# Population Monitoring Work Group Meeting

## *February 20, 2018*

## Meeting Materials:

Meeting Agenda

Meeting Minutes

Scope of Work [not included]

Approval of 1st Task for Review of the Collaborative Program Fish Monitoring Program for the RGSM: A Proposal for a CPUE Metrics and Methodologies Workshop

EC Survey Summary Report

RGSM Population Monitoring Results From February to December 2016 [report not included]

Report Analysis [spreadsheet not included]

Panel Recommendations [spreadsheet not included]

# Middle Rio Grande Endangered Species Collaborative Program

*Est. 2000*

**Data Analysis Team Meeting**
**Meeting Agenda**

**February 20, 2018 9:00 AM – 12:00 PM**
**Location: WEST, Inc. 8500 Menaul NE Suite B-342**

**Conference Call Information:**
**Phone: (712) 451-0011 Passcode: 141544**

| | | |
|---|---|---|
| 9:00-9:10 | Review of February 1, 2018 DAT meeting. | *Jared Studyvin* |

- Approve February 1, 2018 meeting minutes

| | | |
|---|---|---|
| 9:10-9:20 | Questions regarding the database | *Ashley Tanner* |

- Including individual fish-specific data
- Division of data by haul (2002-2016) and station (1993-2016)

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|---|---|---|
| 9:20-9:45 | Review scope of the DAT | *Jared Studyvin* |

- Clarification on goals and objectives
- Limitations

| | | |
|---|---|---|
| 9:45-11:00 | Review panel recommendations | *Jared Studyvin* |

- Identify which recommendations can be addressed quickly, and which will require more time
- Identify the utility and limitations of each recommendation
- Prioritize the recommendations
- Assess the skills required to address each recommendation

| | | |
|---|---|---|
| 11:00-12:00 | Review ASIR's 2017 "Rio Grande Silvery Minnow Population Monitoring Results from February to December 2016" report and analyses within | *Jared Studyvin* |

- Identify which recommendations ASIR addressed
- Assess which analyses the group would like to pursue given the adjustments made by and efforts of ASIR

| | | |
|---|---|---|
| Time Permitting | Review of DAT members | *Jared Studyvin* |

- External reviewer
- Skill sets

- Time availability

Time Permitting      Review and update DAT plan and schedule      *Jared Studyvin*

- Schedule
- Deliverables

## Data Analysis Team (DAT)
## Meeting Minutes
## February 20, 2018 – 9:00 AM–12:00 PM
## Location: WEST, Inc. (WEST) - 8500 Menaul NE Suite B-342

### Decisions
- ✓ The minutes of the February 1, 2018 DAT meeting were approved with no objections.

### Action Items

| WHO | NEW ACTION ITEMS | BY WHEN |
|---|---|---|
| Ashley Tanner Eric Gonzalez | Send the Braun (2015) study to Eric Gonzalez to assess whether stratum weights can be calculated by mesohabitat type. | ASAP |
| Rich Valdez | Draft an Analysis Parking Lot question related to Panel Recommendation #8 and send to Ashley Tanner. | ASAP |
| Rich Valdez | Calculate CPUE, variance, and N for October each year from 2002 to 2016 for the 5 mesohabitat types as well as combinations, and consider alternatives to the mixture model for improving precision. Share with Jared Studyvin. | 2/27/18 |
| Ashley Tanner | Send out the data set, revised based on input at the 2/20/18 DAT meeting. | 3/2/2018 |
| Jared Studyvin | Evaluate Rich Valdez's analysis. | 3/13/18 |
| Ashley Tanner | Perform a short literature review of studies/reports that have mapped and analyzed mesohabitat areas and their potential impact on CPUE. | Next DAT meeting (3/15/18) |
| WHO | ONGOING ACTION ITEMS | BY WHEN |
| Ashley Tanner | Develop a list of questions for ASIR, including questions from 2/1/18 and 2/20/2018 DAT meetings and discuss these questions with ASIR. | Ongoing |

### Next Meeting
- March 15, 2018, 9pm–12pm, @ WEST, Inc. One day after the MAT meeting.

### Review of February 1, 2018 DAT meeting
- Action items from the February 1, 2018 DAT meeting.
  - ○ Ashley Tanner will send out flat file (Excel) and Access versions of the processed data set to the group along with the metadata Word document. *Complete*

o The group will provide feedback to WEST on A. Tanner's processed version of the data set based on the metadata Word document. *Complete*
o The group will provide additional questions for ASIR to WEST regarding specific data set fields. *Incorporated into Ongoing action item.*
o Jared Studyvin and A. Tanner will incorporate questions from 2/1/18 DAT meeting and other questions they receive from the group in their list and discuss those questions with ASIR when WEST meets with them. *Ongoing*
o A. Tanner will send out to the group a version of the data set with fish species rows transferred to columns and Null values changed to zero. *Ongoing*
o J. Studyvin will develop a proposed timeline for the work of the DAT. *Complete*
o J. Studyvin will bring the list of panel recommendations to present at the next DAT meeting, including suggestions for how they should be prioritized. *Complete*
✓ The minutes of the February 1, 2018 DAT meeting were approved with no objections.

**Questions regarding the database:**
- Including individual fish-specific data.
  o Columns like length and tagging are individual-specific, so we need to decide how we want to include them.
  o Suggestion: Keep them as individual records. This will facilitate the analysis. Even if the analysis does not require each field (i.e., they are lumped), at least the data are there if someone needs it.
- Will columns be age-0 and age-1?
  o They can be split out by age, rather than lumping them. This also lines up with the length of the fish (i.e., longer fish are older).
- There will be an additional column for the number of fish that are marked.
- Non-natives: Creating a column for this is valuable, although it does not help with any of the questions that we are trying to answer. This is another field that is good to have in case someone needs it (the utility of this data set will extend beyond the DAT).
- How it will look: Station/Haul | #marked | Hybama Age 1 | Hybama Age 2 | Hybama Final
  o There will be one table for haul (2002–2016) and another for station (1993–2016).
➢ Ashley Tanner will send out the revised dataset based on input at this meeting.

**Discussion on the overall goal of the DAT:**
- Three different perspectives for the overall goal of the DAT:
  o Informing water management
  o Refining the monitoring protocol
  o Refining abundance estimates
- Thoughts on the perspectives:
  o Evaluation of the population monitoring program should precede looking at water management.
  o This is an iterative process that should be aware of both focuses (water management and refining the monitoring protocol), because there are ways in which they may be dependent on each other or aspects of one can be added to the other.
  o The peer review panels have asked the question of how CPUE is dependent on flow.
  o Task 1 of the 2012 "Proposal for a CPUE Metrics and Methodologies Workshop" was addressed by the peer review panel. It only looked at use of CPUE.

- Task 2 of the proposal is what the Population Monitoring Work Group was charged with. The DAT is a subgroup of this, so we should not be directly focusing on this larger task.
- Jared Studyvin: We want to avoid "data hunting." We should discuss what the endpoint of the DAT is and how we get there. If we come to agreement about what the perspective/objective is, we can work toward it.
- Suggestion: Water management and abundance data analyses are things that work concurrently with refining the monitoring protocol, and will continue beyond the DAT.
  - "Evaluation" may be a better word than "updating" regarding the monitoring protocol, because the goals of updating are unclear.
  - The general consensus of the group: What we are doing is taking the panel recommendations, synthesizing them, presenting what we find (i.e., "we found this truth"), and providing some recommendations for refining the monitoring protocol over the next 2–3 years of the ASIR contract. This means that the overarching charge for the DAT falls under Task 2, which is what the broader Population Monitoring Work Group is doing.
  - Should we be looking at improving confidence when we calculate October density of fish, with respect to the authorized incidental take thresholds in the 2016 BO? These density thresholds are defined as:
    - October density is greater than or equal to 1.0 fish per 100 $m^2$ for 10 of 15 years; and
    - October density is less than 1.0 per 100 $m^2$ for no more than 5 of 15 years; and
    - October density is less than 0.3 fish per 100 $m^2$ for no more than 2 of the 15 years.
- What monitoring protocol are we talking about (i.e., monitoring/sampling or analysis)? We are looking at ASIR's monitoring protocol, both sampling and analysis.

**Review of the Hubert et al. panel recommendations:**
- Going through the panel recommendations that J. Studyvin and A. Tanner organized by number listed in the Hubert et al. document:
  1. *"Separate the catch and effort data from the small-mesh seine and the fine-mesh seine into two data sets and compute separate CPUE indices for each gear type, as well as for individual age classes captured in each gear type."*
     - The mean October figure in the ASIR Annual report (Figure 7) is based on all ages of fish and gear types (lumped). The question we need to answer: If we separate it based on fish age and gear types, how will that refine the monitoring protocol?
     - If we pair it with water parameters, we can analyze how different flows produce those fish. However, it is not clear how that will help us refine the monitoring protocol.
     - This recommendation addresses analysis, not sampling.
  2. *"The CPUE from the small-mesh seine is primarily an index of the relative abundance of a single cohort of RGSM (i.e., the most recent cohort) that is recruited into the gear late in the summer and captured into the summer of the following year. The precision of the index can be improved by exclusion of older cohorts. A separate CPUE index*

*can be computed for older cohorts. Consider the use of length-at-age data and frequency histograms to identify cohorts."*

- This analysis does not connect to refining the monitoring protocol. The only possible linkage is if we find that the use of fine-mesh does not have an impact on the numbers and therefore there is no benefit to using fine-mesh.
- This recommendation mostly addresses analysis, with some potential linkage to sampling.

3. *"Only larval fish should be included in the computation of CPUE indices from the fine-mesh seine because of this gear's selectivity for this life stage."*
   - This recommendation has to do with computation/analysis, not sampling.

4. *"An aspect of the CPUE data that warrants attention is the treatment of zero catches in data analyses. Inclusion of dry sample sites as zero CPUE values when analyzing CPUE data for RGSM in the MRG should be avoided. Field data records and the database in which the RGSM CPUE data are stored allow dry sampling sites to be distinguished from sites that were sampled and no RGSM were caught. The problem arises during statistical analyses because the naughty naughts (observations of zeros at dry sampling sites) are treated in the same manner as the zero catches at fished sites where no RGSM are caught."*
   - Question for ASIR: Do they seine dry areas?
   - ASIR has started choosing an alternate site when the original sampling site is dry. Dry sites in October are rare.
   - This recommendation does not say anything about increasing the number of sites, so we should not consider that.
   - This recommendation was important for some stakeholders because ASIR has included zeros from dry sites in the calculation of CPUE.
   - This recommendation has to do with computation/analysis, not sampling.

6. *"The proportions of various mesohabitat types sampled are likely to bias CPUE indices because the catchability coefficient probably differs among mesohabitat types and RGSM are likely to be selective for specific mesohabitat types. We recommend that better understanding of the influence of mesohabitat type on CPUE be developed and used to account for variability in CPUE indices. Further, we recommend that estimation of mean site-specific CPUE be improved by addressing the variable number of mesohabitats that are sampled at any given site and the amount of sampling in each mesohabitat type. We recommend estimation of mean site-specific CPUE from individual seine hauls (which are distinguishable in the database as of 2006); mean CPUE at each site is then computed from the individual CPUEs at each of the 18-20 mesohabitat units sampled per site."*
   - The Population Monitoring Work Group broke this recommendation into three parts. The first part (estimation of mean site-specific CPUE) would require additional data.
   - By-haul analyses are likely of fish that are caught from different mesohabitat types. Between two months of sampling, ASIR may be sampling a different suite of mesohabitats based on the flow that is in the river. This is one of the reasons they are lumping mesohabitat data. If more sampling were done in each mesohabitat type, there could be a more precise calculation of CPUE.
   - Could use November data (the month with repeated sampling).

- Another approach is to consider whether the sampling protocol is getting a representative sample (i.e., if backwaters are 10% of the available habitats, is each station sampling composed of 10% backwaters?)
- Another approach, if mesohabitat sampling is not representative, is to look at weighting the mesohabitat data.
- This recommendation could inform changes in sampling protocol.

10. *"We recommend depiction of the relationship of hydrologic covariates and estimates of the mean annual CPUE for RGSM derived from the mixture model. Those relationships should use the October data from 1993 to 2014. Further, we recommend that such analyses be repeated for catch data collected in 2006 to the present, but using the individual seine-haul approach to estimate CPUE."*
    - In other words: What hydrological variables are predictive of biological variables?
    - This recommendation may fall under water management, and it is an open question about what hydrologic covariates are important. This is a broad question that is also informed by adaptive management. In that way, it could impact sampling protocol.
    - Important: We need a consistent data set.
    - This recommendation could affect the sampling protocol, but requires more clarity and time.

