Gila River Basin Native Fishes Conservation Program
Policy Committee Meeting

Thursday, June 15, 2023
2:00 PM – 4:00 PM (AZT)
Virtual

DRAFT MEETING NOTES

Meeting Objectives:

- Review work completed by the Program in the last year.
- Finalize recommendations for FY24 Work Plan.
- Provide relevant updates on projects, contracts, and species recovery.

Participants: Sean Heath, Kent Mosher, Betsy Grube (USBR), Julie Carter, Brian Hickerson (AZGFD), Scott Richardson (USFWS), Heidi Blasius (BLM), Kirk Patten, Jill Wick (NMGF), Timothy Frey (BLM)

General Program Update

Reclamation and USFWS

- Personnel Updates - Committee Members and Species Leads
    - Scott Richardson, the USFWS Technical Representative is filling in for Heather Whitlaw, USFWS Policy Representative, who could not make it today.

Strategic Plan Goals Update

Kent Mosher, Bureau of Reclamation – see Kent's presentation for details

<u>Scientific Foundation</u>

- Goal 1: Investigate novel methods to control nonnative aquatic biota.
    - Mechanical control using YY male fish (Red Shiners) – Chad Teal wrapped up thesis in 2022/2023 and a post doc was funded to continue to investigate the use of YY male Red Shiner as mechanical control. The post doc will encompass modeling and simulation, population genetic testing, and Estradiol 17 β Pathology (for FDA approval). Chad will be taking this project with him to the Utah State University and will be hiring a grad student to complete the work.
- Goal 2: Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.
    - Habitat suitability and predictive analytics - Kelsie Fields successfully defended thesis for this work and is working on publishing findings. Goal of study is to identify which habitat variables play an important role in Gila Chub abundance then ideally recommend some locations where they're suitable habitat for potential future repatriation
- Goal 3: Improve propagation techniques for Spikedace and Loach Minnow.
    - ARCC – Ongoing study evaluating nest spacing for Loach Minnow and Spikedace. Will continue in 2023. ARCC staff has been successful in improving propagation and is aiming for a 25% increase (see presentation for details).
- Goal 4: Develop genetic management plans for priority species.
    - Gila Topminnow Genetic Management Plan – Final evaluation published in 2022 and genetic management plan in progress with completion anticipated in 2023. Significant findings from evaluation found *P. monacha* (new detection in Arizona) present in the Santa Cruz River, and one hybrid population (accidental mixing) was

discovered at the ASU and fish were destroyed. Two publications related to this work in progress.

- Goal 5: Investigate new stocking strategies to improve survival of repatriated fish.
    - Range-wide habitat assessment in Loach Minnow and Spikedace - Habitat assessments completed in 2020. Genetic-habitat relationship assessment has not been completed. Pit tag efficacy study completed in 2020. Characterize dispersal and survival of stocked Loach Minnow and Spikedace completed in 2022. Results of dispersal study suggests emigration is driver behind success of repatriation efforts.
    - Reintroduction of Razorbacks in Horseshoe Revisor – Ongoing study to evaluate the survival of Razorback Suckers at two different stocking locations in Horseshoe Revisor, seasonal movement, habitat preference, and the impacts of normal SRP operations (draining, or near draining). Pit tagged fish were stocked is 2022 and 2023 and are tentatively planned to be stocked again in 2024.

<u>Preventing extinction and recovery of priority species</u>

- Goal 1: Identify critical streams and populations for protection/repatriation
    - Ongoing list evaluated on a case by case basis. Removed from strategic plan for 2023-2027.
- Goal 2: Maintain and operate ASU holding facility for top minnow and ARCC to support program recovery efforts
    - ASU Topminnow holding facility decommissioned in April 2022 and fish were moved off site.
    - ARCC continues to be funded to support staff and supplies.
- Goal 3: Protect native fish populations from nonnative fish invasions.
    - Constructed 8 barriers: Aravaipa Creek, Fossil Creek, Cottonwood Springs, Bonita Creek, Hot Springs Canyon, Blue River, Spring Creek (Oak Creek), West Fork Black River
    - Proposed 4 barriers: Eagle Creek, Upper Verde River (2 barriers proposed), San Francisco River, O'Donnell Canyon.
    - Ongoing investigation for proposed barriers in 2022 and 2023.
- Goal 4: Remove nonnative threats
    - Continued removal efforts at Redfield Canyon, Harden Cienega, Red Tank Draw, West Fork Gila River, Bonita Creek, Aravaipa Creek, Sharp Springs (completed 2022), Upper Verde Stock Tanks, and West Fork Black River (Funded on tribal plans and is outside of the workplan).
- Goal 5: Replicate populations and their associated native fish community
    - 5 locations stocked: Spring Creek (Spikedace), Blue River (Spikedace), Unnamed Drainage #68b (Gila Topminnow), Aravaipa Creek (Gila Topminnow), Sharp Spring (Gila Topminnow)
    - 11 locations post-stocking monitored: Aravaipa Creek (Gila Topminnow), Arnett Creek (Gila Topminnow), Telegraph Canyon (Gila Topminnow), Maternity Wildlife Pond (Gila Topminnow), Tortilla Creek (Gila Topminnow), Unnamed Drainage #68b (Gila Topminnow), Blue River – Upper (Loach Minnow, Spikedace, Roundtail Chub), Blue River – Middle (Loach Minnow, Spikedace, Roundtail Chub), Rarick Canyon (Gila Chub), Sabino Canyon (Gila Chub), Spring Creek (Spikedace)
- Goal 6: Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.
    - Nothing to report in 2022.
    - Three links easement, that reclamation is maintaining on the San Pedro River, may be stocked with Gila Topminnow pending further coordination.
- Goal 7: Protect, maintain, and restore degraded habitats to use for native fish

    - Nothing to report in 2022.
- Goal 8: Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them
    - Sharing Tails – presented to 40 schools in 2022. Scheduled to end in August 2023. No funding within GRBNFCP is available to support this program.
    - Field Guide to Fishes of Arizona – Developed by Paul Marsh. Release date expected for September 2023.
    - Gila River Native Fish Conservation Field Project – Ongoing photography and film project (2022-2023). By September we should have 6-10 min short film and 1-2 min short film and 24-36 images.
- Goal 9: Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.
    - Awarded new monitoring contract (Marsh and Associates) for 2022-2026. Continue to support/utilize eDNA sampling within long term monitoring.
- Goal 10: Maintain accurate Program tracking records.
    - Programs of work, website, reports and publications continue to be updated on schedule.

