)	2008-2009			

		Mud Spring (#18; Tonto NF Mesa Ranger District)	2007-2009
		Larry & Charlie Tank (#408; Muleshoe Ranch CMA)	2009
		Nursery Tank (#398; McDowell Mountain Regional Park)	2010
		Pemberton Pond (McDowell Mountain Regional Park)	2009
		Robbins Butte Wildlife Area Cottonwood Tank (#391)	2010
		Robbins Butte Wildlife Area Twin Tanks (#391)	2009
		Spur Cross Ranch Conservation Area's Solar Oasis pond (#413)	2009
		TNC Lower San Pedro Preserve's east pond (#390)	2009
		Kei Sundt pond (#XXX)	2010
Longfin Dace	Hassayampa River	Arnett Creek	2007
	Tangle Creek	Fossil Creek	2008-2009
	Coal Mine Canyon	Fresno Canyon	2008
Loach Minnow	Aravaipa Creek	Hot Springs Canyon	2007-2011
Spikedace	Aravaipa Creek	Hot Springs Canyon	2007-2011
	Aravaipa Creek	Fossil Creek	2007-2012
	Upper Gila River	Blue River	2012
Roundtail chub	Eagle Creek	Blue River	2012
Gila Chub	O'Donnell Creek	TNC Lower San Pedro Preserve's west pond	2011