11. "*We recommend that the assumptions of the mixture models be fully defined and that the results of analyses be interpreted with consideration of the assumptions and the effects of the potential violation of assumptions.*"
    - This recommendation prompts us to be very clear about our assumptions, although it does not relate to sampling or analysis specifically.
    - Suggestion: ASIR should provide an appendix explaining their assumptions.
    - This recommendation/question can go into the Parking Lot to look at again once the 2017 ASIR report is available.

17. *"Evaluate alternatives to the parametric mixture model, in particular, Bayesian hierarchical models, for estimating annual CPUEs."*

18. *"Use classification and regression trees, boosted regression trees, or random forests to examine relationships between hydrological variables and CPUE for identifying thresholds above or below which CPUE exhibits changes."*
    - These recommendations address changing how mixture models are used for analyses.
    - Do we have anyone with the skills to do this? These analyses are more complicated than what we already use (i.e., mixture models), so they are even harder to explain to stakeholders.
    - These recommendations have to do with analysis, not sampling.

14. *"Consider using key drivers of mesohabitat variability, such as current velocity, substrate size, and water depth at specific locations where seines are deployed, to replace the mesohabitat factor in the mixture models."*
    - Currently, there are no hydrologic covariates in the population monitoring database. This would mean changing the sampling protocol to measure new things. However, this likely cannot be done during the same sampling event, so it may be covered by a different study.

- How does this impact calculation of CPUE? Capture probability is affected by these variables.
- This one is complicated, and the group has already identified several studies/covariates that they have used. We should start with a quick literature review to inform what we might recommend. Including:
  - Dudley and Platania (1997)
  - Tetra Tech (2015)
  - URGWOPS (2007)
  - Ashley Tanner has the documentation associated with these studies.
  - Braun (2015): USGS report that mapped mesohabitat areas. Can we calculate stratum weights by mesohabitat type?
  - ➢ Ashley Tanner will send the Braun (2015) study to Eric Gonzalez to assess whether stratum weights can be calculated by mesohabitat type.
16. *"Examine the historical availability of mesohabitats in the MRG relative to discharge. If these two measures can be linked, then annual or monthly discharge may provide a good surrogate of mesohabitat availability."*
  - This would involve a large effort of looking at historical imagery. It is complicated, and the group has already identified several studies that are related to this.
  - ➢ Ashley Tanner will perform a short literature review of studies/reports that have mapped and analyzed mesohabitat areas and their potential impact on CPUE.
21. *"Conduct stock-recruitment studies to determine how the abundance of fall recruits relates to the abundance of spring spawners. Investigate the effects of spring and summer discharges on the stock-recruitment relationship to enhance understanding of the dynamics of RGSM. Implement a spring sampling protocol at spawning sites to estimate the number of spring spawners, and compare with October results for several years; such studies may provide useful data on RGSM population dynamics and limiting factors."*
  - This will be future work, as it is dependent on several other analyses.
24. *"Expand the analyses in Dudley et al. (2015) to assess flow regime and habitat fragmentation effects on RGSM occurrence and abundance and suggest preliminary flow regimes for rehabilitating the wild RGSM population."*
  - Habitat fragmentation refers to impact of dams on connection between reaches of the river. It is both longitudinal and lateral.
  - Like #21, this is in the realm of PVA, which is dependent on other analyses. This should be done under a PVA framework, not the data analysis we are doing, because it a simulation-type analysis. We need to assess what PVA has done in the past.
- Other recommendations the group discussed:
  - What is a sufficient sample size? This is not addressed by the panel.
    - This will be placed in the Parking Lot.
  5. *"Survey designs should strive to minimize false zeros resulting from: (1) an inappropriate sampling design (e.g., sampling in mesohabitats avoided by RGSM) and (2) ineffective survey methods (e.g., insufficient sampling effort to detect an organism when it is present)."*

- J. Studyvin did not include this one because he determined that there are not any analyses related to this recommendation that would lead to refining the monitoring protocols. The mesohabitat analysis and evaluation of assumptions will help determine this, so we do not need to look at it ourselves.

8. *"Factors influencing detection and catchability of RGSM in seines need to be determined and incorporated into the sampling design to permit more robust estimation of CPUE."*
   - It is not possible to get this from existing data, so this likely needs to be a new study. We can develop a question for analysis to place in the Parking Lot, and we can come back to it after Michael Porter finishes his current study.
   - ➢ Rich Valdez will draft an Analysis Parking Lot question related to Panel Recommendation #8 and send it to A. Tanner.

**Review of Hubert et al. recommendations that address the sampling protocol:**
- J. Studyvin: Since most of the recommendations fall under evaluating the protocol for analysis, we may be able to do the most to refine the monitoring protocol by focusing on the recommendations that address sampling protocol, which are #6 and #10.

6. *"The proportions of….sampled per site."*
   - ASIR did a little bit of this in the 2016 report, but they do not show coefficients. They sampled equal numbers of areas by mesohabitat site, but they were the same (spatial) areas for each type.
   - We can look at the haul data, partition it by mesohabitat, and see if there are differences in CPUE. The ASIR figure already does this, but it does not consider capture probability. The current data cannot do this, but we may be able to look at difference in precision by mesohabitat type.
   - Which mesohabitat types do we need to sample more of, and how should they be stratified? The confidence intervals in the ASIR data are biased by zeros (i.e., really good at catching no fish in certain mesohabitats). Scenario: If you do not sample the "Runs" mesohabitat type, where there are a lot of zeros, would the calculation of CPUE be more precise?
   - We can do the CPUE analysis using different mesohabitat types. This might involve looking at past studies to find the primary mesohabitat types where fish are found, and focusing on those to see if precision is improved. We should take the 5 mesohabitat types, a couple of different combinations, and calculate CPUE, variance, and N (for October, by year from 2002 to 2016 such that the calculations are within each year). Essentially this means taking the ASIR calculations and redoing them for each year, and then doing them in combinations.
     - We have to keep Recommendation #3 in mind: How will zeros be accounted for?
     - R. Valdez: This might allow us to use a log transformation and parametric model instead of a mixture model.
     - This may lead to a recommendation for how to change the locations for sampling. If we reduce the cost of sampling by focusing on certain mesohabitats, that may mean that more effort can be spent on looking at hydrologic covariates.

➢ Rich Valdez will calculate CPUE, variance, and N for October each year from 2002 to 2016 for the 5 mesohabitat types as well as combinations, and consider alternatives to the mixture model for improving precision. Then, he will share his analysis with Jared Studyvin.

➢ Jared Studyvin will evaluate Rich Valdez's analysis.

10. *"We recommend depiction….to estimate CPUE."*

▪ To be discussed further at another DAT meeting.

## Questions for ASIR

- Why are dry sites noted in both "Mesohabitat" and "NotSampled" fields?
- Confirm whether the "ReportingDateRaw" field corresponds to the date that sampling occurred or the reporting date that it was applied to for analyses.
- Do they seine dry areas?

➢ Ashley will develop a list of questions for ASIR, including questions from 2/1/18 and 2/20/2018 DAT meetings and discuss these questions with ASIR.

## Analysis Parking Lot

- November repeated monitoring data (Project 3) are still separated from this data set, because those data are also separated in ASIR's annual report. ASIR does not include November in the annual data graphs.
  - o These data may be important for understanding impacts on the data for December from fish stocking done in November. Should these data be combined with the larger data set?
    - ▪ Sampling Month/Sampling Period (which may be equal to the reporting month) can be used to determine if the data is from repeated November monitoring.
  - o Some of these data may actually be part of the population monitoring data, but the project number is different. Which of these data under other project numbers should be combined with the larger data set?

## Meeting Participants

| Participant | | Organization |
|---|---|---|
| Eric | Gonzales | U.S. Bureau of Reclamation |
| Mo | Hobbs | Albuquerque-Bernalillo County Water Utility Authority |
| Joel | Lusk | U.S. Fish and Wildlife Service |
| Ed | McCorkindale | Western Ecosystems Technology, Inc. |
| Mike | Marcus | Assessment Payers' Association |
| Kate | Mendoza | Albuquerque-Bernalillo County Water Utility Authority |
| Lana | Mitchell | Western Ecosystems Technology, Inc. |
| Michael | Porter | U.S. Army Corps of Engineers |
| Jared | Studyvin | Western Ecosystems Technology, Inc. |
| Ashley | Tanner | Western Ecosystems Technology, Inc. |
| Rich | Valdez | SWCA Environmental Consultants, for NMISC |
| Dave | Wegner | Western Ecosystems Technology, Inc. |

# Approval of the 1st Task for Review of the Collaborative Program Fish Monitoring Program for the Rio Grande Silvery Minnow

## A Proposal for a CPUE Metrics and Methodologies Workshop

Submitted to
The Executive Committee of the
Middle Rio Grande Endangered Species Collaborative Program

July 13, 2012

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## Executive Committee Action Requested:

- Approval to Conduct a Workshop on Catch-per-Unit-Effort (CPUE) Methodology used by the Current Rio Grande Silvery Minnow Population Monitoring Program (i.e., Task 1, see Appendix A).

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## Contents

# Introduction

### Background

This document was developed by the RGSM Population Monitoring workshop organizers at the request of the Executive Committee (EC) of the Middle Rio Grande Endangered Species Collaborative Program. The document outlines a proposed approach for evaluating and updating the fish monitoring plan for the Middle Rio Grande, New Mexico. This proposed approach helps to address issues identified in a scientific review of the Rio Grande silvery minnow (RGSM) population monitoring program and by the U.S. Fish and Wildlife Service (Service) in a letter dated March 23, 2012. The Service's letter recommended, as a step toward resolution, that the EC host a facilitated science workshop to discuss outstanding issues over the use of catch-per-unit-effort (CPUE) for monitoring the RGSM. Task 1 of this proposed approach addresses the Service's recommendation as part of a broader effort to develop a fish monitoring plan.

### Primary Goal

The primary goal of this proposed approach is to evaluate and update the fish monitoring plan for the Middle Rio Grande. The focus of this plan shall be on the endangered Rio Grande silvery minnow, along with the identification and development of population demographic parameters that will best meet the needs of the Collaborative Program and the Recovery Implementation Program (RIP). The EC of the Collaborative Program has expressed the need to reliably measure the effects of Middle Rio Grande water management actions and conservation measures on the RGSM, and the Service seeks to determine the best population demographic parameter(s) for gauging species recovery and for measuring sufficient progress for the RIP. The proposed approach is intended to resolve how the RGSM population monitoring program can provide a reliable, precise, and accurate measure of the status and trend of the species for these purposes and that is also reasonably attainable (i.e., reasonable expenditure).

### Proposed Approach

The workshop organizers believe that three major steps are needed to achieve the stated goal:

- Task 1 focuses on addressing technical questions concerning use of CPUE in the current RGSM monitoring program (see detailed write-up of Task 1 in Appendix A). This task should be approved and implemented as soon as possible to provide sufficient time to identify and invite qualified scientists to participate in the workshop process and to plan and organize the workshop.
- Task 2 is a review of the current monitoring program including temporal and spatial aspects of sampling design, data collection protocols, and data analyses.
- Task 3 is the development of a formal Fish Monitoring Plan with details of sampling design (e.g., number and location of samples, frequency of sampling, gear types, etc.), data collection protocols (e.g., data to be collected, manner of storage, etc.), and analytical methods (e.g., CPUE computation, relationship of CPUE to population estimates, use in PVA models, etc.).

*Overview of current fish population monitoring*

The fishes of the Rio Grande between Velarde and Elephant Butte Reservoir and their habitat associations were first reported in 1987 (Platania 1993). Monitoring of the fish population with catch-per-unit-effort (CPUE) and specifically the endangered Rio Grande silvery minnow began in 1993 and has been carried out annually except for 1989 (e.g., Dudley and Platania 2011). The current monitoring program continues to provide annual, as well as more or less monthly, CPUE estimates for each of three reaches of the Middle Rio Grande:the Angostura, Isleta, and San Acacia reaches. Sampling has generally been conducted at 15-20 sites for up to 10 months in a year. Fish are taken with multiple seine hauls at a given sample site, and CPUE is computed for each species at each sample site as the pool of seine hauls expressed as the number of individuals per 100 m$^2$ (surface area) of water seined.