Strategic Plan (2018 – 2022) 5-Year Review and Updates

Kent Mosher, Bureau of Reclamation – see Kent's presentation for details

Scientific Foundation

- Goal 1: Investigate novel methods to control nonnative aquatic biota – **completed.**
- Goal 2: Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes – **completed.**
- Goal 3: Improve propagation techniques for Spikedace and Loach Minnow – **completed.**
- Goal 4: Develop genetic management plans for priority species – **In progress but not completed in required timeframe (2018-2022)**.
- Goal 5: Investigate new stocking strategies to improve survival of repatriated fish – **completed**.

Preventing extinction and recovery of priority species

- Goal 1: Identify critical streams and populations for protection/repatriation – **stopped pursuing because it was agreed upon by all parties to not be worthwhile.** Removed from 2023-2027 Strategic Work Plan. Streams will continue to be evaluated on a case-by-case basis.
- Goal 2: Maintain and operate ASU topminnow holding facility and the Aquatic Research and Conservation Center (ARCC) to support the Program's recovery efforts for imperiled fishes in the Gila River Basin through the establishment of refuge populations of genetically distinctive stocks as insurance against extinction in the wild, captive propagation for repatriation, and applied research - **Partially completed as management plans were drafted for fish at ARCC but no final plans have been made available**.
- Goal 3: Protect native fish populations from nonnative fish invasions- **No barriers have been completed under this evaluation period.**
- Goal 4: Remove nonnative threats – **completed.**
- Goal 5: Replicate populations and their associated native fish community – **completed.**
- Goal 6: Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water – **Easement along the San Pedro River is being maintained by Reclamation, but no native fish conservation action has been completed**.
- Protect, maintain, and restore degraded habitats to use for native fish – **Potential projects identified but no work was completed under this evaluation period**.

- Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them – **completed.**
- Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats – **completed.**
- Maintain accurate Program tracking records – **completed.**

Strategic Plan (2023-2027)

Kent Mosher, Bureau of Reclamation

Please see (2023-2027) Strategic Plan for full list of objectives. Plan is subject to change based on the results of the ongoing CAP consultation. Current goals for the 2023-2027 Strategic Plan are summarized below.

Scientific Foundation

- Goal 1: Investigate novel methods to control nonnative aquatic biota.
    - Objective A: Seek at least one opportunity to partner or fund new control methods or improvements upon existing methods
    - Kirk – requested elaboration for FDA process. YY Male Consortium is evaluating approach/working to get Investigational New Drug Application (IND) approval for all 7 species. The GRBNFCP program is focused on the research side of the application and filling in the research gaps. The YY Consortium has requested funding, but the GRBNFCP has not funded the consortium at this time. ***Kirk, Julie, and Kent will meet at another time to discuss further.***
- Goal 2: Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.
    - Objective A: As opportunities arise, initiate ecological/life history studies of native biota where such understanding can assist with conservation goals of the Program.
- Goal 3: Improve propagation techniques for Spikedace and Loach Minnow.
    - Objective A: At a minimum, identify and implement at least one research project aimed at improving propagation.
- Goal 4: Complete genetic management plans for priority species.
    - Objective A: Develop genetic management plans for Spikedace, Loach Minnow, and Gila Topminnow.
- Goal 5: Investigate new stocking strategies to improve survival of repatriated fish
    - Objective A: At a minimum, document existing stocking strategies, identify locations with poor survival, and identify likely causes of poor survival.

Preventing extinction and recovery of priority species

- Goal 1: Maintain the Aquatic Research and Conservation Center (ARCC) and explore alternative locations for establishment of hatchery stocks of upper Gila and San Francisco River lineages of Spikedace and Loach Minnow.
    - Objective A: Use genetic management plans for development of brood stock management plan.
    - Objective B: Augment hatchery populations as outlined in brood stock management plans.
    - Objective C: Ensure the Aquatic Research and Conservation Center (ARCC) has the staff support and supplies necessary to maintain propagation of Spikedace and Loach Minnow at a level needed to meet stocking demands provided wild fish are available.
    - Objective D: Determine start up and O&M costs for New Mexico hatchery stocks of Spikedace and Loach Minnow.
- Goal 2: Protect native fish populations from nonnative fish invasions.
    - Objective A: Complete the scoping, environmental compliance, and design of two additional fish barriers, and initiate their construction.

- Remove nonnative aquatic species threats.
    - Objective A: Eradicate or suppress nonnative aquatic species from a minimum of five surface waters to prepare them for repatriations of native fishes.
- Replicate populations and their associated native fish community into protected streams and other surface waters
    - Objective A: Replicate Gila Topminnow stocks into a minimum of 10 surface waters.
    - Objective B: Replicate each of the other priority species into a minimum of one surface water.
- Protect, maintain, and restore degraded aquatic habitats to use for native fish.
    - Objective A: Restore habitats in a minimum of one location with existing populations or in a location planned for repatriations.
    - Objective B: Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.
    - BR sent letter of support for TNC acquiring Cottonwood/Monkey Spring. Does not have to be a financial task.
- Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them.
    - Objective A: Implement a minimum of one I&E opportunity per year.
    - Objective B: Update Program website at least twice per calendar year.
- Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats
    - Objective A: Implement and report on Long-Term Monitoring Plan for Native Fish Populations in the Gila River Basin.
    - Objective B: Develop/identify monitoring standards as necessary to adequately evaluate fish barrier function, success and failure of nonnative fish species eradications/suppression, and success and failure of repatriations of 5 priority species.
    - Objective C: Incorporate eDNA monitoring techniques and/or other emerging technologies into monitoring practices.
- Maintain accurate Program tracking records.
    - Objective A: Continue to develop annual workplans and reports to track program accomplishments.

