GILA RIVER BASIN
NATIVE FISHES
CONSERVATION PROGRAM

Native Fish Monitoring Workshop Summary

Objective:

The Gila River Basin Native Fishes Conservation Program (Program) is responsible for monitoring streams within the Gila River basin in Arizona and New Mexico. However, the monitoring of these streams is often completed by different entities who sometimes have different goals and utilize different sampling protocols. The objective of this project is as follows:

To better direct the Bureau of Reclamation's commitment to monitor priority species (Loach Minnow, Spikedace, Gila Topminnow, Roundtail Chub/Gila Chub) in the Gila River basin, Reclamation and its contractor SWCA, in cooperation with the U. S. Fish and Wildlife Service, Arizona Game and Fish Department, and New Mexico Department of Game and Fish, will be preparing a questionnaire and a series of multi-day workshops to evaluate the current state of native fish sampling in the Gila River basin for areas in which the priority species are present. The primary objective of this effort is to determine data needs/gaps for each water body in order to develop a basin-wide sampling plan that will best assess the population statuses and trends for each priority species and provide the necessary scientific data to inform species recovery needs and the development of future management strategies.

Program Background:

The Program was established to conserve native fishes and manage against nonnative fishes in response to several Endangered Species Act biological opinions between the Bureau of Reclamation (Reclamation) and the U. S. Fish and Wildlife Service (USFWS) on Central Arizona Project (CAP) water transfers to the Gila River basin (USFWS 1994, 2001, and 2008). The biological opinions established five conservation measures to minimize effects from the potential spread of nonnative aquatic species through the CAP canal:

1. Construction of Fish Barriers
2. Fish Monitoring
3. Native Fish Recovery Funding
4. Nonnative Fish Control Funding
5. Information and Education Program

Prior to 2011, fish monitoring had been directed at the CAP canal and its primary connected waters for the purpose of detecting invasions of new nonnative species. Although successful in its intended purpose, this monitoring had mostly occurred in highly degraded systems that were dominated by nonnative fishes and harbored only tiny remnants of their historical assemblage of native fishes. Therefore, it was determined to have limited potential to contribute to the improvement of the conservation status of native fishes, a primary intention of the biological opinions. As a result, Reclamation and USFWS, in cooperation with the Arizona and New Mexico departments of Game and Fish, shifted emphasis away from the CAP canal and its primary connected waters toward monitoring the status of wild populations of listed fishes (Spikedace, Loach Minnow, Gila Topminnow and Roundtail/Gila Chub) throughout the Gila River basin. Currently, the primary goals of this monitoring are to detect the priority species in each stream, determine the distribution of the priority species within the occupied streams, and provide an estimation of relative abundance (assemblage structure) of the priority species compared to the co-occurring species. Streams are monitored on a rotating cycle using the protocol established by Clarkson et al. (2011), which was further refined in a memorandum sent to the USFWS by Reclamation (R. N. Chandler, August 11, 2011).

A workshop was held on August 9-10, 2017 with fish biologists from Arizona and New Mexico to evaluate the progress of the Program, including Reclamation's native fish monitoring. Some of the monitoring recommendations from the workshop included reviewing the monitoring goals/objectives, evaluating the capacity to expand beyond presence/absence, assessing what other agencies are doing for monitoring, and revisiting how resources are allocated. As a result, Reclamation began efforts to further evaluate its native fish monitoring program.

Core Team:

To better direct Reclamation's fish monitoring, a Core Team was established in late 2018. It included members from the Arizona Game and Fish Department (AGFD), New Mexico Department of Game and Fish (NMDGF), USFWS, and Reclamation. In December 2018, the Core Team developed a questionnaire and designed a Multi-Criteria Decision Analysis (MCDA) to lay the groundwork for a multi-day workshop to evaluate the current state of native fish sampling in the Gila River basin. The primary objective of this effort was to determine data needs/gaps for each water body to aid in the development of a basin-wide sampling plan. The questionnaire and MCDA were sent out to 63 biologists (local, state, federal, and NGO) known to have worked with fish within the Gila River basin. The results of the questionnaire and MCDA then became the basis for a multi-day workshop that was held in April 2019.

Questionnaire:

To assess the state of fish sampling for approximately 150 streams in which the priority species are present, a questionnaire (Appendix 1) was designed to gather all possible information from

biologists familiar with the sites evaluated. It included 16 questions about the sampling location and the current survey protocols being utilized.

Questionnaire Results:

Results of the questionnaire responses (Appendix 2) were tabulated and presented at the April 2018 workshop in a presentation. In some cases, more than one response was given per stream, resulting in the response total being greater than the total number of streams.