## Outline of Actions by Task

The following is an outline of the three major tasks of this proposed approach with objectives and actions identified for each.

1. **Task 1. Conduct a Workshop on Catch-per-Unit-Effort (CPUE) Methodology used by the Current Rio Grande Silvery Minnow (RGSM) Population Monitoring Program (see Appendix A for details)**

*Objectives*:

- Evaluate statistical properties and interpretations of the current RGSM monitoring program, including precision and accuracy of CPUE.
- Discuss, evaluate, and reconcile areas of concern/disagreement over CPUE.
- Discuss and evaluate population estimation for RGSM and compare and correlate with CPUE,
- Identify and evaluate other methods for monitoring the RGSM, including methods used in other river systems.
- Identify, discuss, and reconcile uses of CPUE for RGSM, including demographic recovery criteria, sufficient progress metrics, and inputs and parameter estimates for Population Viability Analysis.

*Actions:*

- Retain two or three external scientists with expertise in CPUE, fish sampling design for small-bodied fishes, and other methodologies to participate in data examination, workshop presentation/interaction, and assist in preparing workshop report.
- Distribute and provide for independent examination, the existing monitoring data (and available population estimation data) to evaluate existing and potential precision and levels of detectable change in abundance of RGSM.
- Conduct a 3-day workshop that includes an introduction session with EC members (2-3 hr) followed by technical presentations, discussion, and draft report preparation.
- Prepare and present a report of the CPUE Workshop to the EC (report to be prepared jointly by workshop organizers and external scientists).

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## 2. Task 2. Review Middle Rio Grande Fish Population Monitoring Plan

*Objectives*:

- Evaluate and refine sampling design, including statistical properties of spatial aspects (longitudinal locations of sample sites, habitats in which samples are taken) and temporal aspects (frequency of sampling, times of year when samples are taken).
- Evaluate and refine sampling methods, including gear types, sampling strategies, etc.
- Evaluate and refine data collection protocols, including types of data collected, recording methods, quality control, electronic storage, and data custody.
- Evaluate and refine data analyses.
- Identify other data needs for concurrent sampling during fish monitoring to support other studies (e.g., augmentation, fish movement, drying, genetics, adaptive management) as part of a programmatic monitoring program
- Evaluate how PVA may assist in refining monitoring.

*Actions:*

- Retain two or three external scientists with expertise in sampling design to participate in the workshop, evaluate and revise the fish monitoring plan, and prepare the workshop report.
- Conduct workshops and work sessions that address elements necessary for long-term fish population monitoring program development, including what other monitoring is needed that can be performed in conjunction with fish monitoring. Prepare and present a report to the EC as guidance to update the Fish Monitoring Plan for the Middle Rio Grande.

## 3. Task 3. Update the Collaborative Program Middle Rio Grande Fish Monitoring Plan

*Objectives*:

- Update the current Fish Monitoring Plan with revisions that may include sampling design, data collection, quality control, storage, and custody; cost estimates; and responsibilities.

- Define the metrics of interest for the initial phase of the Monitoring Plan (3 yrs), define how they will be calculated from the monitoring data, and document data precision and accuracy for the desired performance (such as precision and correlation with some "ground truth").

- Implement the updated Fish Monitoring Plan for a 3-year period for evaluation and refinement.

- Ensure that the needs of the Collaborative Program and the RIP are met with a monitoring program for RGSM sufficiently sensitive to:
  a. Detect changes in RGSM abundance with management actions;
  b. Provide reliable demographic recovery criteria for RGSM; and
  c. Provide reliable metrics for sufficient progress for the RIP.
  d. Utilize past data and analyses to be comparable to any proposed changes

*Actions*:

- Integrate the findings of Tasks 1 and 2 and update the Fish Monitoring Plan with emphasis on the RGSM.

  Implement and evaluate the Fish Monitoring Plan for meeting needs of the EC and the Service for monitoring species response(s) to management actions; demographic recovery criteria; and sufficient progress metrics.

## Anticipated Time Schedule

An anticipated time schedule for this proposed approach is provided in Table 1. The following summarizes the schedule for each task and action.

### *Task 1: CPUE Workshop*

- EC approval of Task 1 in July, 2012.

- Contract 2 or 3 external scientists that have the ability and time to participate in CPUE workshop.

- Independent data examination by external scientists and by Collaborative Program scientists to start as soon as data can be provided (the Program does not have the Population Estimation data at present, and some details are still missing from the Population Monitoring data). A reasonable period of time for this analysis is 3 months (Aug-Oct; given possible time conflicts of scientists and actual data analysis).

- Distribute pertinent existing reports concerning the population monitoring to all anticipated workshop participants at the same time that the data are made available.

- 3-day workshop by end of October 2012.

- Report to EC by December 2012.

### *Task 2: Review Monitoring Program*

- Evaluate and refine aspects of fish monitoring program; workshops may be scheduled in January and February of 2013.

### *Task 3: Update the current Fish Monitoring Plan*

- An updated draft RGSM Population Monitoring Plan will be vetted through the federal agencies and RIP so that it can be funded and implemented in FY2014.

- It is assumed that the current monitoring program will continue until a new or revised program is implemented, evaluated, and refined.

Table 1. Proposed time schedule for revision of the Fish Monitoring Plan.

| Tasks | 2012 | | | | | | 2013 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
| 1. CPUE Workshop | | | | | | | | | | | | |
| • EC Approval | X | | | | | | | | | | | |
| • Contract Scientists | | X | | | | | | | | | | |
| • Data Examination | | X | X | X | | | | | | | | |
| • 3-Day Workshop | | | | X | | | | | | | | |
| • Report to EC | | | | | X | X | | | | | | |
| 2. Evaluate Monitoring | | | | | | X | X | X | | | | |
| 3.Update Plan | | | | | | | | X | X | X | X | X |

# Estimated Costs

- The costs for Task 1 are estimated at $30,000 of federal funding (USFWS and Reclamation/CP) with cost share contributions from nonfederal signatories anticipated. The majority of this cost ($20-25,000) is for contracting external scientists' time and per diem. The costs for participation by the Collaborative Program participants or their contractors are not factored into this estimate.

- The costs of Tasks 2 and 3 are undetermined at this time. Each workshop for Task 2 is estimated to cost about the same as for Task 1 ($30,000).

# Workshop Organizers

The CPUE Metrics and Methodologies workshop planners include:
- Rick Billings, Albuquerque-Bernalillo County Water Utility Authority
- Jim Brooks, U.S. Fish and Wildlife Service
- Michael Porter, U.S. Army Corps of Engineers
- Grace Haggerty, New Mexico Interstate Stream Commission
- Daniel Goodman, Montana State University
- Richard Valdez, SWCA
- Jason Remshardt, U.S. Fish and Wildlife Service

# Literature Cited

Dudley, R.K. and S.P. Platania. 2011. Rio Grande silvery minnow population monitoring program results from September 2009 to October 2010. Report to the Middle Rio Grande Endangered Species Act Collaborative Program and the U.S. Bureau of Reclamation, Albuquerque, NM.

Platania, S.P. 1993. The fishes of the Rio Grande between Velarde and Elephant Butte Reservoir and their habitat associations. Report to the New Mexico Department of Game and Fish, Santa Fe, and U.S. Bureau of Reclamation (Albuquerque Projects Office), Albuquerque, NM.

U.S. Fish and Wildlife Service. 2010. Rio Grande Silvery Minnow (*Hybognathus amarus*) Recovery Plan, First Revision. Albuquerque, NM.

# Appendix A: Task 1 Description.

**Task 1. Conduct a Workshop on Catch-per-Unit-Effort (CPUE) Methodology used in the Current Rio Grande Silvery Minnow (RGSM) Population Monitoring Program**

This task is intended to explore and reconcile issues and concerns with using CPUE to monitor the RGSM. This task will accomplish the first necessary step in developing a better understanding of the current methodologies used to monitor the species and ways to improve and refine the monitoring program. This task will also begin to establish better communications among the scientists, managers, and the EC over the meaning and use of monitoring information. The workshop will also review methodologies for monitoring used in other river systems, as well as analytical methods that may help to improve a fish monitoring program for the Middle Rio Grande.

*Objectives*:

- Evaluate statistical properties and interpretations of the current RGSM monitoring program, including precision and accuracy of CPUE.
- Discuss, evaluate, and reconcile areas of concern/disagreement over CPUE.
- Discuss and evaluate population estimation for RGSM and compare and correlate with CPUE, with <u>available population estimation data</u>.
- Identify and evaluate other methods for monitoring the RGSM, including methods used in other river systems.
- Identify, discuss, and reconcile uses for CPUE, including recovery demographic criteria, sufficient progress metrics, and inputs and parameter estimates for Population Viability Analysis.

*Actions:*

- Retain 2-3 external scientists with expertise in CPUE, fish sampling design for small-bodied fishes, and other methodologies to participate in data examination, workshop presentation/interaction, and assist in preparing workshop report.
- Distribute and provide for independent examination, existing pertinent reports and the existing monitoring data (and available population estimation data_) to evaluate existing and potential precision and levels of detectable change in abundance of RGSM.
- Conduct a 3-day workshop, with EC members participating in a 2-hour introduction followed by technical presentations, discussion, and report preparation.
- Prepare and present a report of the CPUE Workshop to the EC (report to be prepared jointly by workshop organizers and external scientists).

*Proposed Structure and Process:*

- Workshop tentatively scheduled for 3 days in the last week of October, 2012. Draft agenda for the workshop (to be refined with the assistance of the external scientists) is:
  - o Day 1—Morning: Presentation to EC of background, workshop objectives and EC/scientists dialogue/questions/comments.

- o Day 1—Afternoon: Technical presentations and discussions on RGSM current monitoring.
- o Day 2—Morning: Continuation of presentations and discussion of other methods used, data analyses, etc (to be further defined).
- o Day 2—Afternoon: Discussion session (facilitated).
- o Day 3—Morning: Technical presentations and discussion on demographic metrics for sufficient progress and recovery milestones (facilitated).
- o Day 3—Afternoon: Report preparation by Participating Scientists.

- This workshop will involve a detailed evaluation of CPUE collection and analysis methodologies. It is recommended that primary attendees are scientists familiar with fish population monitoring in the MRG and that participating scientists are well prepared. A list of scientists will be developed jointly by the workshop organizers and the EC; that list will be used to form the discussion groups and to write the Workshop Report. A list of technical participants will be distributed to the EC for approval prior to the workshop. A cross section of knowledgeable scientists from the diverse agencies/entities is encouraged.

- Other attendees may participate as observers and be allowed to provide comments or questions only during specified comment/question periods, most likely at the end of each presentation and discussion session. This is done to ensure that the workshop stays on schedule with technical issues. However, this is a public meeting.

- Two to three scientists not currently involved in the Collaborative Program and with expertise in sampling methodologies/statistical analysis/CPUE monitoring for small-bodied river fishes will be contracted to participate in data examination, workshop participation, and report preparation. Availability will most likely be a determining factor in who is contracted. Prior to contracting with these individuals, their names and CVs will be provided to the EC members for approval.

- The contracted external scientists are not considered to be a science panel or peer reviewers but will participate as other scientists do in the workshop and will assist in drafting the Workshop Report on the last day of the meeting and following the workshop.

- A facilitator will be used to lead the workshop. The facilitator shall be experienced at leading technical workshops. One or two additional assistants may be requested to help with workshop materials, monitor and record discussion sessions, etc. The facilitator's contract may be with any of the EC members and the facilitator's name and CV will be provided to the EC for approval at the same time the information is provided to external scientists.

- The workshop organizers will remain in place to assist in selection and contracting the external scientists, setting up the workshop, and finalizing the Workshop Report. Technical editing and technical and administrative assistance will be provided by the Collaborative Program PMT and EC contributions.

*Products/Outcomes:*
- Workshop Report written by the workshop organizers and the external scientists to include:
  - o Summary of CPUE issues as used in the MRG.

- Effectiveness of current program and CPUE to address Collaborative Program and RIP needs.
- Recommendation to the EC on continued use and refinement of CPUE.
- Other uses for CPUE (e.g., survival, recruitment).
- Recommendation to the EC for additional sampling methods for monitoring the RGSM.
- Provision for minority reports to document alternative views or opinions on content of report.

- Electronic and hard copies of workshop proceedings and presentations.
- Summary of discussion group dialogue.
- Proposed outline to help guide Tasks 2 and 3.