FY24 Work Plan

Kent Mosher, Bureau of Reclamation

- Review of Project Proposals (Kent)
    - Ranking – projects scores were averaged by review score. Tech committee members did not rank own projects.
    - Proposed projects –
        - NMDGF/USFS/USFWS - Nonnative removal in West Fork Gila River, New Mexico T&E Fish Repatriations and Monitoring, Remote Site Inventory and Assessment
        - AZGFD – Green sunfish removals in Redfield Canyon, Topminnow and Chub assessments, stockings, and post stocking monitoring, Spring Creek (Oak Creek tributary) Repatriations, Blue River Native Fish Restoration, Harden Cienega Creek Native Fish Restoration, Upper Verde River Native Fish Restoration, Sharp Spring Native Fish Restoration, George Wise Spring Nonnative Fish Removals, Eagle Creek Spikedace and Loach Minnow Reintroduction, continued maintenance and stockings associated with ARCC.
        - BLM – Nonnative removals at Bonita Creek and Aravaipa Creek.

- Technical Committee Clarifications (if needed, All)
    - FY2024 project costs exceed allotted $550,000. In FY2025, there is no guarantee that all projects will be funded as there is projected to be increasing costs associated with all work.
- Policy Committee Recommendation
    - Reminder – There have been concerns over ranking due to conflicting interest. Each agency did not rank their own projects and each agency has one vote. It is Reclamation and USFWS's final authority on approval of projects.
    - All agencies recommended approval of FY2024 workplan as it stands.

Updates
All

- Species Status Updates (Scott)
    - No specific updates on Gila Chub, Spikedace, Loach Minnow, or Desert Pupfish
    - Gila Topminnow SSA – in progress
- Fish Barriers (Kent)
    - Eagle Creek – Drafting/finalizing barrier related agreements. NEPA/Section 7 initiations expected to begin Summer/Fall 2023. Earliest construction anticipated for 2024.
    - O'Donnell Creek – Initial discussions with (new) AWRR Coordinator and BLM in Spring 2023. Site visit with preliminary assessment in May 2023. Awaiting decision of support from BLM and AWRR by July 2023.
    - Verde River Barrier – Reclamation is proposing two barriers on the Verde River. Awaiting findings of Upper Verde River Wild and Scenic Suitability Study. Final EA, FONSI, and Decision of Notice is expected by July/August 2023 and will influence the future of this project.
    - San Francisco River at Pleasanton Diversion – Diversion on Gila NF but access is through private property. Site visit in April 2023, however, flows were too high and land surveyor and engineer plan to revisit in Summer 2023. Additional canals and diversion may need to be modified to secure upstream of barrier from nonnatives.
- Fish Monitoring (Kent)
    - Contractor (Marsh and Associates) started surveying sites in April 2023. Lead Biologist for contract is now Paul Reap.
- Information and Education (Kent)
    - Currently supporting Sharing Tails, Field Guide of Fisheries of Arizona, and Gila River Native Fish Conservation Field Project. All anticipated to be completed in 2023.
    - Please contact Kent or Betsy with ideas for information/education.
- AGFD/NMDGF Updates (Julie/Brian and Kirk/Jill)
    - AZGFD (Julie/Brian)
        - AZGFD working with WMAT to stock YY male Brook Trout in West Fork of the Black River in combination with ongoing mechanical removal.
        - Gila Chub taxonomy manuscript is under revision and should be published soon. Once published, Julie will share the manuscript with the GRBNFCP.
        - ARCC Phase 3 designs were developed in 2017. New cost estimates increased project costs put construction on hold for the foreseeable future. A portion of GRBNFCP funds went towards furnishings and gear needed for operating and maintenance.
        - Translocation of Loach Minnow in Bear Wallow (Black River Drainage) was postponed due to resource availability (White River lineage Loach Minnow

are limited). Recovery team meeting, anticipated to be scheduled once new species lead has been hired, will provide additional resolution.
    - NMDFG (Kirk/Jill)
        - NMDFG bought property in Glenwood for conservation. Whitewater Creek (on property) has been surveyed but no Loach Minnow have been captured/observed. Habitat restoration is being discussed for this reach. Pond on property may serve as possible refuge pond for native fish.
        - The YY Consortium is set to meet in Santa Fe in July.
- Annual Reporting/Technical Committee Meeting Date
    - Currently scheduled for December 12-14 in Silver City New Mexico.
        - Jill proposed to move the meeting to the 11-13. No issues with meeting attendees but USFS representatives will be contacted to confirm.

Meeting adjourned at 3:42

BUREAU OF RECLAMATION

GILA RIVER BASIN NATIVE FISHES CONSERVATION PROGRAM

Year in Review (2022)

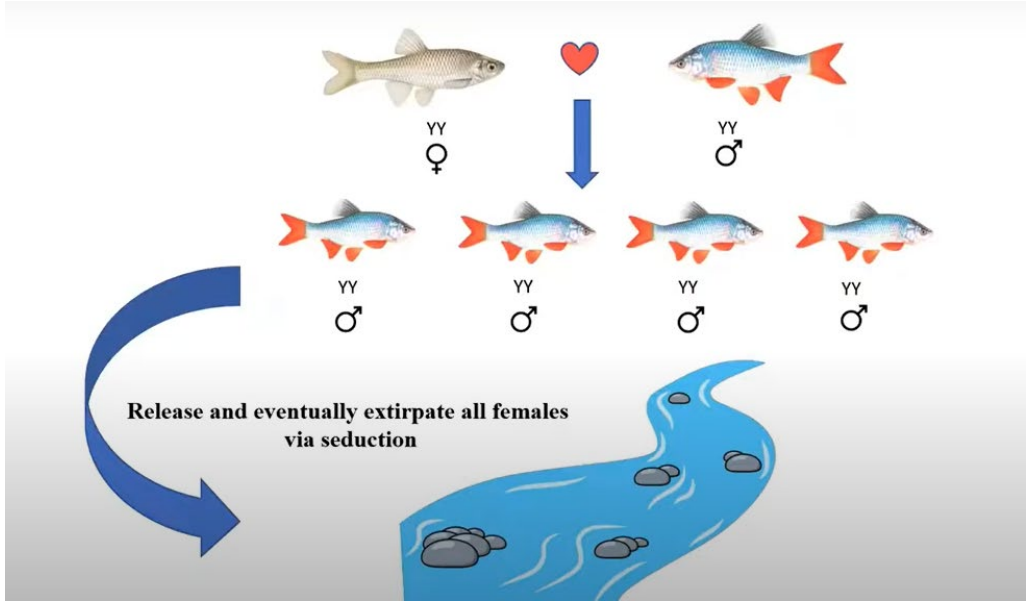
5 Year Strategic Plan (2018 – 2022)