The questionnaire results indicated that most biologists agreed that the native fish sampling currently being conducted within each stream was adequate given the resources; however, many also indicated that not all suitable habitat was being sampled. Sampling was typically geared toward gathering data on species presence/absence, species composition, and catch rates. Ninety percent of fish monitoring was done according to an established protocol that primarily incorporated mixed random or fixed sampling locations. Similar sampling techniques were used by most biologists which were chosen based on the target species and habitat being sampled. Most biologists agreed that nonnative fish and habitat alteration were the largest threats to the native fish populations being sampled and that they would like to see the basin-wide sampling plan set up by target species and habitat type.

Factors that limited current surveys included funding, access issues, and time availability. When asked about data gaps, biologists highlighted the need to sample more habitat and the incompatibility of sampling protocols. Biologists also identified that better communication and information sharing between the entities conducting fish sampling within the Gila River basin would be beneficial.

MCDA:

The purpose of the MCDA (Appendix 1) was to assist in the ranking of the approximately 150 streams by monitoring importance. This was needed as fish monitoring funding is restricted, and not all sites can be sampled each year. The MCDA was developed by the Core Team during their initial meeting in 2018. The Core Team decided on what questions to ask, as well as the scoring system. Streams that received higher scores were considered higher priority sites. The following eight questions were asked of all streams:

1) What is the current frequency of sampling?
    a. Once per Year = 3 points, Once every three years = 2 points, Other = 1 point
2) Are there non-natives present?
    a. No = 1 point, yes = 0 points
3) What is the potential for new invasion from harmful non-natives?
    a. High = 5 points, medium = 3 points, low = 1 point
4) Are there potential habitat threats?

    a. One point for each: Fire, post-fire flood, dewatering, or mining
5) How many target species are present?
    a. 1 point for each
6) What is the geographic extent of the monitoring location?
    a. Greater than 10 miles = 3 points, 5-10 miles = 1 point, less than 5 miles = 0 points
7) Is there active management without surveys occurring (i.e. stocking, habitat restoration, non-native removal, barriers)?
    a. Yes = 1 point, No = 0 points
8) Does the surveyed population need to be replicated?
    a. 1 point for each species needing replication

Workshop:

On April 2 - 3, 2019, Reclamation held a two-day workshop to summarize and collect data on on-going and historic sampling methodologies. All 63 biologists surveyed, and their programs, were invited to attend the workshop. Attendees included Reclamation, AGFD, NMDGF, USFWS, Bureau of Land Management, Marsh and Associates, The University of Arizona, and The Nature Conservancy. The workshop was focused around three objectives:

1. Review MCDA prioritization rankings.
2. Review sampling goals for each site.
3. Determine if data gaps exist and if sampling can be improved at each site.

To best capture this large amount of information, workshop attendees were separated into groups based on the HUC 6 watersheds within the Gila River basin. These watershed groups worked independently during three breakout sessions and then came back together to review the results with the whole group after each one. The following questions were answered for each stream during the breakout sessions:

Breakout #1

Review the results of the MCDA for your group's sub-basin.

1. Do you agree with the priority rankings within the sub-basin?
2. If you disagree with the prioritization, how would you re-rank the streams by priority? Please provided your justification.

Breakout #2

1. What are the primary goals for the current sampling within each stream?
2. Do the current sampling goals align with Reclamation's goals and the goals for the recovery of the species?
    a. If not, please explain how the sampling goals differ.

3. How often should the stream be monitored to effectively answer the current sampling goals and Reclamation's goals?

Breakout #3

1. Does the current sampling inform presence/absence and abundance of all target species (including nonnatives) within the stream?
    a. If not, what information is missing?
    b. What are the current sampling methodologies, and can they be improved upon (i.e., gear type, design)?
    c. Is it possible to estimate trends for all target species within the stream?
2. Is the current sampling able to detect changes in the distribution of the species of all target species (including nonnatives) within the stream?
    a. If not, what information is missing?
    b. What is the current geographic extent of the sampling (e.g., are there sections in between sampling sites that are missing information)?
    c. If applicable, what additional locations within the stream should be sampled to ensure the entire geographic extent is covered?

The workshop resulted in a great deal of information on the current sampling methodologies occurring within the Gila River basin. To summarize this large amount of information, a matrix was created containing all the streams, their priority rankings, and the answers to the breakout sessions.