# Appendix B: Suggested External Scientists (Preliminary)

The following are recommended scientists and a list of their qualifications who are not directly involved with the Collaborative Program and who could provide an objective evaluation of the RGSM monitoring program and data:

- Dr. Wayne Hubert (retired)
    - Wyoming Cooperative Fish and Wildlife Research Unit, University of Wyoming, WY
    - Lead author: Relative Abundance and Catch-per-Unit-Effort, Chapter 7 *in* Analysis and Interpretation of Freshwater Fisheries Data
- Dr. Ron Ryel
    - Department of Forest, Range, and Wildlife Sciences, Utah State University, Logan, UT
    - Teaches classes in Inventory, Monitoring and Assessment
- Dr. Brett Johnson
    - Associate Professor, Colorado State University, Ft. Collins, CO
    - Co-author: Predator-Prey Interactions, Chapter 16 *in* Analysis and Interpretation of Freshwater Fisheries Data
- Dr. Carl Walters
    - University of British Columbia, Vancouver, BC
- Dr. Josh Korman
    - Ecometrics, Vancouver, BC
- Dr. William Pine
    - University of Florida, Gainesville, FL
- Dr. Lewis Coggins
    - NOAA's Southeast Fisheries Science Center, National Marine Fisheries Service, Beaufort, NC
- Dr. Ray Hilborn
    - School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA
- Dr. Mike C. Runge
    - US Geological Survey Patuxent Wildlife Research Center, Laurel, MD

Scientists will provide curriculum vitae to the Collaborative Program and the EC as part of the selection process for participating in the CPUE workshop.

*Mary Fabrizio*

*Phaedra Budy*

*David Galat*

# Survey of the Executive Committee on Fish Population Monitoring Needs Summary Report

## Middle Rio Grande Endangered Species Collaborative Program

**March 2015**

*Daniel B. Stephens & Associates, Inc.*

# Survey of the Executive Committee on
# Fish Population Monitoring Needs, Summary Report
# Middle Rio Grande Endangered Species Collaborative Program
# March 2015

## Introduction and Background

The Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) Executive Committee (EC) consists of designated representatives from each of the 16 Signatories.  In May 2014, the Collaborative Program Population Monitoring Workshop Planning Workgroup (Planning Workgroup) requested that the EC complete a survey entitled "Executive Committee Survey of Collaborative Program Fish Population Monitoring Needs." The Rio Grande silvery minnow (silvery minnow) is a federal and state listed endangered species, and is the primary concern for the Collaborative Program in the Middle Rio Grande. The purposes of the survey were primarily to (1) assess the level of understanding by EC members of the monitoring program's metrics and methodologies, (2) obtain EC member's perspectives on the effectiveness of the current Rio Grande silvery minnow (RGSM) monitoring program in meeting the needs of the Collaborative Program, and (3) obtain information on what EC members believe are important in a species monitoring program that is designed for a recovery focused program (Recovery Implementation Program [RIP]).

The Planning Workgroup will use this survey to help guide the agenda and assemble questions for a Fish Population Monitoring Workshop that will assess the current fish monitoring methodologies and CPUE indices through discussions in a forum that includes scientists external to the Collaborative Program who are subject experts.  The workshop is intended to provide the EC with recommendations that will help to build the direction and rationale for the Collaborative Program's RIP fish monitoring program.

Of the 16 signatory representatives, 11 EC members responded to the survey, as follows:

- Albuquerque Bernalillo County Water Utility Authority (ABCWUA)
- Assessment Payers Association of the MRGCD (APA)
- Bureau of Reclamation (Reclamation)
- City of Albuquerque (CoA)

- Fish and Wildlife Service (FWS)
- New Mexico Interstate Stream Commission (NMISC)
- New Mexico Department of Game and Fish (NMDGF)
- Pueblo of Isleta
- Pueblo of Santa Ana
- U.S. Army Corps of Engineers (USACE)
- University of New Mexico (UNM)

The survey (Attachment 1) consisted of 10 questions (with 1 question containing 3 parts).  Each question asked the respondent to (A) assess the level of importance of each identified need and (B) assess how well the current monitoring program addresses each identified need.  Each respondent rated the need using a scale of 1 to 6, with 1 being "not needed," 5 being "a critical need," and 6 being "unsure/don't know."  Comments were encouraged, and were included by some of the respondents.  Table 1 shows the numerical responses from each responding member of the EC.  The figures graphically depict the responses to each question.

Funding for this report was provided by the ABCWUA and the NMISC as part of their contribution to the nonfederal cost share for the Collaborative Program.

# Table 1. Responses to the Executive Committee Survey of Collaborative Program Fish Population Monitoring Needs

| | A. Level of Importance for Each Need | | | | | | | | | | | | | | | | | | B. How Well Current Monitoring Program Addresses Need | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Albuquerque-Bernalillo County Water Utility Authority | Assessment Payers Association of the MRGCD | Bureau of Reclamation | City of Albuquerque | Fish and Wildlife Service | Interstate Stream Commission | Middle Rio Grande Conservancy District | New Mexico Attorney General's Office | New Mexico Department of Agriculture | New Mexico Department of Game and Fish | Pueblo of Isleta | Pueblo of Sandia | Pueblo of Santa Ana | Pueblo of Santo Domingo | U.S. Army Corps of Engineers | University of New Mexico | AVERAGE | MEDIAN | Albuquerque-Bernalillo County Water Utility Authority | Assessment Payers Association of the MRGCD | Bureau of Reclamation | City of Albuquerque | Fish and Wildlife Service | Interstate Stream Commission | Middle Rio Grande Conservancy District | New Mexico Attorney General's Office | New Mexico Department of Agriculture | New Mexico Department of Game and Fish | Pueblo of Isleta | Pueblo of Sandia | Pueblo of Santa Ana | Pueblo of Santo Domingo | U.S. Army Corps of Engineers | University of New Mexico | AVERAGE | MEDIAN |
| 1. Provides estimates of long-term population trends (increase/decrease). | 5 | 1 | 5 | 5 | 5 | 2 | -- | -- | -- | 4 | 5 | -- | 5 | -- | 5 | 5 | 4.3 | 5 | 2 | 1 | 4 | 2.5 | 4 | 2 | -- | -- | -- | 6 | 2 | -- | 4 | -- | 3 | 5 | 3.2 | 3 |
| 2. Provides estimates of population abundance over time and area. | 5 | 1 | 5 | 5 | 3 | 5 | -- | -- | -- | 5 | 5 | -- | 4 | -- | 5 | 4 | 4.3 | 5 | 2 | 1 | 4 | 2.5 | 2 | 1 | -- | -- | -- | 6 | 4 | -- | 3 | -- | 2 | 3 | 2.8 | 2.5 |
| 3. Evaluates species response to variations in natural conditions. | 4 | 3 | 5 | 5 | 2 | 4 | -- | -- | -- | 5 | 5 | -- | 4 | -- | 4 | 3 | 4.0 | 4 | 3 | 1 | 3 | 2 | 1 | 1 | -- | -- | -- | 6 | 4 | -- | 3 | -- | 2 | 4 | 2.7 | 3 |
| 4. Evaluates species response to management actions, such as: | 5 | -- | 5 | -- | 2 | 5 | -- | -- | -- | 5 | | -- | | -- | 3 | | 4.2 | 5 | 1 | -- | -- | -- | 1 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | 1 | -- | 1.0 | 1 |
|     Habitat restoration | 5 | 3 | 4 | 4 | | 5 | -- | -- | -- | 5 | 5 | -- | 4 | -- | 2 | 4 | 4.1 | 4 | 1 | 2 | 1 | 2 | | 1 | -- | -- | -- | 6 | 4 | -- | 1 | -- | 1 | 3 | 2.2 | 1.5 |
|     Modified spawning flows | | 3 | 5 | 4 | 2 | 5 | -- | -- | -- | 5 | 5 | -- | 3 | -- | 4 | 5 | 4.1 | 4.5 | | 2 | 5 | 3 | 1 | 1 | -- | -- | -- | 6 | 4 | -- | 3 | -- | 2 | 4 | 3.1 | 3 |
|     Summer/fall/winter operations | 5 | 3 | 5 | 4 | 3 | 4 | -- | -- | -- | 5 | 4 | -- | 3 | -- | 2 | 5 | 3.9 | 4 | 1 | 2 | 4 | 3 | 1 | 1 | -- | -- | -- | 6 | 2 | -- | 3 | -- | 1 | 5 | 2.6 | 2 |
|     Other | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 5. Refines understanding of species development and behavior. | 4 | 4 | 4 | 4 | 3 | 3 | -- | -- | -- | 3 | 3 | -- | 3 | -- | 3 | 2 | 3.3 | 3 | 2 | 2 | 1 | 2.5 | 1 | 1 | -- | -- | -- | 6 | 2 | -- | 2 | -- | 1 | 6 | 2.4 | 2 |
| 6. Evaluates progress toward species recovery. | 5 | 3 | 5 | 5 | 5 | 4 | -- | -- | -- | 4 | 3 | -- | 4 | -- | 5 | 5 | 4.4 | 5 | 1 | 1 | 6 | 2 | 4 | 2 | -- | -- | -- | 2 | 2 | -- | 4 | -- | 2 | 5 | 2.8 | 2 |
| 7. Evaluates sufficient progress. | 5 | 2 | 5 | 4 | 4 | 4 | -- | -- | -- | 3 | 3 | -- | 3 | -- | 5 | 6 | 4.0 | 4 | 1 | | 6 | 2 | 4 | 6 | -- | -- | -- | 2 | 2 | -- | 3 | -- | 2 | 6 | 3.4 | 2.5 |
| 8. Assesses population viability and self-sustainability. | 5 | 3 | 5 | 5 | 3 | 3 | -- | -- | -- | 5 | 3 | -- | 3 | -- | 4 | 5 | 4.0 | 4 | 3 | 1 | 3 | 2 | 2 | 6 | -- | -- | -- | 1 | 2 | -- | 6 | -- | 2 | 5 | 3.0 | 2 |
| 9. Tracks trends and abundances of other fish species. | 3 | 2 | 3 | 3 | 2 | 2 | -- | -- | -- | 2 | 3 | -- | 3 | -- | 3 | 4 | 2.7 | 3 | 3 | 2 | 4 | 2 | 3 | 6 | -- | -- | -- | 6 | 3 | -- | 4 | -- | 3 | 5 | 3.7 | 3 |
| 10. Provides high level of precision and accuracy for the cost. | 5 | 4 | 3 | 4 | 5 | 4 | -- | -- | -- | 5 | 3 | -- | 3 | -- | 2 | 3 | 3.7 | 4 | 1 | 1 | 3 | 2 | 5 | 1 | -- | -- | -- | 2 | 1 | -- | 3 | -- | 1 | 5 | 2.3 | 2 |

Notes:

A. Level of Importance for Each Need
1. Not needed
2. May be needed
3. Needed
4. Important need
5. Critical need
6. Don't know

B. How Well Current Monitoring Program Addresses Need
1. Poor
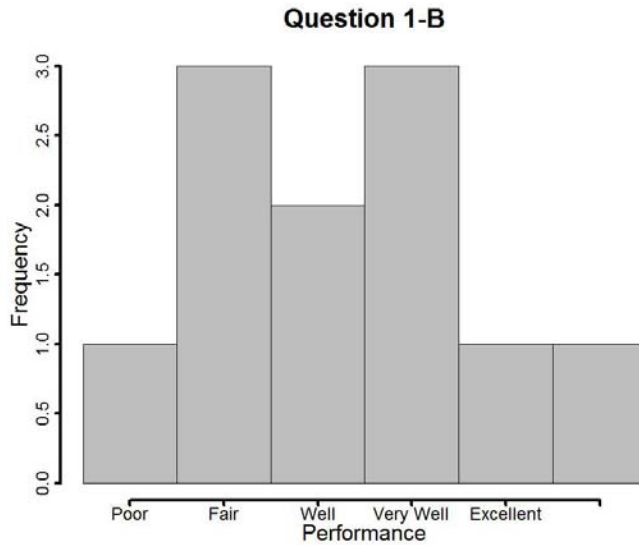2. Fair
3. Well
4. Very well
5. Exellent
6. Don't know