Scientific Foundation		
No	**Goal**	**Objective**
1	Investigate novel methods to control nonnative aquatic biota.	a) Seek at least one opportunity to partner or fund new control methods or improvements upon existing methods.
2	Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.	a) As opportunities arise, initiate ecological/life history studies of native biota where such understanding can assist with conservation goals of the Program.
3	Improve propagation techniques for spikedace and loach minnow.	a) At a minimum, identify and implement at least one research project aimed at improving propagation.
4	Develop genetic management plans for priority species.	a) Develop genetic management plans for spikedace, loach minnow, and gila topminnow by 2022.
5	Investigate new stocking strategies to improve survival of repatriated fish.	a) At a minimum, document existing stocking strategies, identify locations with poor survival, and identify likely causes of poor survival.

1. Investigate novel methods to control nonnative aquatic biota.

Mechanical Control Investigation Using YY Fish (Red Shiner)

- Task 1 – Modeling and Simulations
- Task 2 – Population Genetic Testing
- Task 3 – Estradiol-17β Pathology



2. Update and assemble existing knowledge of life history needs.

Habitat Suitability and Predictive Analytics for Informing the Translocation of Gila Chub in the San Francisco River, NM

- Characterize habitat variables in streams with extant Gila Chub populations
- Determine initial suitability of potential translocation sites in the upper San Francisco River.
- Apply a predictive analytic approach to identify the relationships between variables deemed necessary to promote Gila Chub abundance.
- Offer recommendations for potential translocation sites.


San Francisco River, New Mexico

3. Improve propagation techniques for spikedace and loach minnow.

Aquatic Research and Conservation Center

- During spawn season, ARCC staff began the first year of a Loach Minnow nest spacing study.
- Year 1 (2022) - Evaluated nest spacing at 25 cm, 38 cm, and 50 cm utilizing Blue River lineage Loach Minnow.

3. Improve propagation techniques for spikedace and loach minnow.

Taxa	Extant Lineage/Stream		2015	2016	2017	2018	2019	2020	2021	2022
Spikedace	upper Gila River	#B	392	531	267	159	254	219	176	131
		#P	296	0	384	352	2404	408	914	466
		#S	296	0	327	0	0	0	0	0
		#A	0	0	0	0	0	0	0	0
Spikedace	Gila River Forks	#B	204	138	122	83	71	76	151	120
		#P	0	0	1183	195	1132	833	203	1252
		#S	0	0	1000	0	0	0	0	705
		#A	0	0	0	1	0	0	52	0
Spikedace	Aravaipa Creek	#B	412	262	382	331	523	529	379	158
		#P	35	120	1347	3214	4250	2182	1032	393
		#S	221	67	0	2234	0	2897	106	1707
		#A	150	80	160	0	322	49	0	27
Loach Minnow	Bear Creek	#B							112	66
		#P							196	65
		#S							0	0
		#A							0	0
Loach Minnow	Gila River Forks	#B	81	96	128	97	169	121	0	58
		#P	0	220	7	1207	665	15	0	475
		#S	0	0	159	0	0	0	0	0
		#A	0	0	110	145	0	0	102	0
Loach Minnow	San Francisco R.	#B	119	215	314	318	231	208	173	92
		#P	0	26	177	1627	601	3	541	310
		#S	0	0	243	0	0	0	0	0
		#A	0	0	0	0	0	0	0	0
Loach Minnow	Blue River	#B	245	214	156	117	290	266	364	244
		#P	0	426	47	6	713	16	919	278
		#S	0	390	0	0	0	500	400	0
		#A	0	12	0	223	80	269	130	4
Loach Minnow	Aravaipa Creek	#B	316	297	490	439	354	337	261	200
		#P	0	265	305	1848	1398	57	504	168
		#S	0	0	0	0	0	300	0	0
		#A	50	200	100	0	57	82	0	23

4. Develop genetic management plans for priority species.

Gila Topminnow

- Final Report (May 2022)
  - Yaqui/Gila Hybrids discovered at ASU holding facility
  - Genetic drift among lineages
  - P. monacha haplotypes in Santa Cruz River drainage
- Publications
  - Development of twenty-one novel microsatellite loci for Gila topminnow, *Poeciliopsis occidentalis occidentalis (Mussmann et al. 2023 – Molecular Biology Reports)*
  - Under Review (Biological Invasions): Genetic detection and population structure of a non-native hybridogenic Poeciliopsis species in the Santa Cruz River of Arizona, USA
- Genetic Management Plan to be completed by end of 2023.

Loach Minnow and Spikedace

- Genetic Management Plans to be initiated by end of 2023/early 2024.

5. Investigate new stocking strategies to improve survival of repatriated fish.

Range-wide habitat assessment of Loach Minnow and Spikedace

- Objective 1 – 2 (Habitat evaluation; completed - 2020)
- Objective 3 (Genetic-habitat relationships; TBD)
- Objective 4 (PIT tag efficacy; completed – 2020)
- Objective 5: Characterizing Dispersal and Survival of Stocked Loach Minnow and Spikedace
  - Hatchery fish had a five-fold higher emigration rate than wild fish shortly (<40 days) after being released.
  - Emigrating hatchery fish also tended to move downstream, whereas wild fish were more likely to move upstream.
  - Apparent survival estimates were ten times higher for tagged wild fish than hatchery fish one year after release.
  - Results suggest emigration, rather than lowered survival might limit the success of stocking efforts.