All Sites Matrix:

The All Sites Matrix (Appendix 3) ranks every site by priority as determined by the MCDA rankings (after incorporating input from Breakout #1) and contains all the answers obtained during Breakout #2 and #3. The columns in the matrix are defined as follows:

A: Site	Name of the sampling site.
B-I:	Criteria for the scores in the MCDA.
J: MCDA Total	Total score given by the MCDA and approved by the workshop attendees.
K: Notes	Sampling notes from the workshop group.
L-P: Goal Questions	Questions asked in the second breakout session (sampling goals) of biologist on the site.
Q-X: Sampling Questions	Question asked in the third breakout session identifying data gaps on sampling and sample site location.

When possible, similar sites were grouped that had the same survey type and/or habitat characteristics. Some sites may have blank cells due to a lack of information about the site.

Final Site Rankings:

Appendix 4 shows the final ranking of all sites examined during the workshop. This final list is based upon the results of the MCDA and workshop breakout sessions. The final 120 sites are broken down into three tiers, with Tier 1 sites being the highest priority and Tier 3 sites being the lowest priority. Additionally, sites that fell off the matrix are grouped as Need More Info, Priority Species Not Established, Priority Species Not Present, and Tribal Lands (i.e., outside of federal jurisdiction). Due to limited funding availability, it is recommended that Tier 1 sites should be sampled more frequently (e.g., every year); whereas, Tier 3 sites should be sampled less frequently (e.g., once every 3 to 5 years). A sampling schedule will be included in the final basin-wide sampling plan.

Overall Notes:

General comments by the workshop attendees included:

1) Better communication.
    a. It was noted several times during the workshop that there needs to be better communication between all entities that conduct the sampling.
        i. This includes survey plans (survey timing, survey location, etc.) and sharing data post-survey.
        ii. It was recommended that a winter coordination meeting could help address these issues.
2) Sampling schedule changes.
    a. There needs to be triggers in place to increase sampling frequency at a site, if needed. Examples of possible triggers:
        i. Disaster events like wildfire, flood, and waterbody drying
        ii. Increased potential for non-native invasion
        iii. Change in population trends
        iv. Change in species listing status or review
    b. Alternatively, there should be be triggers for a decrease in sampling.
        i. Stable population protected by barrier
        ii. Multiple years of sampling with high population numbers
3) Current sampling is likely unable to detect changes in distribution, especially for longer streams.
    a. It was recommended that more sites/stream reaches should be sampled.
    b. It was identified that there may be issues with the current Reclamation sampling protocol as the establishment of fixed sites typically restrict sampling to one 100-m site per 5 miles.
4) For the most part, the current sampling goals align with Reclamation's goals.
    a. Some monitoring does not inform on abundance, only presence/absence.
    b. Trend estimates/ability to estimate are lacking at several sites.

5) Sampling methods are relatively consistent across sites and habitat types with little improvement needed.
    a. However, remote sites with restricted access can limit the sampled gear used.

List of Workshop Attendees:

Workshop/Breakout Session Moderators

Jason Kline	(SWCA)
Marty Rozzelle	(The Rozzelle Group)
Andi Rogers	(Southwest Decision Resources)
Carrie Eberly	(Southwest Decision Resources)
Bill Stewart	(Bureau of Reclamation)
Kent Mosher	(Bureau of Reclamation)

Workshop Attendees

Brett Montgomery	(Arizona Game and Fish Department)
Brian Hickerson	(Arizona Game and Fish Department)
Chris Cantrell	(Arizona Game and Fish Department)
Curt Gill	(Arizona Game and Fish Department)
Julie Carter	(Arizona Game and Fish Department)
Matt Rinker	(Arizona Game and Fish Department)
Ryan Mann	(Arizona Game and Fish Department)
Tony Robinson	(Arizona Game and Fish Department)
Heidi Blasius	(Bureau of Land Management)
Jeff Simms	(Bureau of Land Management)
Tim Frey	(Bureau of Land Management)
Rob Clarkson	(Bureau of Reclamation - Retired)
Brian Kesner	(Marsh and Associates)
Jake Rennert	(Marsh and Associates)
Paul Marsh	(Marsh and Associates)
Dale Turner	(The Nature Conservancy)
Brian Ferguson	(New Mexico Department of Game and Fish)
Jill Wick	(New Mexico Department of Game and Fish)
Scott Bonar	(The University of Arizona/U. S. Geological Survey)
Andy Dean	(U. S. Fish and Wildlife Service)
Mary Richardson	(U. S. Fish and Wildlife Service)
Stuart Wilkins	(U. S. Fish and Wildlife Service)
Tiffany Love-Chezem	(U. S. Fish and Wildlife Service)
Albert Sillas	(U. S. Forest Service)
Stephanie Coleman	(U. S. Forest Service)
Yvette Paroz	(U. S. Forest Service)