# 1. Provides estimates of long-term population trends (increase/decrease)

A) Level of importance
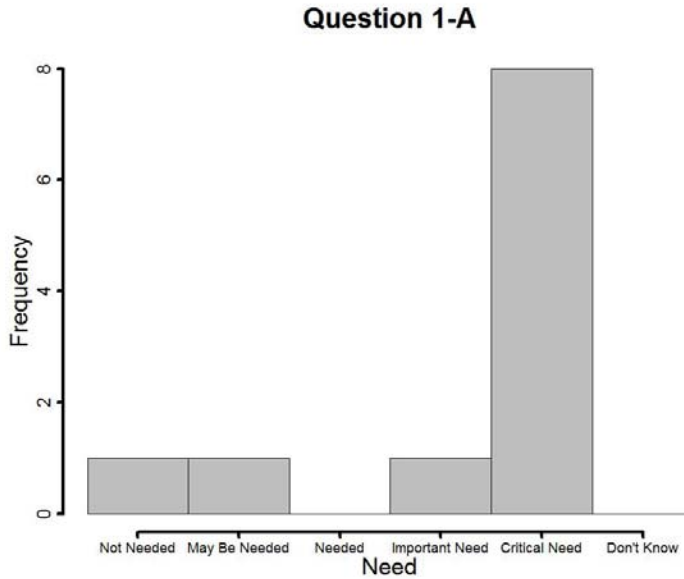


**Question 1-A**

**This is seen as a critical need by the majority of signatories.**

B) How well current monitoring program addresses this need
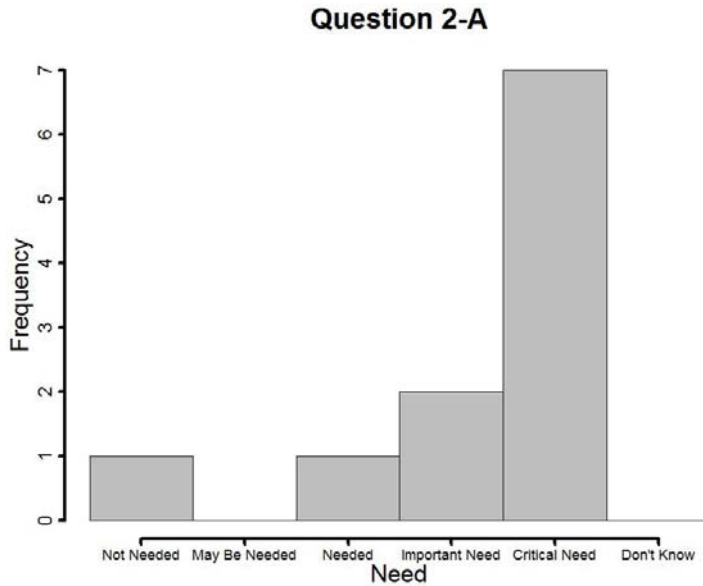


**Question 1-B**

**Range of responses indicates uncertainty by the EC.**

**Question 1 Comments provided as written (anonymous):**

- *Long term is very relative. RGSM seem to have large population fluctuations possible year to year, which makes sense for a fairly short lived species. Population estimate trends seem to depend greatly on assumptions and may in fact compound errors and not be useful as an accurate reflection of actual population.*

- *The PVA process identified the population monitoring, long-term trend data as some of the most valuable robust data on the species that the Program currently has. However, it is always valuable to re-examine and ensure that it meets the Program's needs and is being used appropriately. Maintaining the long-term trend dataset is a critical need; if adjustments are made those will require overlap for a period of time with the current monitoring protocol so that we can still translate from past data to any new effort and maintain the long-term trend information. For example, a biometrician could build in a random aspect to our current program and could reduce the number of sampling events we do at our current 20 sites. An overlapping adjustment was done for several years with the RGSM Population Estimate Program which was discontinued recently.*

- *CP should consider using traps to supplement seine data.*

- *Despite alternative sampling methods, the current protocol provides consistant, long-term trend data.*

- *Monitoring is robust at detecting major increasing population trends of smaller silvery minnows, but limited for enumerating decreasing densities of larger silvery minnows. There appears to be differential overdispersion by size and age.*

- *This may be one of the most thoroughly evaluated catch-per-unit-effort studies ever done, especially on a warm-water and small-bodied fish. A 20-year time series conducted with the same efficiency and consistency simply does not exist elsewhere in the scientific literature.*

## *2. Provides estimates of population abundance over time and area.*

A) Level of importance

### Question 2-A



**Majority see this as a critical need for the Program.**

B) How well current monitoring program addresses this need
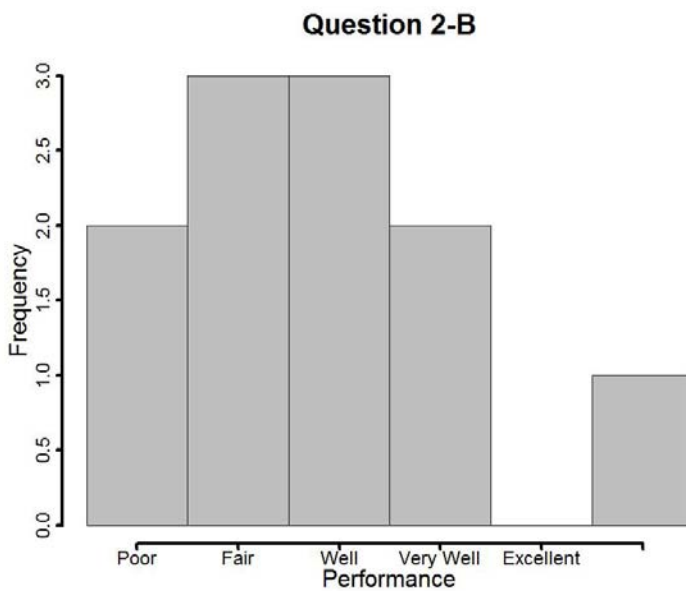
### Question 2-B



**Range of responses indicates uncertainty by the EC.**

**Question 2 Comments provided as written (anonymous):**

- *The population monitoring program assesses relative species abundance in terms of density; it does not provide a population estimate (i.e., number of individuals in the population - that was provided through the RGSM Population Estimation Program that was discontinued recently). The sampling sites for population monitoring are distributed over the overall area of the MRG where minnows are found; sampling 9 months during the year covers the fluctuations over time in terms of monthly and yearly changes. Our answers to this question assume it is referring to the need for abundance information over time and area (rather than the need for a specific estimate or population number). Also, our answers assume the level of resolution of time and area under consideration is consistent with the scope of the population monitoring as noted above.  See Response 3 below for some population monitoring limits.*

- *Current methods do an acceptable job of providing population estimates.*

- *The monitoring program provides a relative abundance (CPUE), which makes comparisons between reaches and years less definitive. Attempts to estimate abundance from CPUE have not been productive. Progress criteria should reflect the uncertain nature of the CPUE data.*

- *The relationship between CPUE and census size is difficult to ascertain even in relatively closed systems. However, there is a strong correlation of CPUE and census size.*

***3. Evaluates species response to variations in natural conditions.***

A) Level of importance
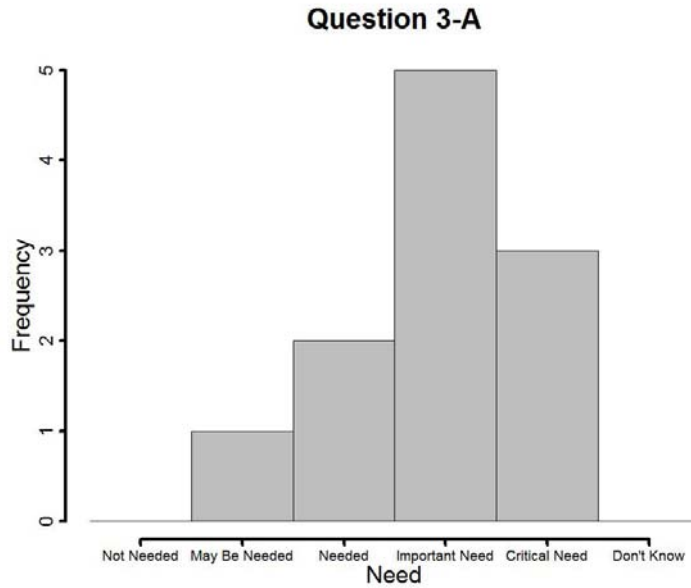


**Question 3-A**

**Majority indicates needed to critical need for species response to natural variability.**

B) How well current monitoring program addresses this need
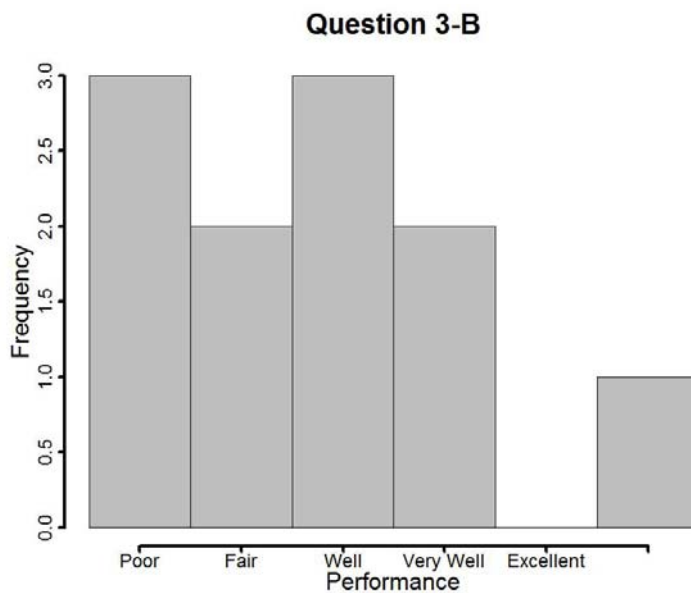


**Question 3-B**

**Range of responses indicates uncertainty.**

**Question 3 Comments provided as written (anonymous):**

- *This is a broad question and depends on which conditions are referenced. For species response to spring peak and summer intermittency, the PVA process has identified the value of the population monitoring data for assessing correlations with those river conditions. However, there is a limit, because population monitoring is at the population level (broad scale), it does not allow an evaluation of site-specific project contributions or site-specific conditions to the overall species status. In addition, as the MRG is highly regulated, the current monitoring reflects species response under regulated conditions, such as the response to the current severe drought.*

- *Monitoring is robust at detecting major increasing population trends of smaller silvery minnows, but limited for enumerating decreasing densities of larger silvery minnows. There appears to be differential overdispersion by size and age.*

- *Species sampling is sufficiently temporally and spatially dense to assess fish response to varying conditions, including river drying and intermittency. High flow conditions impede sampling.*

## 4. Evaluates species response to management actions, such as:

### 4.1. Habitat restoration

A) Level of importance
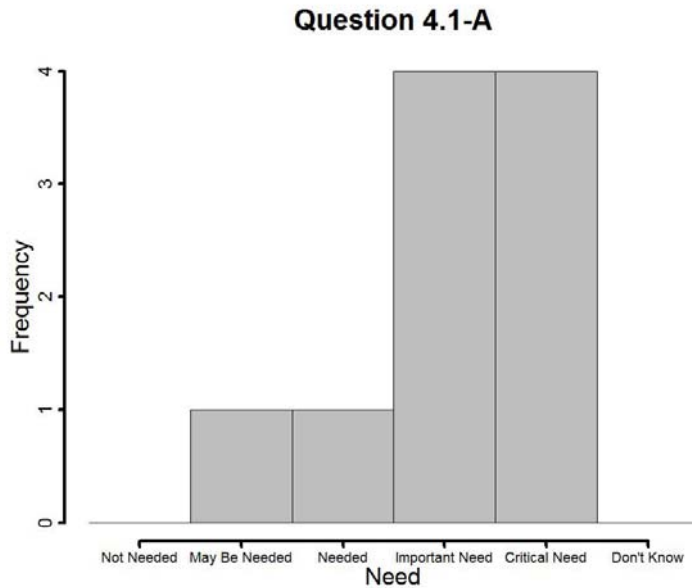
**Question 4.1-A**