5. Investigate new stocking strategies to improve survival of repatriated fish.

Reintroduction of Razorback Sucker into the Lower Verde River and Horseshoe Reservoir

- Horseshoe Reservoir is managed to benefit native species.
- Water is manipulated to disadvantage nonnative fishes through draining and refilling.

- Objective: Investigate the ability to improve survival of Razorback Sucker by examining responses to stocking under various water manipulations.

- March 2022: Fish stocked while Horseshoe Reservoir was being drained.
- May 2023: Fish stocked when Horseshoe Reservoir was at full capacity.
- Spring 2024: TBD (or fish stocked while Horseshoe Reservoir is refilled)

5 Year Strategic Plan (2018 – 2022)

Preventing Extinction and Managing Toward Recovery		
No	**Goal**	**Objective**
1	Identify critical streams and populations in need of protection and potential replication.	a) By December 2018 create a document to be appended to the strategic plan that identifies and prioritizes streams in need of protection (habitat enhancement and threat removal) and potential repatriation.
2	Maintain and operate ASU topminnow holding facility and the Aquatic Research and Conservation Center (ARCC) to support the Program's recovery efforts for imperiled fishes in the Gila River Basin through the establishment of refuge populations of genetically distinctive stocks as insurance against extinction in the wild, captive propagation for repatriation, and applied research.	a) Identify key populations of other native species that may need refuge protection.
		b) Develop a broodstock management plans for captive populations.
		c) Augment hatchery populations as outlined in broodstock management plans.
		d) Ensure that ASU has the staff support and supplies necessary to maintain genetically viable refuge populations of Gila Topminnow.
		e) Ensure the Aquatic Research and Conservation Center (ARCC) has the staff support and supplies necessary to improve propagation of spikedace and loach minnow by 25% from the previous 5 years provided wild fish are available.
		f) Develop a hatchery management plan for ARCC.
3	Protect native fish populations from nonnative fish invasions.	a) Complete the scoping, environmental compliance, and design of four additional fish barriers, and initiate their construction.
4	Remove nonnative aquatic species threats.	a) Eradicate nonnative aquatic species from a minimum of five surface waters to prepare them for repatriations of native fishes.
5	Replicate populations and their associated native fish community into protected streams and other surface waters.	a) Replicate Gila topminnow stocks into a minimum of 10 surface waters.
		b) Replicate each of the other priority species into a minimum of one surface water.
6	Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.	a) Identify major surface and groundwater rights in perennial stream reaches of the Gila River basin where acquisition can contribute to conservation goals of the Program.
		b) Develop a sub group to investigate acquisition potential for a minimum of five water rights/properties/ easements to improve watershed protection for Gila River basin native fishes.
7	Protect, maintain, and restore degraded aquatic habitats to use for native fish.	a) Restore habitats in locations with existing populations and in locations planned for repatriations.
8	Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them.	a) Develop an I&E working group to implement no less than two opportunities per year.
		b) Update USBR website by December 2018.
9	Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.	a) By 2019, contribute to a basin wide long term survey strategy to ensure streams are being adequately monitored.
		b) Develop/identify monitoring standards as necessary to adequately evaluate fish barrier function, success and failure of eradications, and success and failure of repatriations.
		c) Incorporate eDNA and associated database and/or other technologies into monitoring practices.
10	Maintain accurate Program tracking records.	a) Continue to develop annual workplans and reports that track program accomplishments.

1. Identify critical streams and populations in need of protection and potential repatriation.

- Nothing to report in 2022.
- Removed from 2023 – 2027 Strategic Plan.

2. Maintain and operate ASU topminnow holding facility and the ARCC to support the Program's recovery efforts.

3. Protect native fish populations from nonnative fish.

- Proposed/Investigating
  - Eagle Creek
  - Upper Verde River (2 barriers)
  - San Francisco River (NM)
  - O'Donnell Creek
- Constructed
  - Aravaipa Creek
  - Fossil Creek
  - Cottonwood Spring
  - Bonita Creek
  - Hot Springs Canyon
  - Blue River
  - Spring Creek (Oak)
  - West Fork Black River

4. Remove nonnative aquatic species threats

- West Fork Gila River
- Aravaipa Creek
- Bonita Creek
- Sharp Spring
- Harden Cienega Creek
- Redfield Canyon
- Upper Verde River (investigations)
- West Fork Black River (tribal land)*

5. Replicate Populations and their associated native fish community…

- Stockings (5 locations)
  - Spring Creek (Spikedace)
  - Blue River (Spikedace)
  - Unnamed Drainage #68b (Gila Topminnow)
  - Aravaipa Creek (Gila Topminnow)
  - Sharp Spring (Gila Topminnow)

- Post-Stocking Monitoring (11 locations)
  - Aravaipa Creek (Gila Topminnow)
  - Arnett Creek (Gila Topminnow)
  - Telegraph Canyon (Gila Topminnow)
  - Maternity Wildlife Pond (Gila Topminnow)
  - Tortilla Creek (Gila Topminnow)
  - Unnamed Drainage #68b (Gila Topminnow)
  - Blue River – Upper (Loach Minnow, Spikedace, Roundtail Chub)
  - Blue River – Middle (Loach Minnow, Spikedace, Roundtail Chub)
  - Rarick Canyon (Gila Chub)
  - Sabino Canyon (Gila Chub)
  - Spring Creek (Spikedace)

6. Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.

- Nothing to report in 2022.

7. Protect, maintain, and restore degraded aquatic habitats to use for native fish.

- Nothing to report in 2022.