**Majority believes this is an important or critical need.**

B) How well current monitoring program addresses this need
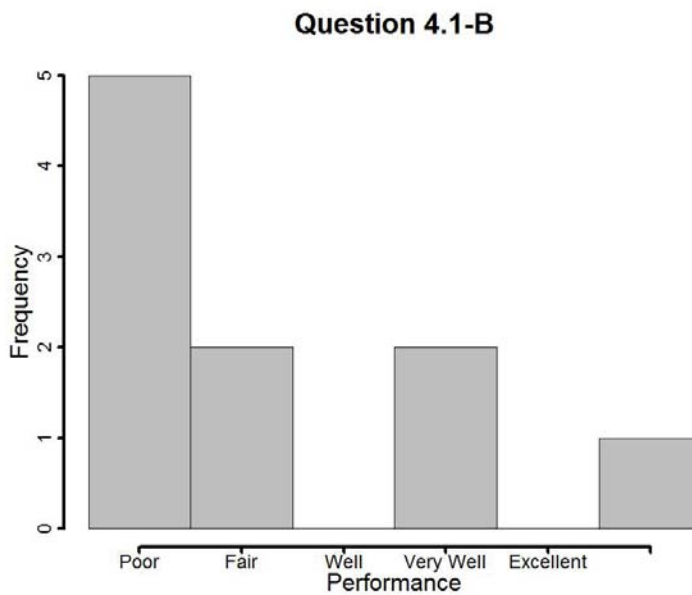
**Question 4.1-B**



**Majority believes need is addressed poor to fair.**

**Question 4.1 Comments provided as written (anonymous):**

- *See comments above; because the current population monitoring was designed to provide population-wide (broad scale) information on species trends in abundance, it does not necessarily allow for site-specific conclusions on the contributions of individual projects such as HR to the overall species status. To better focus on specific habitat restoration sites or other operational changes, additional monitoring could be done at a site-specific level. At habitat restoration sites, monitoring could be conducted to determine if the improvements have attracted more RGSM and other fish species, determine if the project has created desirable habitat for the minnow, determine how the restoration functions with the various water operations, etc. This would then, in turn, better focus the design of future restoration projects. This type of site-specific monitoring for HR projects is currently addressed in the Effectiveness Monitoring Plan (EMP) developed by the Program and specifically addresses this need to evaluate the effectiveness of Habitat Restoration projects for the minnow and flycatcher. The EMP is comprised of a Low Intensity and High Intensity level of effort for monitoring representative HR sites and should be implemented, and then evaluated, for its ability to address this need for evaluating species' responses to HR.*

- *Current monitoring program is not designed to evaluate habitat restoration projects. Population response may result from overall habitat restoration, but may be influenced by other management actions.*

- *Depends on the expected scope of restoration. For example, if restoration efforts are expected to increase reach-wide abundances, then population monitoring as currently constituted provides reach-wide estimates of abundance. If a specific restoration site is expected to increase abundance only at the site, then sampling should occur at that site.*

### 4. Evaluates species response to management actions, such as:

*4.2. Modified spawning flows*

    A) Level of importance
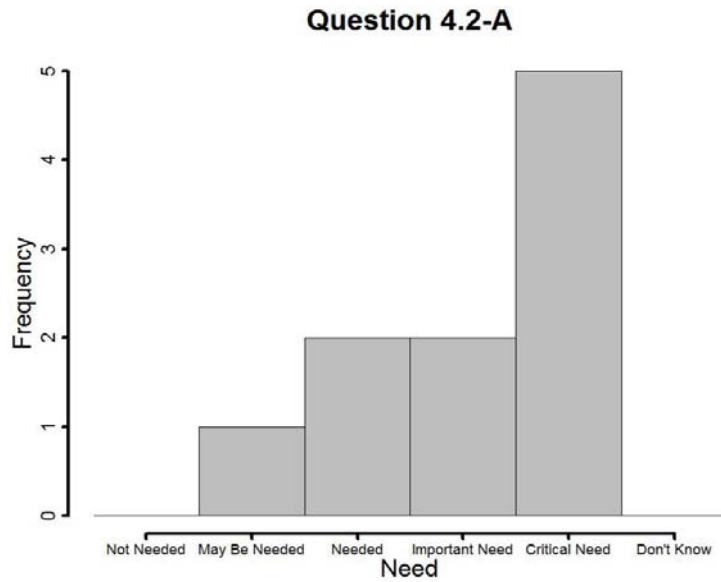
**Question 4.2-A**



**Majority indicates important to critical need.**

    B) How well current monitoring program addresses this need
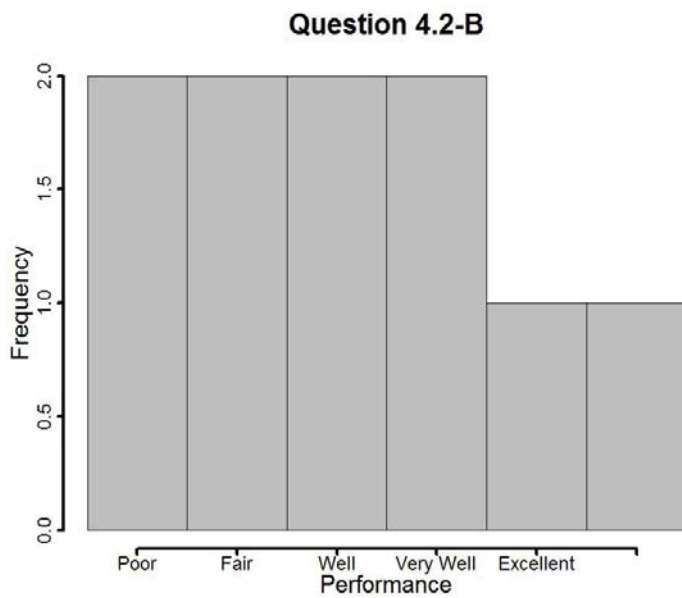
**Question 4.2-B**



**Range of responses shows uncertainty or unknown.**

**Question 4.2 Comments provided as written (anonymous):**

- *One of the strongest correlations identified through the PVA process was between population monitoring data for the October census and the correlation with spring spawning flows.*

- *The CPUE data are one consideration for the development of recruitment flow management actions. Focused studies on silvery minnow spawning and nursery areas provides finer resolution data for spawning flow criteria.*

- *Addresses post-modified flow abundance and provides insight into recruitment.*

# 4. Evaluates species response to management actions, such as:

## 4.3. Summer/fall/winter operations

A) Level of importance
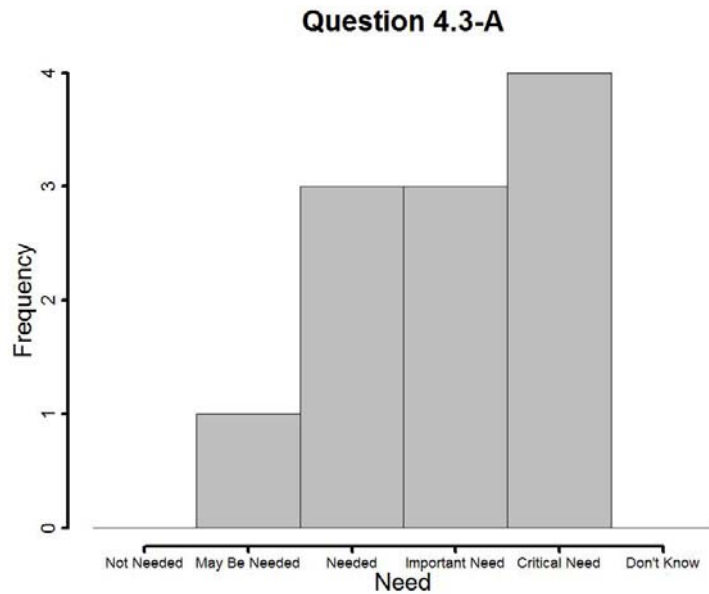
### Question 4.3-A



**Majority believes this is a need to critical need.**

B) How well current monitoring program addresses this need
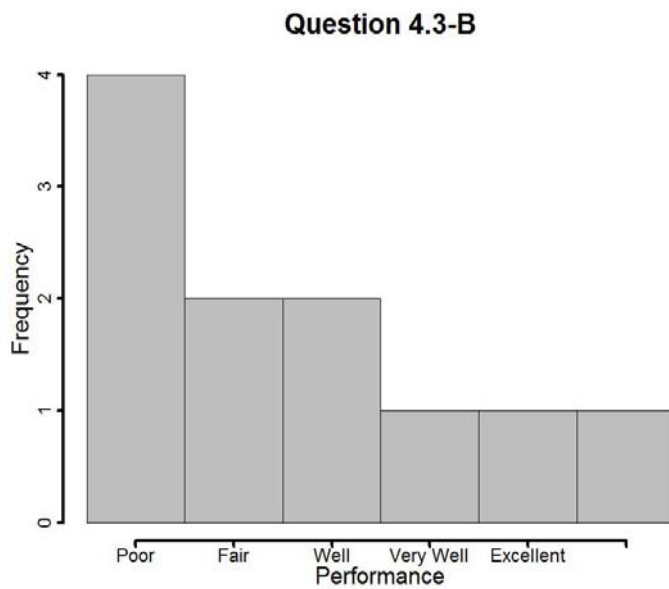
### Question 4.3-B



**Range of responses indicates uncertainty or unknown.**

**Question 4.3 Comments provided as written (anonymous):**

- *Another correlation informed by the population data is between summer and fall operations and October census data for the population. The population monitoring program also allows for assessment of trends during winter months (both within a given year and across years).*

- *CP should consider allowing habitat restoration projects to be constructed during the low to no flow periods in the summer to reduce costs, reduce construction time frame, and better construct features in the dry.*

- *Not applicable to USACE water operations. There is currently no standardized fish population monitoring on the Rio Chama, or the Cochiti Reach on the Rio Grande.*

## 5. *Refines understanding of species development and behavior.*

A) Level of importance
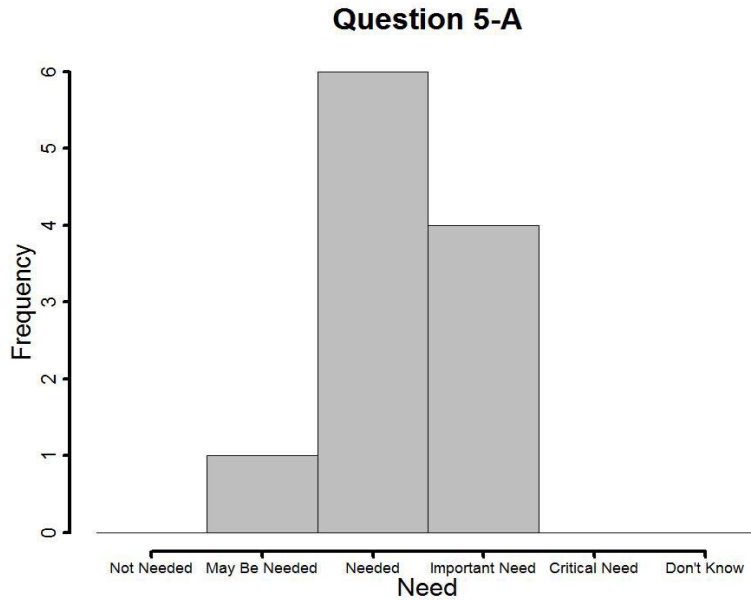
### Question 5-A



**Majority indicates needed (perhaps not through this monitoring program?).**

B) How well current monitoring program addresses this need
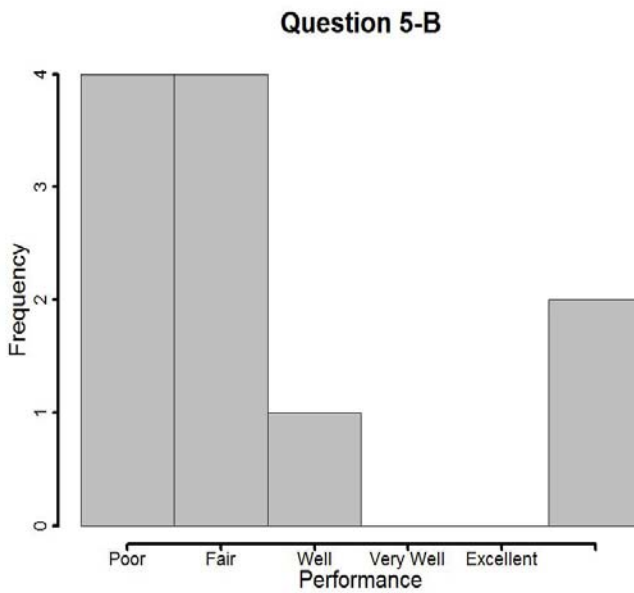
### Question 5-B



**Majority indicates poor to fair or unknown.**

**Question 5 Comments provided as written (anonymous):**

- *To refine our understanding of species development, specific scientific studies are needed rather than expecting a broad-scale population monitoring program to fulfill this need.  This information is not normally obtained through population-level monitoring; research and monitoring are two separate objectives.  Our baseline monitoring program should be geared toward long term population trends only and more specific information needs should be met through short term adaptive management assessments.  The fish length data obtained from monthly population monitoring does contribute, however, to our understanding of minnow development during the summer and fall (for Age-0, young of year), as well as the overall composition of age-classes in the population. However, a population monitoring program is not a behavioral study, nor a specific species development study. To do address those needs correctly, specific scientific research studies are required. Many of those studies have been conducted and some were funded by the Program (e.g., age and growth, minnow egg and larval development, fecundity, spawning behavior studies).*

- *This requires a different study design from population monitoring.*

- *This is not a stated goal of population monitoring.*

### 6. *Evaluates progress toward species recovery.*

A) Level of importance
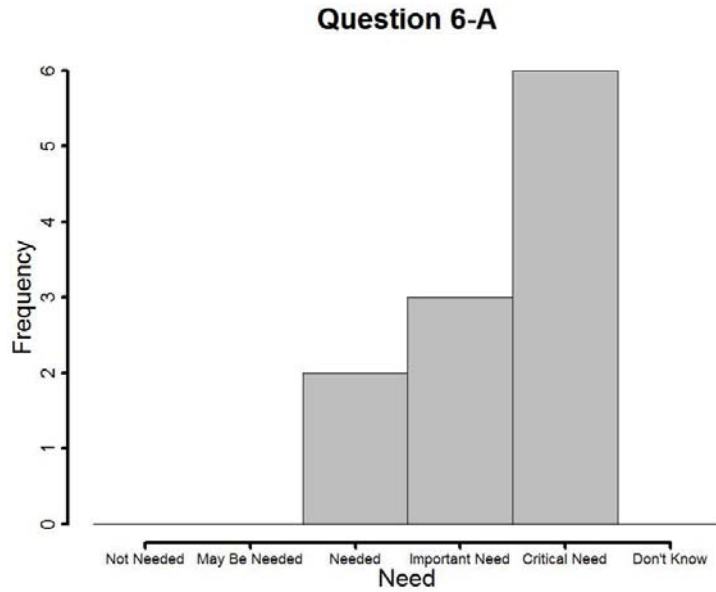
**Question 6-A**



**Majority sees this as an important to critical need.**

B) How well current monitoring program addresses this need
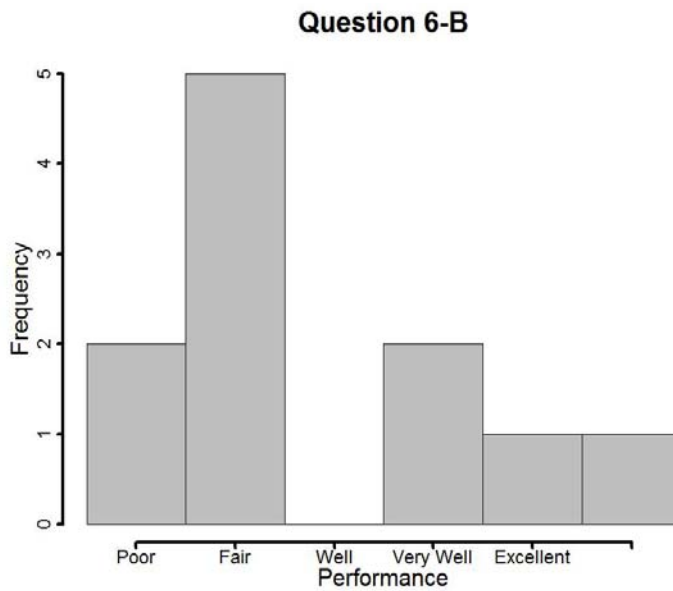
**Question 6-B**



**Majority indicates poor to fair.**

**Question 6 Comments provided as written (anonymous):**

- *This is a critical need; however, the Program or RIP would need to identify how progress toward recovery will be evaluated. Then the use of data from the population monitoring program can be assessed for how well it meets that evaluation need. The current monitoring does track the silvery minnow with a common, scientifically accepted measure for fish population assessment (CPUE). If the Program or RIP determines that additional monitoring is needed to evaluate progress toward recovery, all agencies should agree to this within the Program, including the USFWS, which has the responsibility for determining recovery criteria.*

- *Current recovery criteria have little documentation for the target values. This may be addressed by revisions to the monitoring program or the recovery criteria.*

- *Disagreement about recovery criteria precludes answering this question; however, population monitoring is a critical piece of information to assess species status.*

### 7. Evaluates sufficient progress.

A) Level of importance
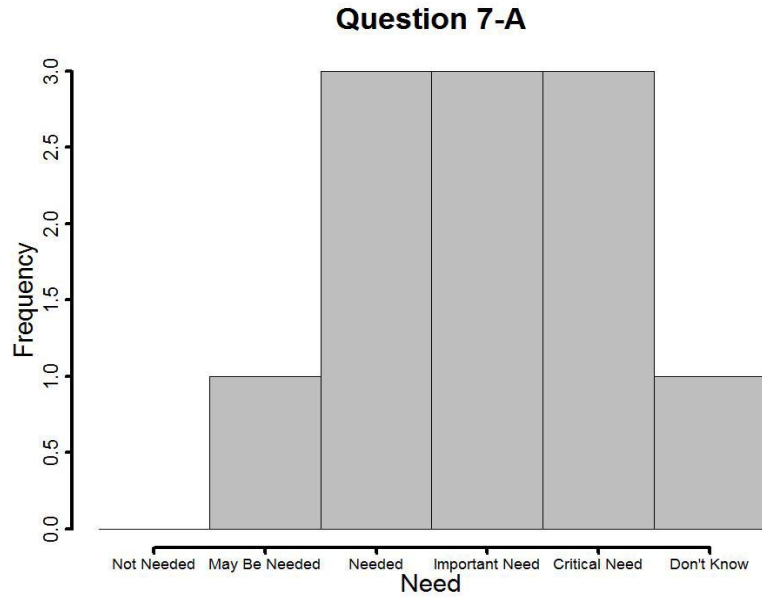
**Question 7-A**



**Range of responses indicates uncertainty but needed.**

B) How well current monitoring program addresses this need
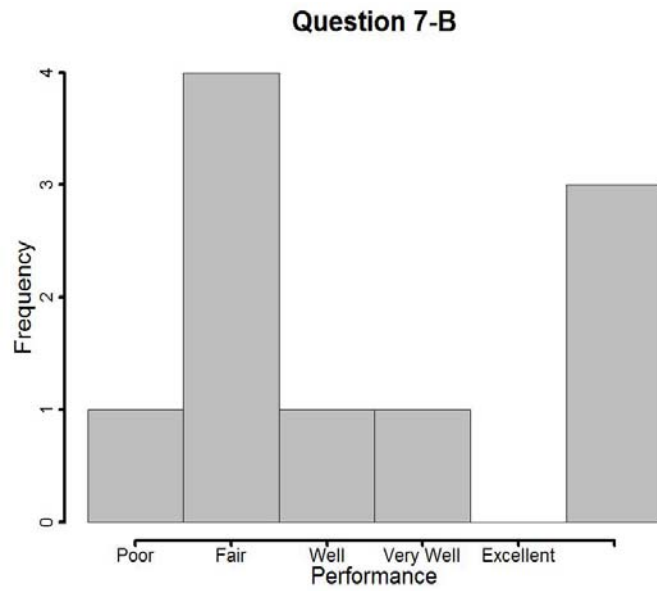
**Question 7-B**



**Wide range of responses indicates uncertainty and unknowns.**

**Question 7 Comments provided as written (anonymous):**

- *This is a critical need; however, the Program or RIP would need to identify how progress toward recovery will be evaluated. Then the use of data from the population monitoring program can be assessed for how well it meets that evaluation need. The current monitoring does track the silvery minnow with a common, scientifically accepted measure for fish population assessment (CPUE). If the Program or RIP determines that additional monitoring is needed to evaluate progress toward recovery, all agencies should agree to this within the Program, including the USFWS, which has the responsibility for determining recovery criteria.*

- *Progress criteria have little documentation for the target values. This may be addressed by revisions to the monitoring program or the progress criteria. See response below (8).*

- *I don't understand this question.*

### 8. Assesses population viability and self-sustainability.

A) Level of importance
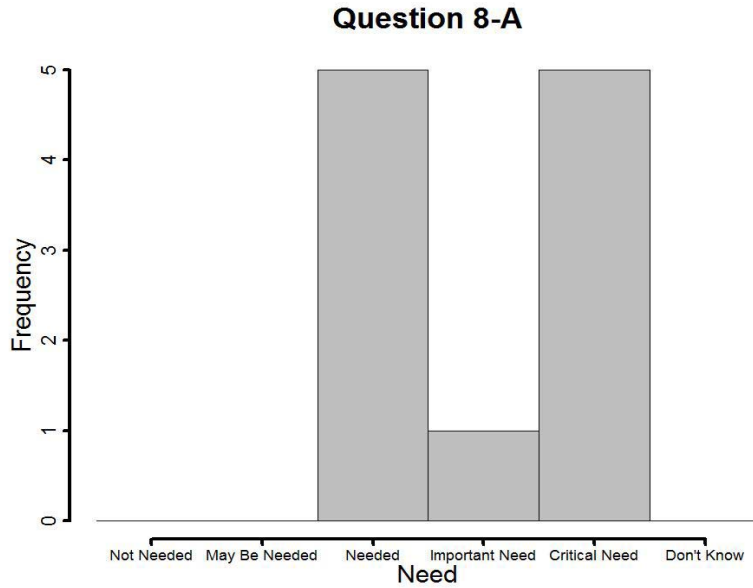
**Question 8-A**



**Needed to critical need.**

B) How well current monitoring program addresses this need
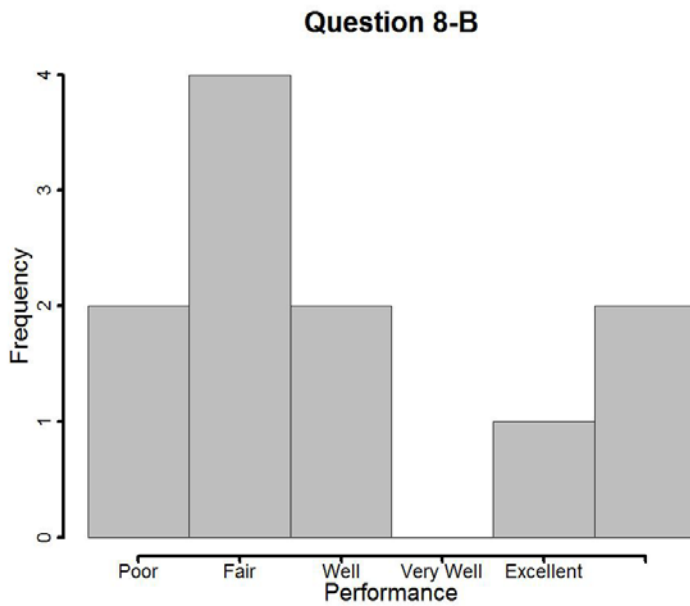
**Question 8-B**



**Wide range of responses indicates uncertainty and unknowns.**

**Question 8 Comments provided as written (anonymous):**

- *This is a long-term need. The life history of this species (short-lived and fluctuating abundance, or "r-selected") makes determinations of population viability difficult, as was brought forward during the PVA process. Long-term trend data that are provided through the population monitoring program do provide the big picture of overall trends in abundance over time, which can provide insight into the viability and self-sustainability of the population. Specifically how that viability is evaluated requires more definition and discussion - e.g., is it a multi-year average that needs to be above a certain threshold, is it the lambda value (i.e., positive increase in abundance yearly), etc.? There is current guidance in the USFWS' recovery plan, and we expect this will be revised over time with improved understanding of the species and through adaptive management.*

- *The population data appear to be over-dispersed (lots of zeros). The CPUE data have been used in population viability analyses (PVA). PVA modeling may be useful for developing useful progress criteria.*