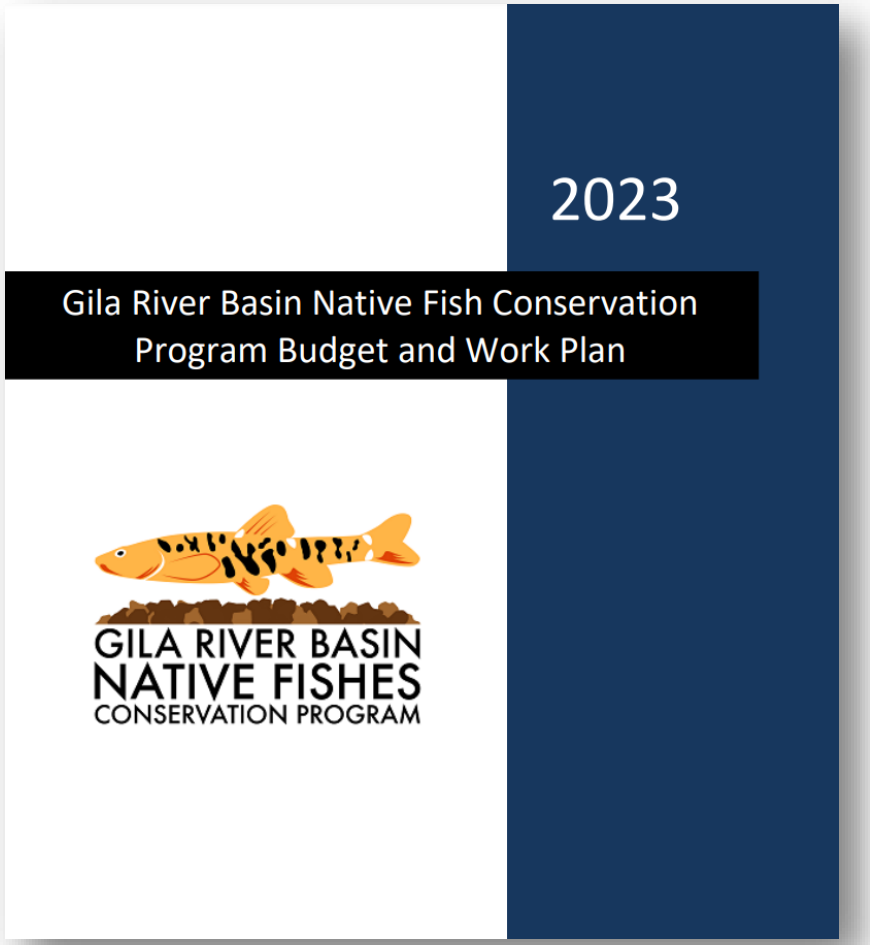
8. Inform and educate the public….

- Sharing Tails
  - Virtually presented to 40 schools in 2022.
  - Program ends August 2023.
- Field Guide to Fishes of Arizona
  - Expected release date in September 2023.
- Gila River Basin Native Fish Conservation Film Project
  - Ongoing filming/photography in 2022-2023.
  - Expected completion in September 2023.
    - 6-10 min short film
    - 1-2 min short film for social media
    - 24-36 still images

9. Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.

- Awarded new 5-year contract (2022 – 2026) for native fish monitoring.
- Continued to support/utilize eDNA sampling to monitor target species and non-natives.

10. Maintain accurate Program tracking records



5 Year Review (2018 – 2022)

Scientific Foundation		
No	**Goal**	**Objective**
1	Investigate novel methods to control nonnative aquatic biota.	a) Seek at least one opportunity to partner or fund new control methods or improvements upon existing methods.
2	Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.	a) As opportunities arise, initiate ecological/life history studies of native biota where such understanding can assist with conservation goals of the Program.
3	Improve propagation techniques for spikedace and loach minnow.	a) At a minimum, identify and implement at least one research project aimed at improving propagation.
4	Develop genetic management plans for priority species.	a) Develop genetic management plans for spikedace, loach minnow, and gila topminnow by 2022.
5	Investigate new stocking strategies to improve survival of repatriated fish.	a) At a minimum, document existing stocking strategies, identify locations with poor survival, and identify likely causes of poor survival.

5 Year Review (2018 – 2022)

Preventing Extinction and Managing Toward Recovery		
No	**Goal**	**Objective**
1	Identify critical streams and populations in need of protection and potential replication.	a) By December 2018 create a document to be appended to the strategic plan that identifies and prioritizes streams in need of protection (habitat enhancement and threat removal) and potential repatriation.
2	Maintain and operate ASU topminnow holding facility and the Aquatic Research and Conservation Center (ARCC) to support the Program's recovery efforts for imperiled fishes in the Gila River Basin through the establishment of refuge populations of genetically distinctive stocks as insurance against extinction in the wild, captive propagation for repatriation, and applied research.	a) Identify key populations of other native species that may need refuge protection.
		b) Develop a broodstock management plans for captive populations.
		c) Augment hatchery populations as outlined in broodstock management plans.
		d) Ensure that ASU has the staff support and supplies necessary to maintain genetically viable refuge populations of Gila Topminnow.
		e) Ensure the Aquatic Research and Conservation Center (ARCC) has the staff support and supplies necessary to improve propagation of spikedace and loach minnow by 25% from the previous 5 years provided wild fish are available.
		f) Develop a hatchery management plan for ARCC.
3	Protect native fish populations from nonnative fish invasions.	a) Complete the scoping, environmental compliance, and design of four additional fish barriers, and initiate their construction.
4	Remove nonnative aquatic species threats.	a) Eradicate nonnative aquatic species from a minimum of five surface waters to prepare them for repatriations of native fishes.
5	Replicate populations and their associated native fish community into protected streams and other surface waters.	a) Replicate Gila topminnow stocks into a minimum of 10 surface waters.
		b) Replicate each of the other priority species into a minimum of one surface water.
6	Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.	a) Identify major surface and groundwater rights in perennial stream reaches of the Gila River basin where acquisition can contribute to conservation goals of the Program.
		b) Develop a sub group to investigate acquisition potential for a minimum of five water rights/properties/ easements to improve watershed protection for Gila River basin native fishes.
7	Protect, maintain, and restore degraded aquatic habitats to use for native fish.	a) Restore habitats in locations with existing populations and in locations planned for repatriations.
8	Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them.	a) Develop an I&E working group to implement no less than two opportunities per year.
		b) Update USBR website by December 2018.
9	Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.	a) By 2019, contribute to a basin wide long term survey strategy to ensure streams are being adequately monitored.
		b) Develop/identify monitoring standards as necessary to adequately evaluate fish barrier function, success and failure of eradications, and success and failure of repatriations.
		c) Incorporate eDNA and associated database and/or other technologies into monitoring practices.
10	Maintain accurate Program tracking records.	a) Continue to develop annual workplans and reports that track program accomplishments.

5 Year Strategic Plan (2023 – 2027)

GILA RIVER BASIN NATIVE FISHES CONSERVATION PROGRAM
STRATEGIC PLAN 2023-2027
November 2022

U.S. Fish and Wildlife Service
U.S. Bureau of Reclamation
New Mexico Department of Game and Fish
Arizona Game and Fish Department

INTRODUCTION

This is the fifth 5-year strategic plan to assist the near-term implementation of the Gila River Basin Native Fishes Conservation Program (Program; previously known as the Central Arizona Project [CAP] Fund Transfer Program). The Program is funded by the U.S. Bureau of Reclamation (Reclamation), and is directed by the U.S. Fish and Wildlife Service (Service) and Reclamation, in cooperation with the New Mexico Department of Game and Fish (NMDGF) and Arizona Game and Fish Department (AZGFD). The Program mission is to undertake and support conservation actions (recovery and conservation) for federally listed, candidate and other at-risk fish species native to the Gila River basin by implementing existing and future recovery plans for those fishes. This strategic plan identifies the long-term vision for the Program as well as broad goals and actions that are expected to be accomplished by the Program over the next 5 years.

DESCRIPTION OF THE PROGRAM

The Program was developed to partially mitigate impacts of the CAP canal on threatened and endangered native aquatic species of the Gila River basin. In a 1994 biological opinion, the Service determined the CAP is a conduit for transfers of non-indigenous fishes and other aquatic organisms from the lower Colorado River (where the CAP originates) to waters of the Gila River basin. The Service identified the spread and establishment of nonnative aquatic organisms as a serious long-term threat to the conservation and recovery of native aquatic species, following a long history of habitat loss and degradation. Impacts of nonnatives include predation, competition, hybridization, and parasite and pathogen transmission. In most cases, it is extremely difficult or impossible to remove invaders once they have established.

For these reasons, the 1994 Service opinion concluded that operation of the CAP would jeopardize the continued existence of four native threatened or endangered fish species: Gila topminnow (*Poeciliopsis occidentalis*), spikedace (*Meda fulgida*), loach minnow (*Tiaroga cobitis*), and razorback sucker (*Xyrauchen texanus*). The Service also concluded that the CAP would adversely modify designated critical habitat of spikedace, loach minnow, and razorback sucker. A suite of reasonable and prudent alternatives were designed to monitor the introduction and spread of nonnative aquatic species, construct and operate barriers to prevent the upstream spread of nonnative species, implement fund transfers to the Service to recover natives and control nonnatives, and inform and educate the public about the value of native fishes and the negative impacts posed by nonnatives. In the 2001 revision of the 1994 opinion, the reasonable and prudent alternatives became conservation measures, and in the 2008 revision, the Santa Cruz

5 Year Strategic Plan (2023 – 2027)

Scientific Foundation		
No	**Goal**	**Objective**
1	Investigate novel methods to control nonnative aquatic biota.	a) Seek at least one opportunity to partner or fund new control methods or improvements upon existing methods.
2	Update and assemble existing knowledge of life history needs and ecology of Gila River basin native fishes.	a) As opportunities arise, initiate ecological/life history studies of native biota where such understanding can assist with conservation goals of the Program.
3	Improve propagation techniques for spikedace and loach minnow.	a) At a minimum, identify and implement at least one research project aimed at improving propagation.
4	Complete genetic management plans for priority species.	a) Develop genetic management plans for spikedace, loach minnow, and Gila topminnow.
5	Investigate new stocking strategies to improve survival of repatriated fish.	a) At a minimum, document existing stocking strategies, identify locations with poor survival, and identify likely causes of poor survival.

5 Year Strategic Plan (2023 – 2027)

Preventing Extinction and Managing Toward Recovery		
No	**Goal**	**Objective**
1	Maintain the Aquatic Research and Conservation Center (ARCC) and explore alternative locations for establishment of hatchery stocks of upper Gila and San Francisco River lineages of spikedace and loach minnow.	a) Use genetic management plans for development of brood stock management plan.
		b) Augment hatchery populations as outlined in broodstock management plans.
		c) Ensure the Aquatic Research and Conservation Center (ARCC) has the staff support and supplies necessary to maintain propagation of spikedace and loach minnow at a level needed to meet stocking demands provided wild fish are available.
		d) Determine start up and O&M costs for New Mexico hatchery stocks of spikedace and loach minnow.
2	Protect native fish populations from nonnative fish invasions.	a) Complete the scoping, environmental compliance, and design of two additional fish barriers, and initiate their construction.
3	Remove nonnative aquatic species threats.	a) Eradicate or suppress nonnative aquatic species from a minimum of five surface waters to prepare them for repatriations of native fishes.
4	Replicate populations and their associated native fish community into protected streams and other surface waters.	a) Replicate Gila topminnow stocks into a minimum of 10 surface waters.
		b) Replicate each of the other priority species into a minimum of one surface water.
5	Protect, maintain, and restore degraded aquatic habitats to use for native fish.	a) Restore habitats in a minimum of one location with existing populations or in a location planned for repatriations.
		b) Acquire or work with other programs to acquire easements, land, or water rights to protect key surface water.
6	Inform and educate the public about the conservation status and values of native fishes and the problems nonnative fishes create for them.	a) Implement a minimum of one I&E opportunity per year.
		b) Update Program website at least twice per calendar year.
7	Monitor to quantitatively measure and evaluate project success in improving the status of target species and their habitats.	a) Implement and report on Long-Term Monitoring Plan for Native Fish Populations in the Gila River Basin.
		b) Develop/identify monitoring standards as necessary to adequately evaluate fish barrier function, success and failure of nonnative fish species eradications/suppression, and success and failure of repatriations of 5 priority species.
		c) Incorporate eDNA monitoring techniques and/or other emerging technologies into monitoring practices.
8	Maintain accurate Program tracking records.	a) Continue to develop annual workplans and reports to track program accomplishments.

Fish Barriers

Eagle Creek

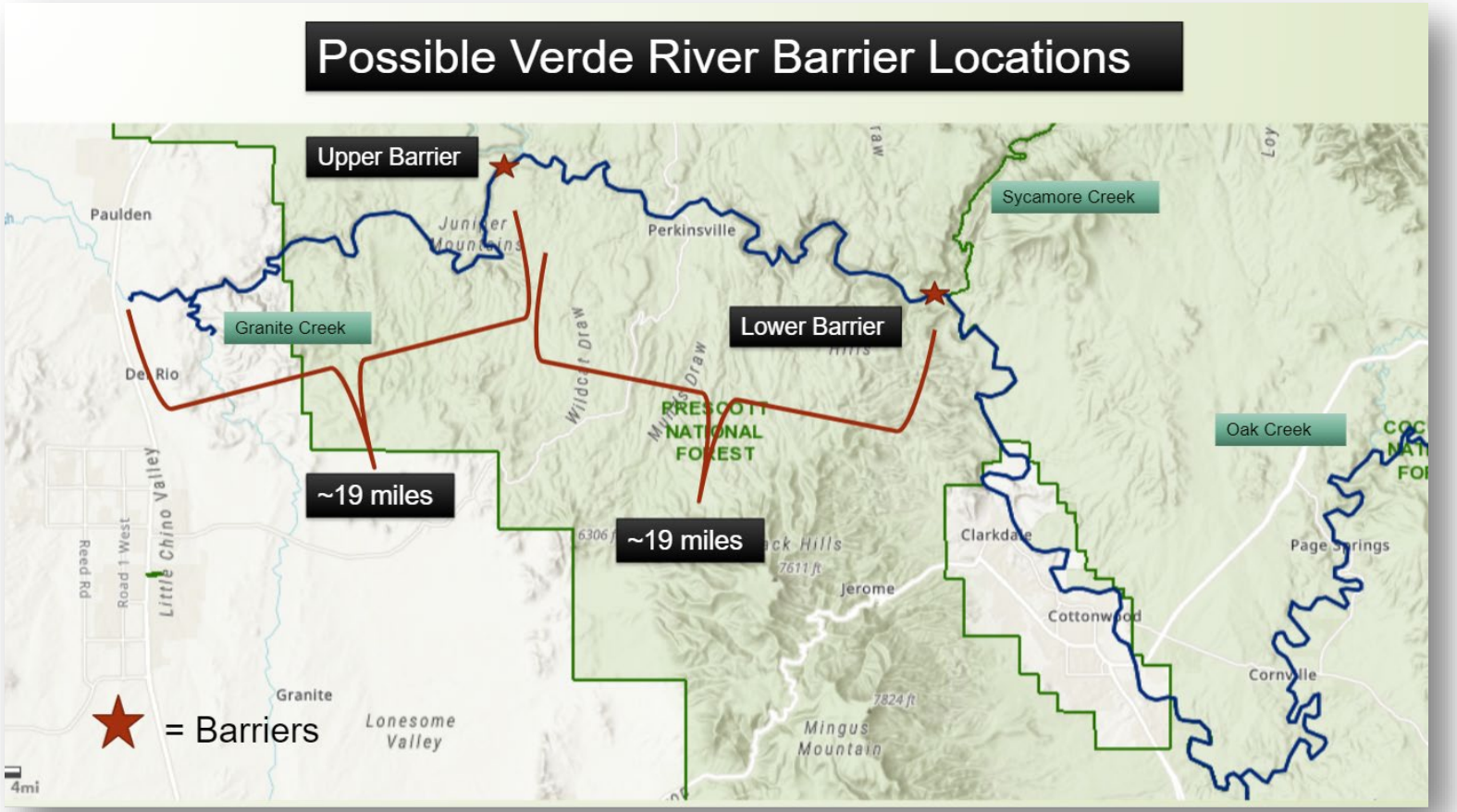
- Drafting and finalization of barrier-related agreements currently ongoing.
- NEPA/Section 7 initiation in Summer/Fall 2023.
- Earliest construction in Fall 2024.

O'Donnell Creek

- Initial discussions with BLM and new AWRR director in 2023.
- Site visit in May 2023 to discuss project and preliminarily re-assess the existing structures and erosion.
- BLM and AWRR will provide a decision in July 2023.

Verde River (2 Barriers)

- Upper Verde River Wild and Scenic Suitability Study
  - USFS expected to issue Final EA, FONSI, and Decision Notice in July/August 2023.



San Francisco River (Pleasanton Diversion)

- Site visit in April 2023 to meet landowner and conduct initial land survey.
- Flows were high during visit and land surveyor/engineer plan to revisit in Summer 2023.

Fish Monitoring

2023 GRB Native Fish Monitoring

Region(s)	Start Date	End Date	Site #1	Site #2	Site #3	Site #4
5	April 4, 2023	April 6, 2023	Cottonwood Spring	Monkey Spring	Coal Mine Canyon	Fresno Canyon
6	April 18, 2023	April 19, 2023	Charlebois Spring	La Barge Creek		
6	May 3, 2023	-	Hidden Water Spring			
6	May 9, 2023	May 10, 2023	Tortilla/Mesquite	Upper Tortilla Creek		
5	May 16, 2023	May 17, 2023	Sheehy Spring			
2	May 23, 2023	May 26, 2023	Fossil Creek			
1	June 7, 2023	June 9, 2023	KP Creek	Grant Creek		
1	June 27, 2023	June 29, 2023	Campbell Blue	Dry Blue		
NM	July 11, 2023	July 12, 2023	Burro Cienega			
2 & 6	August 8, 2023	August 10, 2023	Walker Creek	Sycamore Creek	Little Sycamore	
5	September 1, 2023	-	Cienega Creek			
5	September 11, 2023	September 14, 2023	Hot Springs Canyon	Wildcat Canyon	Headquarters Spring	
2	September 26, 2023	-	Spring Creek			
1	October 3, 2023	October 6, 2023	Lower Blue River			

Focal Species Key
Gila Topminnow
Spikedace/Gila Topminnow
Spikedace/Loach Minnow
Gila Chub
Gila Chub, Loach Minnow, Spikedace
Loach Minnow

Contractor: Marsh & Associates
Lead Biologist: Paul Reap (preap@nativefishlab.net)


BUREAU OF
RECLAMATION