## 9. *Tracks trends and abundances of other fish species.*

A) Level of importance
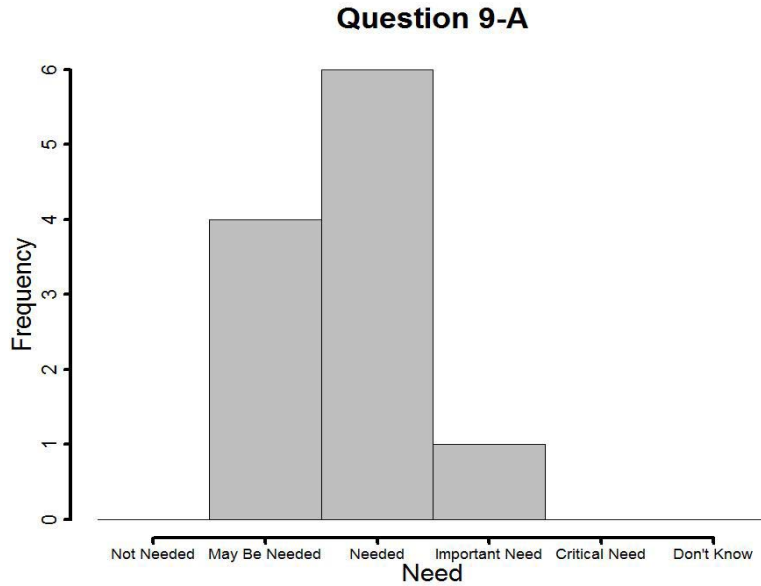
**Question 9-A**



**Needed, maybe?**

B) How well current monitoring program addresses this need
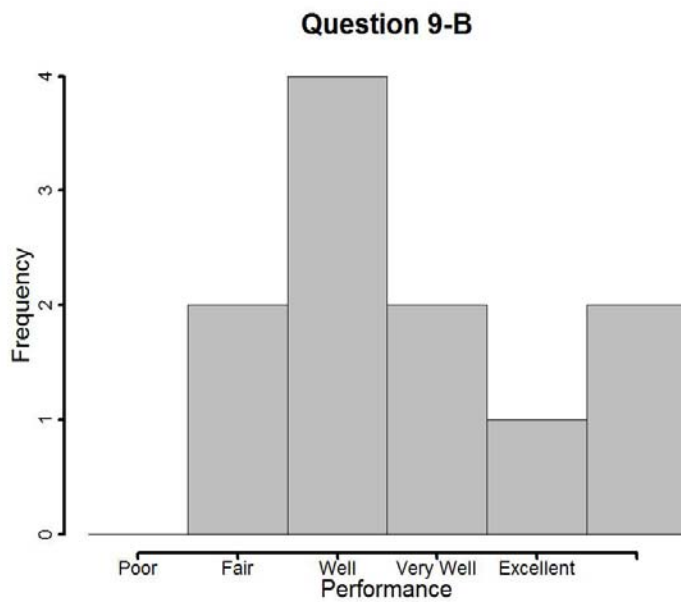
**Question 9-B**



**Range of responses indicates uncertainty and unknowns.**

**Question 9 Comments provided as written (anonymous):**

- *The current population monitoring program does collect concurrent data on the broader fish community - i.e., what other fish species are also found and their abundance at each monitoring site. The annual report for population monitoring devotes an entire section to the MRG fish community. These data are useful for examining trends of competitor and predator fish species that may impact the minnow population, as well as evaluating the risk of upstream expansion of those species (e.g., fish passage).*

- *Tracking multiple fish species may inform the program about important ecological relationships.*

### 10. Provides high level of precision and accuracy for the cost.

A) Level of importance
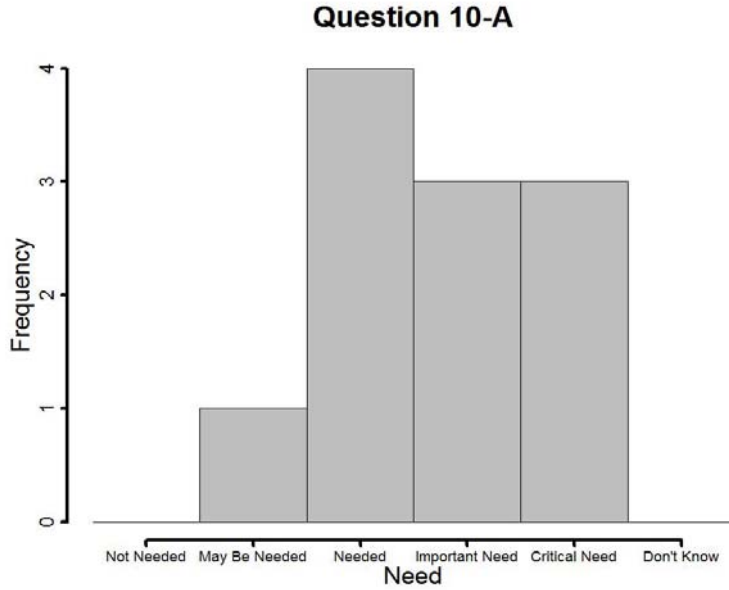
**Question 10-A**



**Needed to critical need.**

B) How well current monitoring program addresses this need
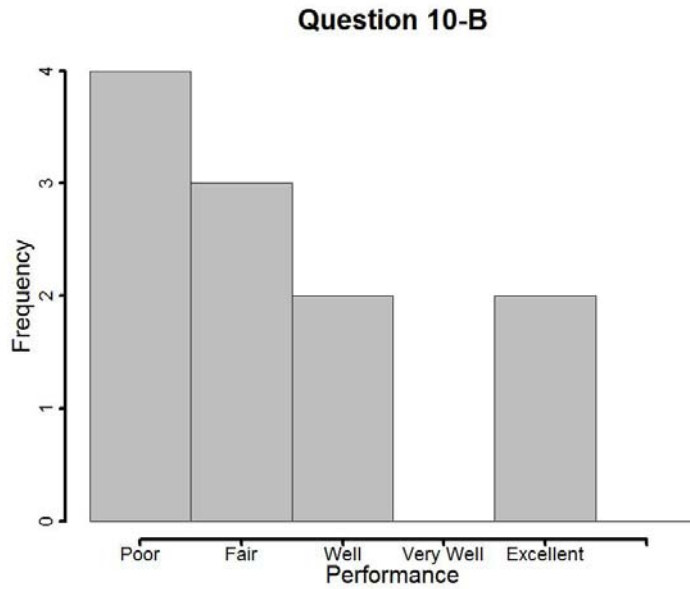
**Question 10-B**



**Range of responses indicates uncertainty, mostly poor to well.**

**Question 10 Comments provided as written (anonymous):**

- *The current population monitoring program is conducted at fairly low cost for the type of data that are provided and the importance of those data.  The current population monitoring program provides a reasonable level of precision and accuracy for the scope and cost.  More thorough monitoring efforts could be examined, however many suggestions in the past have been at high cost with little anticipated benefit over the current program.  Nonetheless, it is always valuable to re-examine and ensure the population monitoring effort is meeting the Program's needs.*

- *Not sure how to answer this question because my answer depends on the metric being measured. Assume you are asking about metric 2.*

- *Recognize the trade-off between precision & accuracy with cost.  This is an important concept that limits the sufficient progress and recovery criteria. Detecting a 10% population change is considerably more expensive than detecting  a 50-100% change. Successful recovery will depend on management actions that have large positive effects on silvery minnow populations.*

## Summary and Conclusion

In general, the results of the questionnaire indicate that the EC has a number of expectations for the Collaborative Program's fish monitoring program. Whether these are obtainable expectations was not explored in this questionnaire, but could be an important topic of discussion during the first Population Monitoring Workshop. The results of the survey also indicated that, in many cases, the EC provided a wide range of responses on whether the current monitoring program addresses those needs. These responses seem to indicate that the EC as a whole was much less certain about the current monitoring program and what it does than what they believe is important for a monitoring program to provide. These issues also should be explored during the Workshop. Some attention should be given to this report during the Workshop to ensure that scientists engaged are aware of the ultimate purpose for monitoring the Rio Grande silvery minnow for the Collaborative Program.

Additional comments were made at the end of the survey. The majority of these comments indicated that (1) the current Program needs to be evaluated from a technical, cost, and managerial viewpoint to look at any improvements that could be made, (2) additional monitoring conducted concurrently with the existing monitoring program could be beneficial, and (3) a workshop is needed and can be used to address the stated needs.

**Final Comments provided as written (anonymous):**

- *The program must evaluate current monitoring from a technical, cost and managerial viewpoint. Almost two decades of the current process should be investigated from a technical and managerial viewpoint. This is representative of good science and management. It should not take multiple years to do this. How the fish are monitored is the backbone of successful recovery and if this can be improved, needs additional sampling, needs a different sampling design, more locations or different analytical methods should be determined. Workshops are common and effective ways to do this. A beginning workshop to start addressing the monitoring program is an important step and the EC should step up.*

- *Recommend input from independent biometrician(s) with expertise on small-bodied, short-lived fish species in ephemeral western river systems, in conjunction with the establishment of an Independent Science Panel, to examine the appropriateness of*

*randomizing aspects of monitoring and/or evaluating the number of sampling events we do at our current 20 sites. As mentioned above, the PVA process identified the population monitoring, long-term trend data as some of the most valuable robust data on the species that the Program currently has. However, it is always valuable to re-examine and ensure that it meets the Program's needs and is being used appropriately. To maintain the comparability of the long-term dataset with any future adjustments, any changes that are considered (e.g., additional sites, new methods) would need to be conducted concurrently with the existing monitoring protocol to preserve the long-term dataset and allow us to translate between the current and the new approach. For example, this was done for several years with the RGSM Population Estimation Program. The current population monitoring program provides a long term data set for estimates on the RGSM population and the fish community in the MRG. This program should be continued; adding additional monitoring sites to the current 20 sites would be beneficial and would help address concerns regarding site selection for the population monitoring program. It would also provide additional data and geographic coverage. The population monitoring program (or any monitoring) needs to be cost-effective and designed to provide the information needed for management decisions. That requires awareness (and documentation) of what questions management needs answered. Implementing the RGSM Population Estimation Program again would provide more robust information on species status and specific mesohabitat use information.*

- *This workshop is badly needed and has been in planning for too long. The lack of sufficient progress in getting a reasonably simple workshop organized does not reflect well on agencies trying to monitor sufficient progress on the health of endangered species.*

- *The program is not designed to accomplish many of these tasks. And many of them are very costly.*

- *The population monitoring is crucial to recovery planning but the tension associated with providing accurate estimates that could indicate declining numbers/viability make it hard for some Committee members to accept. Whatever approach is adopted will have to be very robust. It may require that several complimentary approaches may be needed.*

**Attachment 1**

**Blank Survey**

# Executive Committee Survey of MRGESCP Fish Population Monitoring Needs

May 15, 2014

To:     Middle Rio Grande Endangered Species Collaborative Program Executive Committee
From:   Population Monitoring Workshop Planning Committee

The Population Monitoring Workshop Planning Committee requests that you please take a few minutes to:
A)  Indicate the level of importance (1-6) for each of the identified "needs" below of a RGSM monitoring program

B)  Evaluate (to the best of your knowledge) how well the MRGESCP's current monitoring program addresses each identified need (1-6).

Please expand on your answers if you wish and indicate additional needs that you believe should be considered.  The input you provide will help to guide the workshop to ensure we address EC needs.

Name: _____
Organization: _____

| | A. Level of Importance for Each Need | | | | | | B. How Well Current Monitoring Program Addresses Need | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Needed | May Be Needed | Needed | Important Need | Critical Need | Don't Know | Poor | Fair | Well | Very Well | Excellent | Don't Know |
| | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| 1. Provides estimates of long-term population trends (increase/decrease). Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 2. Provides estimates of population abundance over time and area. Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 3. Evaluates species response to variations in natural conditions. Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 4. Evaluates species response to management actions, such as: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Habitat restoration Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Modified spawning flows Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Summer/fall/winter operations Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| Other Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

*(continued)*

# Executive Committee Survey of MRGESCP Fish Population Monitoring Needs

| | A. Level of Importance for Each Need | | | | | | B. How Well Current Monitoring Program Addresses Need | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Not Needed | May Be Needed | Needed | Important Need | Critical Need | Don't Know | Poor | Fair | Well | Very Well | Excellent | Don't Know |
| | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| 5. Refines understanding of species development and behavior.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 6. Evaluates progress toward species recovery.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 7. Evaluates sufficient progress.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 8. Assesses population viability and self-sustainability.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 9. Tracks trends and abundances of other fish species.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |
| 10. Provides high level of precision and accuracy for the cost.<br>Comments: | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

Additional Comments/Suggestions: