

Science and Adaptive Management Committee Meeting

January 13, 2021

Meeting Materials:

Agenda

Minutes

2021 MRGESCP Work Plan [read-ahead, spreadsheet]

Draft MRGESCP S&T Ad Hoc Group Charge RGSM Population Monitoring Summary Report Ad Hoc [read-head, draft]

Draft MRGESCP S&T Ad Hoc Group Charge RGSM Population Modeling Ad Hoc [read-ahead, draft]

PMWG Update to the EC [read-ahead]

Summary of Proposed Actions: Genetics Subgroup Flowchart [read-ahead]

AM Database Excerpt – Compiled Independent Science Panel Recommendations [read-ahead, spreadsheet, not included]

Assessing the Assessment – Four Corners Adaptation Forum [presentation]

Revised MRGESCP Draft S&T Ad Hoc Group Charge PMWG Summary Report Ad Hoc Group [follow-up, draft]

Revised MRGESCP Draft S&T Ad Hoc Group Charge RGSM Population Model Ad Hoc Group [follow-up, draft]

MRG Width Maintenance Program [presentation, not included]



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

Science and Adaptive Management Committee (SAMC) Meeting January 13, 2021 1:00 PM-4:00 PM

Meeting Location: Zoom

<https://west-inc.zoom.us/j/8983593120?pwd=bU54V3NGeG93bXVISIJFcElzcE9wZz09>

Meeting ID: 898-359-3120; Passcode: 1251

Call-In: +1-669-900-6833

Meeting Agenda

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|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| 1:00 – 1:10 | Welcome and Agenda Review <ul style="list-style-type: none">✓ Decision: Approve January 13, 2021 meeting agenda✓ Decision: Approve December 7, 2020 meeting minutes <p>Read-ahead:</p> <ul style="list-style-type: none"><input type="checkbox"/> December 7, 2020 meeting minutes | <i>Catherine Murphy,
Program Support Team</i> |
| 1:10 – 2:00 | 2021 Work Plan <ul style="list-style-type: none">• Review 2021 MRGESCP Work Plan and discuss priority tasks for January-March 2021• EC requested Science & Technical (S&T) Ad Hoc Groups:<ul style="list-style-type: none">○ Population Monitoring Work Group (PMWG) summary report completion (Lead: Rich Valdez)○ RGSM Population Monitoring modeling small group (Lead: Charles Yackulic)• Other outstanding efforts:<ul style="list-style-type: none">○ RGSM Genetics work <p>Read-aheads:</p> <ul style="list-style-type: none"><input type="checkbox"/> 2021 MRGESCP Work Plan<input type="checkbox"/> Draft S&T Ad Hoc group charges (2)<input type="checkbox"/> R_Valdez PMWG Update to EC 2020_12_07<input type="checkbox"/> Summary of Proposed Actions - RGSM Genetics small group <ul style="list-style-type: none">✓ Decision: Review and approve draft charges for PMWG report and PM modeling S&T Ad Hoc Groups➤ Action Item: Invite Genetics small group rep(s) to next SAMC meeting Re: reassessment of priority questions➤ Action Item: Review proposed S&T Ad Hoc Groups based on priority work plan tasks | <i>Facilitated discussion</i> |

2:00 – 2:20	<p>Discuss Objectives Workshop (February 2021)</p> <ul style="list-style-type: none"> • Applying the Program Objectives as guiding principles • Discuss workshop sessions and facilitation • Review available pre-workshop survey responses • Discuss revisions to S.M.A.R.T. statements <p>✓ Decision: Workshop format and session facilitation</p>	<i>Facilitated discussion</i>
2:20 – 2:30	Break	
2:30 – 2:50	<p>Discuss Uncertainty in Adaptive Management (AM)</p> <ul style="list-style-type: none"> • Discuss categorization and incorporation of Independent Science Panel recommendations • Assessing and characterizing uncertainty – M. Friggens • Capturing uncertainty/error/assumptions in Ad Hoc deliverables • Incorporating uncertainty/predictability into conceptual ecological models (CEMs) and other models <p>Read-aheads:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Excel spreadsheet of compiled ISP recommendations with Type of Action Recommended label <input type="checkbox"/> Uncertainty Four Corners presentation 	<i>Facilitated discussion</i>
2:50 – 3:10	<p>Incorporating Climate Science</p> <ul style="list-style-type: none"> • Overview <ul style="list-style-type: none"> ○ Areas of concern for the Middle Rio Grande ○ Opportunities • Discussion on how to incorporate into project prioritization 	<i>Facilitated discussion</i>
3:10 – 3:25	<p>Opportunities for Collaboration</p> <ul style="list-style-type: none"> • U.S. Bureau of Reclamation’s width maintenance program • City of Albuquerque’s habitat restoration site • Others? <p>➤ Action Item: Invite Colleen McRoberts to present to the SAMC on the habitat restoration project</p>	<i>Ari Posner PST</i>
3:25 – 3:45	<p>Odds, Ends and Announcements</p> <ul style="list-style-type: none"> • Geospatial Mapper data layer requests – (A. O’Brien, T. Archdeacon, others?) • Announcement: MRGESCP management tools – WRDA USACE authorization to start 5-year study Re: deviations to Cochiti Dam operations • Other? 	<i>Open topics discussion</i>
3:45 – 4:00	Meeting Summary and Action Items Review	

➤ **Decision:** Next meeting date - February XX, 2021

4:00

Adjourn

Ongoing Discussion

Potential Topics for S&T Ad Hoc Groups

This section is provided to support future SAMC deliberations and decisions around tasking S&T Ad Hoc Groups. During the December 7, 2020 meeting, the following questions and/or activities were mentioned as potential future tasks.

- Developing a list of potential management actions and areas of management flexibility. This includes liaising with the Minnow Action Team (MAT) to gather that information.
- Completing outstanding PMWG tasks, such as:
 - Finalizing the PMWG summary report
 - Continuing work on the RGSM population model
- Completing other outstanding work from sunsetted work groups, including:
 - Addressing existing panel recommendations (prioritization to be determined by the SAMC)
 - Incomplete scopes of work
 - RGSM genetics next-steps from development of RGSM High-Throughput Markers
- Continue working on CEMS, including:
 - Integrating panel recommendations into the CEMs
 - Building the linkages necessary to incorporate CEMs into the AM Database
 - Developing less-detailed “public” versions of CEMs
- Investigating options for U.S. Bureau of Reclamation’s width maintenance program in order to inform discussions by the SAMC and Executive Committee on potential recommendations for implementation



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

Science and Adaptive Management Committee (SAMC) Meeting Minutes

January 13, 2021; 1:00 PM–4:00 PM

Location: Zoom Meeting

Decisions:

- ✓ Approval of January 13, 2021 SAMC meeting agenda
- ✓ Approval of December 7, 2020 SAMC meeting minutes

Action Items:

WHO	ACTION ITEM	BY WHEN
Ari Posner	Send presentation on the U.S. Bureau of Reclamation's width maintenance program to the Program Support Team (PST)	1/13/2021
PST	Send out a Doodle Poll to schedule the February SAMC meeting	1/15/2021
Catherine Murphy	Revise the Population Monitoring Work Group (PMWG) Summary Report Science & Technical (S&T) Ad Hoc Group Charge and send to the Executive Committee (EC)	1/15/2021
Catherine M.	Revise the Rio Grande silvery minnow (RGSM) Population Model S&T Ad Hoc Group Charge and send to the EC	1/15/2021
Catherine M.	Contact Rich Valdez to confirm membership of the PMWG Summary Report S&T Ad Hoc Group	1/15/2021
SAMC members	Fill out the Pre-Objectives Workshops survey	1/21/2021
Catherine M.	Invite Rich V. to the February SAMC meeting to discuss expectations for the PMWG summary report	February/March meeting
Catherine M.	Draft a S&T Ad Hoc Group charge for incorporating genetic factors into the RGSM conceptual ecological model (CEM)	February/March meeting
Catherine M.	Invite Wade Wilson to the February SAMC meeting to discuss incorporating genetic factors into the RGSM CEM	February/March meeting
PST	Create a template for assessing and quantifying uncertainty for deliverables to SAMC	February/March meeting
PST	Update status of independent science panel recommendations and send to SAMC	February/March meeting
PST	Invite Colleen McRoberts to attend the February SAMC meeting to discuss the City of Albuquerque's habitat restoration project	February/March meeting
Catherine M., Debbie L., and Megan F.	Catherine M., Debbie Lee, and Megan Friggens will discuss plans for the Scenarios Workshop	End of February

Next Meeting: February/March 2021

Meeting Summary

Welcome and Agenda Review

Catherine M., Program Support Team (PST) Science Coordinator and SAMC Facilitator, opened the meeting and reviewed the January 13, 2021 meeting agenda and December 7, 2020 meeting minutes.

- ✓ **Decision:** The SAMC approved the December 7, 2020 SAMC meeting minutes
- ✓ **Decision:** The SAMC approved the January 13, 2021 SAMC meeting agenda

2021 Work Plan

Review 2021 MRGЕСP Work Plan and discuss priority tasks for January-March 2021

- The Executive Committee (EC) approved the Collaborative Program’s 2021 Work Plan at its December meeting.
 - Tasks associated with transitioning to a new PST may be included in the 2021 Work Plan, as the current Program and Science Support contract will end in September 2021.
- The 2021 Work Plan is split into 8 tasks (see plan). The SAMC will help complete tasks in the ways described below:
 - Task 1 – Updating the objectives
 - Hold the Objectives Workshops and make updates to the Science & Adaptive Management (S&AM) Plan and Long-Term Plan (LTP).
 - Task 2 – Tasking Science & Technical (S&T) Ad Hoc Groups
 - Task 3 – Conceptual Ecological Models (CEMs)
 - Identify uncertainties in the CEMs, integrate them into the Adaptive Management (AM) Database, and link uncertainties to project ideas.
 - Develop models for the Pecos Sunflower and New Mexico meadow jumping mouse.
 - Task 4 – Improving science communication
 - Improve processes around communication (e.g., peer review, scope of work process, topical executive summary process).
 - Task 5 – Planning for using adaptive science
 - Hold a forecasting and scenario planning workshop.
 - Task 6 – Updating the LTP
 - Assist with the Project Bank in the AM Database.
 - Task 7 & 8 – Administrative tasks
 - Determine how the SAMC will coordinate/work with the Fiscal Planning Committee.
 - Link scientific findings from the annual summary report to guiding principles.
- Work can be delegated to S&T Ad Hoc Groups and the PST.
- The administrative side of the Collaborative Program needs to be developed, to coordinate with the SAMC.

EC requested S&T Ad Hoc Groups:

- The EC requested the SAMC charge two S&T Ad Hoc Groups to complete follow-up work from the sunsetted Population Monitoring Work Group (PMWG): the PMWG Summary Report Ad Hoc Group and the Rio Grande silvery minnow (RGSM) Population Model Ad Hoc Group.
 - PMWG Summary Report Ad Hoc Group (see charge):
 - Group Lead: Rich Valdez, SWCA Environmental Consultants, former chair of the PMWG

- The group needs additional time to complete the summary report. The deadline set is March 2021.
- The SAMC will review the summary report to ensure it contains contrasting viewpoints with supporting evidence, and relevant findings and recommendations.
- SAMC members made the following suggestions to the draft charge:
 - Clarify in the charge that the summary report is on PMWG Tasks 1 and 2. Task 3 was not initiated.
 - Revise the charge to state that different viewpoints should be documented.
 - Define the original Tasks 1–3 in the charge.
 - Add deliverables of 1-page summaries/fact sheets and brief presentations.
 - Use “findings and recommendations” consistently throughout the charge.
- The final summary report is due on **March 18, 2021**. Rich V. plans to submit the draft report by **March 1, 2021**. The SAMC will need to review, suggest changes, and approve the final version within that time.
- Rich V. will attend a SAMC meeting to discuss what is expected in the report.
- Will there be an opportunity to talk to Rich V. about the review?
 - We can schedule a meeting with Rich V., if needed, or he and Catherine can have those conversations.
- It would be easier to submit comments on the report in a comment matrix.
- Catherine M. will reach out to Rich V. to discuss membership.
- RGSM Population Modeling Ad Hoc Group (see charge):
 - Group Lead: Charles Yackulic, U.S. Geological Survey
 - Charles Y. conducted expert elicitation for modeling scenarios.
 - The original group of individuals will continue the work as an ad hoc group.
 - Mo Hobbs and Thomas Archdeacon are members of the group.
 - Charles Y.’s contract ends in June/July and will need support until then.
 - The SAMC suggested adding deliverables of 1-page summaries/fact sheets and brief presentations to the charge.
- The first S&T Ad Hoc Group charges will be sent to the EC for review. The SAMC will take any comments under consideration.
- The SAMC agreed that SAMC members will not be leads for S&T Ad Hoc Groups. This should be added to the SAMC description in the S&AM Plan when it is revised.
- The charges for all ad hoc groups should ask the groups to characterize the uncertainty and assumptions in their work products.
- With all ad hoc groups, it will be important to ensure members are presenting findings to the right people to get appropriate feedback. That could be in the form of brown bag seminars or small meetings between experts.
 - Peer Review Process:
 - The SAMC needs to develop and refine a peer review process.
 - The process has multiple levels, from minor in-group review to independent science panels, with many steps between.
 - It is important to develop appropriate levels of review for different types of products/deliverables and to determine who should direct the reviews.
 - The SAMC may function as an editorial board to find appropriate and critical reviewers.
 - The SAMC needs to establish a minimum set of steps for review to make sure group members check all the right places for information.

- How do we reach out for S&T Ad Hoc Group membership?
 - Moving forward, if there is a core group working on a problem, we can bring in additional people with fresh perspectives.
 - The PST or SAMC members can reach out to appropriate individuals to assess interest in ad hoc membership, as needed.
- Follow-up work from the sunsetted RGSM Genetics Work Group
 - Ad Hoc groups are formed around questions or tasks, not individuals. Genetics questions need to be prioritized based on scientific urgency and relationship to RGSM uncertainties.
 - The SAMC can ask previous group members to identify issues to focus on, which will likely include follow-up work from the SNP panels.
 - To engage the group in another way, the SAMC can task a genetics ad hoc group with incorporating genetic elements into the RGSM CEM.
 - Wade Wilson, U.S. Fish & Wildlife Service (USFWS), is already working on this task, which will help link genetics issues to critical uncertainties.
 - This process can also be applied to the avian CEMs, if appropriate data are available.
 - Wade W. will be invited to a SAMC meeting to discuss applying genetics to the RGSM CEM.
- Additional Ad Hoc Group Tasks
 - Identify critical uncertainties from the avian CEMs.
 - The information in the CEMs needs to be formatted for the AM Database.
- **Action Item:** Catherine Murphy will revise the PMWG Summary Report S&T Ad Hoc Group Charge and send to the Executive Committee
- **Action Item:** Catherine Murphy will revise the RGSM Population Model S&T Ad Hoc Group Charge and send to the Executive Committee
- **Action Item:** Catherine Murphy will contact Rich Valdez to confirm membership of the PMWG Summary Report S&T Ad Hoc Group
- **Action Item:** Catherine Murphy will invite Rich Valdez to the February SAMC meeting to discuss expectations for the PMWG summary report
- **Action Item:** Catherine Murphy will draft a S&T Ad Hoc Group charge for incorporating genetic factors into the RGSM CEM
- **Action Item:** Catherine Murphy will invite Wade Wilson to the February SAMC meeting to discuss incorporating genetic factors into the RGSM CEM

Discuss Objectives Workshop (February 2021)

Melissa Welsch, PST, revised some preliminary objectives to be S.M.A.R.T. (Specific, Measurable, Attainable, Relevant, Time-Bound). She advises the following for revising objectives and strategies:

- Activities should be manageable by the SAMC and show incremental progress.
- Focus on expanding on verbs (e.g., “support research.”)
- Identify specific ways to accomplish objectives/strategies.
- Add timelines and deliverables to objectives/strategies.
- Include one-page reports and short presentations as deliverables to the SAMC.
 - Shorter, simpler communication will be easier to complete, and will summarize pertinent information for the SAMC.
- **Action Item:** The SAMC will fill out the Pre-Objectives Workshop survey

Discuss Uncertainty in Adaptive Management (AM)

- There are many types of uncertainties associated with the Program (e.g., knowledge gaps in CEMs, reducible/irreducible variabilities, confidence/error/bias of model estimators and parameters). All are called uncertainty, but it would help to be more specific.
 - Taylor Higgins, PST, categorized the independent science panel recommendations in a spreadsheet (see spreadsheet).
 - Taylor H. added the types of actions proposed in each recommendation (e.g., reporting, analytical, new data collection, modify protocol).
 - Some recommendations have been addressed, but the list has not been updated.
 - How do we deal with recommendations that are not well supported by the science?
 - The SAMC should avoid making changes without providing justification. If a recommendation is ignored, there will be evidence to support that conclusion.
 - An ad hoc group may need to be tasked with updating the status of each recommendation and deciding if it should be ignored or prioritized, with justification.
 - Suggestion to create a template that outlines the types of uncertainty, so groups preparing deliverables can check off which uncertainties were addressed.
 - Asking for confidence level may be easier. Uncertainty is harder for people to characterize than their confidence level.
 - The uncertainty four corners presentation was very straightforward but is narrower than what is needed; a template would work better.
- **Action Item:** The PST will update the status of independent science panel recommendations and send to SAMC
 - **Action Item:** The PST will create a template for assessing and quantifying uncertainty for deliverables to SAMC

Incorporating Climate Science

- Question from 50-Year Water Plan Dialogue: What water share will climate change take?
 - This is not being accounted for in current water plans.
 - What can the Collaborative Program do to start incorporating that question?
 - This directly contributes to scenario planning and forecasting.
 - Megan Friggens will be consulted on development of the Scenarios Workshop.
 - Suggestion to include questions related to climate change/future scenarios in deliverables.
- **Action Item:** Catherine Murphy, Debbie Lee, and Megan Friggens will discuss plans for the Scenarios Workshop

Opportunities for Collaboration

U.S. Bureau of Reclamation's width maintenance program

- Ari Posner, U.S. Bureau of Reclamation (Reclamation), gave an update on the program:
 - Background: The river was channelized in the 50s/60s; the channel was cleared and jetty jacks were built to stabilize the banks. Reclamation maintained the channel through vegetation removal through the early 90s, but stopped when the southwestern willow flycatcher was listed. Since then, vegetation has overgrown. In some places, when there is flooding, water goes over bank at lower discharges. Water deliverers are interested in maintaining water conveyance.
 - Reclamation plans to enter the active channel to clear vegetation, widen the channel, possibly build a pilot channel, etc.

- Reclamation is coming up with 5–10 year plan to work through system to maintain conveyance capacity, while optimizing vegetation to reduce senescent stands.
 - Widening the channel decreases velocity in the river. This activity is one of the few that overlaps river management/conveyance goals and habitat goals.
 - Reclamation does not view the project as its sole responsibility; the project needs to be done in partnership with USFWS, U.S. Army Corps of Engineers, New Mexico Interstate Stream Commission (NMISC), and Middle Rio Grande Conservancy District.
 - This is a pilot program, and Reclamation does not know the impacts it will have. The intent is to use the project to monitor changes in the river to inform other projects.
 - How can the Collaborative Program contribute to the width maintenance program?
 - The Collaborative Program can help with monitoring and determining benefits to species and habitat.
 - It is hard to measure response to widening the channel, as the response (change in spawning habitat) will not occur at the same time and place. Suggestion to look at particle retention as a surrogate to quantify impacts from the activity.
 - Reclamation plans to do 2D numerical modelling, which can include particle tracking.
 - Ari P. will send a draft slideshow on the proposed width maintenance program to the SAMC (not for public distribution).
 - What is the timeline of implementation?
 - The width maintenance program is at a very early stage.
 - The Collaborative Program can provide input on how to optimize implementation vis-à-vis habitat and how to monitor impacts/benefits.
- **Action Item:** Ari Posner will send draft presentation on Reclamation’s width maintenance program to the PST

City of Albuquerque’s habitat restoration site

- Colleen McRoberts, City of Albuquerque, will be invited to the next SAMC meeting to present on the habitat restoration project.
- **Action Item:** The PST will invite Colleen McRoberts to attend the February SAMC meeting to discuss the habitat restoration project

Odds, Ends and Announcements

- There will be no more development on the Portal, including additional interactive mapper layers.
 - Trevor Birt, NMISC, suggested forming S&T Ad Hoc Groups that include University of New Mexico (UNM) students.
 - A UNM professor reached out to Trevor about getting hands-on experience for students.
 - Trevor had several ideas for groups, including a GIS-related one.
 - The SAMC should start working with Trevor B. on questions for students to work on.
 - Mo Hobbs will be stepping away from the SAMC towards the end of May.
- **Action Item:** The PST will send out a Doodle Poll to schedule the February SAMC meeting

Meeting Participants

Alan Hatch	EC <i>Ex Officio</i> Member
Ara Winter	Statistics/Modeling Expert
Ari Posner	Geomorphology Expert
Catherine Murphy	Program Support Team, SAMC Facilitator
David Moore	Terrestrial Ecology Expert
Debbie Lee	Program Support Team
Meaghan Conway	Ecosystem Function Expert
Megan Friggens	Climate Science Expert
Melissa Welsch	Program Support Team
Michelle Tuineau	Program Support Team
Mo Hobbs	Aquatic Ecology Expert
Ryan Gronewold	Hydrology Expert
Thomas Archdeacon	Aquatic Ecology Expert

TASK	SUBTASK	EC	AAH	SAASC	S&T	FPC	PST	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21
8d	Develop a format for a concise Annual Report						X							X	X				
8e	Begin drafting FY21 Annual Report						X							X	X	X	X	X	X
8f	Develop annual summary report			X			X							X	X	X	X		
8g	Compile and report on FY21 Non-federal Cost Share	X					X										X	X	X
8h	Develop and approve 2022 Annual Work Plan	X					X											X	X
8i	Update the MRGESCP contact lists to reflect changes to the new structure	X					X	X	X										

**Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)
Science & Technical (S&T) Ad Hoc Group Charge
Rio Grande Silvery Minnow Population Monitoring Summary Report Ad Hoc**

Approved by Science and Adaptive Management Committee (SAMC) on January XX, 2021.

Parent Committee

Science and Adaptive Management Committee

Ad Hoc Group Charge

Summarize findings from Rio Grande silvery minnow (RGSM) Population Monitoring Work Group Tasks 1-3 (2012-2020) and provide the SAMC with specific recommendations and remaining critical uncertainties.

Membership

A. Criteria for membership

Member of RGSM Population Monitoring Work Group (PMWG) familiar with group accomplishments and recommendations.

B. Member List

Lead: Rich Valdez, PhD (Former Chair PMWG), others?...

Iterative Task Development

- The summary report of findings directly addresses RGSM **Objective A-1**: Analyze available monitoring data for the RGSM from Cochiti Reservoir to Elephant Butte Reservoir to track population trends in the MRG.
- Recommendations provided will inform EC decisions and guide formation of new S&T Ad Hoc groups around prioritized critical uncertainties.
- Drafting of the report is currently underway.

Tasks and Deliverables

1. Delivery of Report

Summarize findings from PMWG Tasks 1-3 (2012-2020) and provide the SAMC with specific recommendations and remaining critical uncertainties. Provide supporting evidence for recommendations and clearly define all assumptions. Critical uncertainties should be presented as research hypotheses and may be accompanied by recommended experimental approaches, if desired.

Objective of Task One

This charge has one associated task: Delivery of report.

Deliverable(s): Summary Report

Timeline and Reporting Scheduling

Task	Subtask	Deliverable	To Be Completed By
Delivery of report	Review	DRAFT Summary Report to SAMC	March XX, 2021
	Submit	FINAL Summary Report to EC	March XX, 2021

**Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)
Science & Technical (S&T) Ad Hoc Group Charge
Rio Grande Silvery Minnow Population Modeling Ad Hoc**

Approved by Science and Adaptive Management Committee (SAMC) on January XX, 2021.

Parent Committee

Science and Adaptive Management Committee

Ad Hoc Group Charge

Develop an integrated population model for the Rio Grande silvery minnow (RGSM) using population monitoring data to predict RGSM responses to different factors, including stocking, salvage, spring flows, low summer flows and intermittency.

Membership

A. Criteria for membership

Familiarity with river conditions and habitat needs of RGSM in the MRG, knowledge of fisheries science and/or population dynamics.

B. Member List

Charles Yackulic (Lead), Rich Valdez, Mo Hobbs, Thomas Archdeacon, Joel Lusk, Eric Gonzales, and Mick Porter (if available), **others?**

Iterative Task Development

1. This modeling effort will directly or indirectly inform three RGSM Objectives:
 - **Objective A-3:** Support research and modeling efforts to determine how much base flow is needed to produce sufficient habitat to support species survival rates necessary to achieve a self-sustaining population in each reach.
 - **Objective A-4:** Support research and modeling efforts to determine timing, duration, and magnitude of flows needed to produce sufficient habitat in support of species recruitment rates for a self-sustaining population in each reach.
 - **Objective A-5:** Contribute to research and modeling efforts to better understand the quantity and quality of habitat needed at different flow regimes to support recruitment and survival of RGSM.
2. To better define linkages to these objectives, please describe in greater detail the specific RGSM responses and factors being modeled.
3. To ensure appropriate application of the model, please describe the methods of development, as well as associated model assumptions and estimation error and/or bias.
4. Describe the knowledge gaps and critical uncertainties that reduce the accuracy or precision of the parameter estimates.

Tasks and Deliverables

1. **Expert Elicitation**

Refine model parameters using a process of subject matter expert elicitation. Document methodologies, assumptions and supporting evidence.

Objective of Task One

Improve model performance and applicability by harnessing the institutional knowledge of subject matter experts, where data may not exist.

Deliverable(s): Report on expert elicitation process and findings in a brown bag seminar format.

2. Application of Integrated Population Model for RGSM in the MRG

Describe decision support using the integrated population model (IPM). What questions does the model help to answer? How much error is associated with an estimate? Do the model outputs inform other decision support tools? What critical information is needed to improve the model estimates?

Objective of Task Two

Demonstrate the utility of the IPM and bridge the gap between the abstract modeling exercise and practical management application.

Deliverable(s): Presentation of the IPM framework, model outputs and decision support scenarios as a brown bag seminar and accompanying one to two page fact sheet.

Timeline and Reporting Scheduling

Task	Subtask	Deliverable	To Be Completed By
Expert Elicitation		Report methods and findings in a brown bag seminar	March 2021?
Application of IPM		Decision support brown bag and fact sheet	June 2021?

Population Monitoring Work Group (PMWG) Update
To the Executive Committee
Richard A. Valdez, Ph.D.
Chair, Population Monitoring Workgroup
December 17, 2020

One of the most important aspects of the Middle Rio Grande Endangered Species Collaborative Program is the ability to confidently monitor key resources. In 2012, the Executive Committee (EC) formed and convened the Population Monitoring Workgroup (PMWG) to evaluate the fish monitoring plan for the Middle Rio Grande, with a focus on the Rio Grande silvery minnow. The EC charged the workgroup with three tasks. Task 1 was a workshop with external scientists and signatory technical representatives designed to evaluate the CPUE index and sampling methods. The workshop was held in December 2015, with a report and presentation to the EC by Dr. Wayne Hubert in 2016. Task 2 is an evaluation of the sampling design, methods, protocols, and analyses that is the primary subject of a status report currently in development. Task 3 is to be initiated at the completion of Task 2, and would evaluate refinements to the monitoring plan.

The draft status report for Tasks 1 and 2 is currently in development and review by the PMWG. The report evaluates the monitoring program, and is designed to inform the EC and the SAMC about the strengths and weaknesses of the program, especially as it describes the status and trends of the silvery minnow. Basic questions about the sampling design and methodologies are posed and addressed in the report with responses that also identify critical uncertainties. The results of this report are designed to be incorporated by the SAMC into the new adaptive management plan. This Status Report is expected to be completed about March 1, and a Summary of Findings and Recommendations will be presented to the EC at the March webinar.

Members of the workgroup are also involved in a project to help develop a Rio Grande silvery minnow population model. Dr. Charles Yackulic of the USGS has been retained by the New Mexico Interstate Stream Commission to develop an integrated model that uses the population monitoring data to predict responses by the silvery minnow to different factors, such as stocking, salvage, spring flows, and low summer flows and intermittency. Six members of the workgroup are currently serving as Subject Matter Experts with Dr. Yackulic to help parameterize the model through an elicitation process. This small modeling group will need to continue to meet virtually with Dr. Yackulic, possibly through the end of his contract period in June 2021.

Summary of Proposed Actions: Genetics Subgroup Flowchart

Categories of actions:

- Compile and conduct additional analyses with existing data (immediate and low cost)
- Standardize hatchery techniques (immediate to short term and mostly low cost)
- Literature search to support planning (immediate and low cost)
- Research and studies (start with next FY that new contracts can be issued; pilot studies at low to moderate cost; larger studies at moderate to high cost)

Flowchart

- *Existing data*: what can be done with it, implemented immediately
 - Q1-2; Q11: Develop techniques to establish critically low diversity thresholds across years (using available data and 95% confidence intervals)
 - Q1-6: use existing data from monitoring reports to examine genetic diversity / N_e variation over time using a piecewise regression.
 - Q3-3: conduct additional genetic analyses on the existing data; analysis by reach differentiation (genetics and survival)
 - Intent: to help characterize the biology of RGSM in different river reaches and to refute/confirm that augmentation has homogenized the species; aggregating the existing data could be a first step to determining if there is any new reach-specific information that can be gleaned from work that has already been done.
 - Q5-5: Survival in the river (treating fish as marked recapture); compare survival from hatchery fish
 - Q13-12: Length and weight data for fish in river versus hatchery – only looking at young-of-year;
 - Refer to: age and growth study(s) for other comparisons; monitoring data;
 - To do: plot on growth rates of wild spawned fish versus hatchery fish (time, length, weight data)
- *Hatchery Techniques*
 - Paired spawning – equalize family sizes, appropriate number of pairs
 - Natural food source, natural rearing techniques
 - Developing protocols for experiments with, or disposal of fish produced outside standardized breeding protocols*

* Suggest we NOT call fish produced outside standardized breeding protocols “surplus”. We were informed that there are no surplus fish, any fish not needed for the Rio Grande are available for the Big Bend experimental population.

 - Developing standardized forms and nomenclature
- *Literature Search*
 - R4-8H: Evaluate the extent of domestication selection is occurring in the hatcheries.
 - start with literature review; evaluating domestication selection need not rely exclusively on genetics; behavioral and morphological traits could also be used to evaluate selection.
 - R4-10M: There are several resources on PIT tagging mortality that could be searched for information before tissue samples be taken with the current tagging process (to immediately begin collecting data).
 - Refer to: Thomas Archdeacon, Jason Remshardt, the Los Lunas Silvery Minnow Refugium (LLSMR), mainstream literature, etc.
 - R4-2H: literature search to support the development of the contingency plans and addressing of surplus fish
 - Refer to: FWS protocols, other programs, etc.

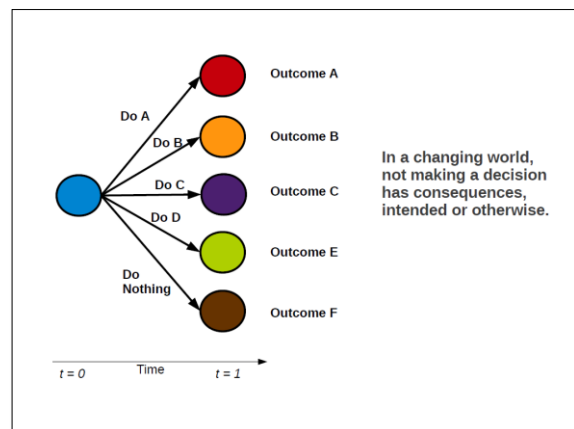
- R4-4H: literature search and summary of what we have done and what others have done in years with little to no wild fish; relates to the development of contingency plans
- *Research and/or Studies:*
 - Q1-5: Pilot Study #1: Develop larger scale, rapid throughput genetic methods; separate effort/contract required to run side-by-side for comparison to the microsatellites; scope to be developed for pilot project
 - Q3-5: Pilot Study #2: Assess whether different MRG reaches may have more natural spawning, rearing, retention, and recruitment than other reaches to assess whether habitat rather than augmentation stocking is more affecting the relatively low abundance of naturally spawned fish relative to hatchery spawned fish (Ryman-Laikre effect: having a large proportion of hatchery fish derived from a low number of breeders depresses the effective population size).
 - Q5-1 and Q7-3: a separate study to look at parentage and genetic diversity over time by different families;
 - Q8-3: evaluate the power of the existing markers to identify the number of parents and sibship relationships
 - Q13-6 and Q13-8: comparative genetics study on the eggs collected from the floodplain versus main channel.
 - Q13-12: Studies on growth rates of wild spawned fish; compare hatchery fish versus wild fish data
 - Q13-15: implement experimentation with controls to assess performance (survival, reproductive success) and assist real-time, adaptive management decision-making on a short-term basis
 - Intent: determine if fish from different facilities outperform others; compare techniques, cultures, etc. to determine if changes in process are warranted.
 - Q13-17: monitor same broodstock over multiple years (to test them repeatedly) to see how genetic expression might change in response to confinement, handling, hatchery conditions, etc.
 - Intent: (1) are we changing the organisms by keeping them in a hatchery setting year after year after year? and (2) do fish with certain genotypes disproportionately survive better through time?
 - Q15-1: Techniques to improve rapid analysis (genetics results)
 - Potentially modify contracts to specify “X number of samples to be delivered by Y date.” Then the Program can select a lab/contractor based on capability of meeting the specified need.
 - Q16-1: Recognize problems before stocking - *related to timing of results of genetic analysis
 - R4-11bM and R4-10M: have an experimental study of paired spawning versus communal
 - Intent: to show how powerful the genetic markers are in estimating relatedness (to ensure that potential spawners in a group have low relatedness);
 - Approach: could be accomplished at one of the hatcheries
 - R4-12M: have a new study on marked fish and follow success by hatchery, stocking strategy, etc.
- *Identified Compiling Data Needs*
 - Q13-15: performance of fish from different hatcheries (survival, reproduction, etc.)
 - Refer to/Use: (1) 2016 BioPark and Dexter release information from Santa Ana site; (2) the 24-hour cage study (2014 or 2015); previous “soft-release” stocking practices;
 - Intentions: compare techniques, cultures, etc. to determine if changes in process are warranted.

ASSESSING THE ASSESSMENT

Megan Friggens
Four Corners Adaptation Forum
Durango CO
August 29th-30th



Uncertainties related to knowledge gaps or variability can act as a significant barrier to implementing actions in natural resource management



Uncertainties in Assessments

- Arise in identification and modeling sensitivities, levels of exposure, and adaptive capacity
- Combining various sources of data may magnify or reduce overall uncertainty
- A good assessment needs to recognize uncertainty and remain flexible to new information that may become available



Figure 1: Robust adaptation to climate change, from Wilby and Dessai (2010)

Sources of Uncertainty in Assessments

Underlying Data

- Knowledge gaps
- Quantifiable errors in the data
- Uncertain futures (e.g. projections of human behavior)
- Unknown unknowns

Methodology

- Ambiguously defined concepts or terminology
- Approach for quantifying vulnerability

Other uncertainties exist when translating assessment outputs into adaptation options

How to deal with uncertainty

- Qualitatively describe
- Quantify by calculating a range of measures
- Quantify through models

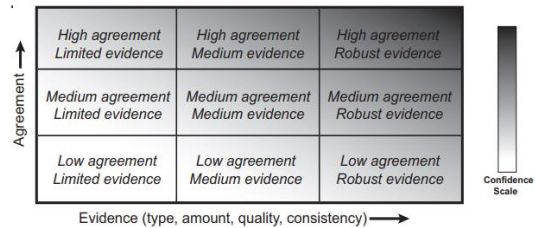


Figure 1: A depiction of evidence and agreement statements and their relationship to confidence. Confidence increases towards the top-right corner as suggested by the increasing strength of shading. Generally, evidence is most robust when there are multiple, consistent independent lines of high-quality evidence.

IPCC guidelines

Uncertainty in Four Corner Assessments

- Knowledge uncertainty and gaps (Not all data spatially explicit)
- We are not creating new information therefore assessment products are subject to measures taken to reduce uncertainty by data authors
- Where choice exists, we make “best” decision as to what to include in these assessment versions




We want to include as much information about the uncertainties inherent in assessments as possible

- Describe data uncertainties
- Address primary approaches for managing scientific uncertainty (Rouse and Norton 2010):
 - Identify source
 - Reduce uncertainty where possible
 - Acknowledge and manage residual or unavoidable uncertainty
- Assess need for additional measures in FC Assessments

<http://www.tandfonline.com/doi/pdf/10.1080/14486563.2010.972525?needAccess=true>

Assess the Indicators

High Confidence  Low Confidence

[Data] We have enough information to measure indicator

[Process] We understand or can accurately measure relationship between indicator and focal resource

[Process] We understand or can accurately measure outcome of indicator for focal resource

Assess the Vulnerability Elements

High Confidence \longrightarrow Low Confidence

[Model] The vulnerability measures (Exposure, Sensitivity and Adaptive Capacity) provide meaningful information

Management actions can be undertaken to reduce Impact, Sensitivity or Adaptive capacity

By the end of today

- We cannot know all possible outcomes
- This does not mean we are without useful information
- Not making a decision has implications just as making a decision
- During this breakout session, we begin to engage the scientific uncertainty
 - >The acknowledgement step
- This is the first step towards thinking about adaptation strategies in light of uncertainties and may highlight need for additional measures of uncertainty



**Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)
Draft Science & Technical (S&T) Ad Hoc Group Charge
Population Monitoring Work Group Summary Report Ad Hoc Group**

Approved by Science and Adaptive Management Committee (SAMC) on _____ **XX**, 2021.

Parent Committee

Science and Adaptive Management Committee

Ad Hoc Group Charge

Summarize findings and recommendations from the Population Monitoring Work Group (PMWG) Tasks 1-2 (2012–2020), and provide the SAMC with specific recommendations and remaining critical uncertainties.

In 2012, the Executive Committee tasked the PMWG with the following tasks:

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

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

A third task evaluating refinements to the monitoring plan would have been initiated upon completion of Task 2, and thus, will not be included in this charge.

Membership

A. Criteria for Membership

Member of Population Monitoring Work Group (PMWG) familiar with group accomplishments and recommendations.

B. Member List

Rich Valdez (Lead), SWCA Environmental Consultants,

Thomas Archdeacon, U.S. Fish and Wildlife Service,

Andy Dean, U.S. Fish and Wildlife Service,

Eric Gonzalez, U.S. Bureau of Reclamation,

Grace Haggerty, New Mexico Interstate Stream Commission,

Mo Hobbs, Albuquerque Bernalillo County Water Utility Authority,

Joel Lusk, U.S. Fish and Wildlife Service,

Mike Marcus, Assessment Payers Association, Middle Rio Grande Conservancy District,

Anne Marken, Middle Rio Grande Conservancy District,

Mick Porter, U.S. Army Corps of Engineers,

Charles Yackulic, U.S. Geological Survey.

Iterative Task Development

- The summary report of findings directly addresses RGSM **Objective A-1**: Analyze available monitoring data for the RGSM from Cochiti Reservoir to Elephant Butte Reservoir to track population trends in the MRG.

- Recommendations provided will inform EC decisions and guide formation of new S&T Ad Hoc groups around prioritized critical uncertainties.
- Drafting of the report is currently underway.

Tasks and Deliverables

1. Delivery of Report

The S&T Ad Hoc Group will develop a summary report of the PMWG efforts (2012-2020) from PMWG Tasks 1 and 2. The report shall:

- Summarize findings and recommendations, as well as remaining critical uncertainties.
- Provide supporting evidence for findings and recommendations
- Document opposing viewpoints (supported by evidence) among group members
- Clearly define all assumptions.
- Present critical uncertainties as research hypotheses. These may be accompanied by recommended experimental approaches, if desired.

Objective of Task One

This charge has one associated task: Delivery of report.

Recommendations provided will inform EC decisions and guide formation of new S&T Ad Hoc groups around prioritized critical uncertainties.

Deliverable(s): Draft Summary Report, Summarized list of findings and recommendations (one to two pages).

2. Presentation of Findings and Recommendations

The S&T Ad Hoc Group will present a summary of the findings and recommendations documented in the PMWG summary report.

Objective of Task Two

A presentation will more effectively communicate the findings and recommendations of the PMWG summary report to the SAMC.

Deliverable(s):

- A 1–2 page summary brief of the PMWG findings and recommendations
- A PowerPoint presentation to the SAMC of the PMWG findings and recommendations

Timeline and Reporting Scheduling

Task	Subtask	Deliverable	To Be Completed By
Delivery of report	Review	DRAFT Summary Report to SAMC	March 1, 2021
	Review	DRAFT List of findings and recommendations	March 1, 2021
	Submit	FINAL Summary Report to EC	March 18, 2021
Presentation of Findings and Recommendations	Summary brief	1-2 page summary brief of PMWG findings and recommendations to SAMC and EC	March 18, 2021
	Presentation	PowerPoint presentation to the SAMC	March SAMC meeting

**Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)
Draft Science & Technical (S&T) Ad Hoc Group Charge
Rio Grande Silvery Minnow Population Model Ad Hoc Group**

Approved by Science and Adaptive Management Committee (SAMC) on _____ XX, 2021.

Parent Committee

Science and Adaptive Management Committee

Ad Hoc Group Charge

Communicate and relate to MRGESCP Objectives the relevant findings/outputs resulting from the development of an Integrated Population Model (IPM) for the Rio Grande silvery minnow (RGSM) that uses population monitoring data to predict RGSM responses to different factors.

Membership

A. Criteria for membership

Familiarity with river conditions and habitat needs of RGSM in the Middle Rio Grande (MRG), knowledge of fisheries science and/or population dynamics.

B. Member List

Charles Yackulic (Lead), U.S. Geological Survey,
Rich Valdez, SWCA Environmental Consultants
Mo Hobbs, Albuquerque Bernalillo County Water Utility Authority
Thomas Archdeacon, U.S. Fish and Wildlife Service
Joel Lusk, U.S. Bureau of Reclamation
Eric Gonzales, U.S. Bureau of Reclamation
Mick Porter, U.S. Army Corps of Engineers

Iterative Task Development

1. This modeling effort will directly or indirectly inform three RGSM Objectives:
 - **Objective A-3:** Support research and modeling efforts to determine how much base flow is needed to produce sufficient habitat to support species survival rates necessary to achieve a self-sustaining population in each reach.
 - **Objective A-4:** Support research and modeling efforts to determine timing, duration, and magnitude of flows needed to produce sufficient habitat in support of species recruitment rates for a self-sustaining population in each reach.
 - **Objective A-5:** Contribute to research and modeling efforts to better understand the quantity and quality of habitat needed at different flow regimes to support recruitment and survival of RGSM.
2. To better define linkages to these objectives, please describe in greater detail the specific RGSM responses and factors being modeled.
3. To ensure appropriate application of the model, please describe the methods of development, as well as associated model assumptions and estimation error and/or bias.
4. Describe the knowledge gaps, quantifiable error, and critical uncertainties that influence the accuracy or precision of the parameter estimates.

Tasks and Deliverables

1. *Expert Elicitation*

Refine model parameters using a process of subject matter expert elicitation. Document methodologies, assumptions and supporting evidence.

Objective of Task One

Improve model performance and applicability by harnessing the institutional knowledge of subject matter experts, where empirical data may not exist.

Deliverable(s): Report on expert elicitation process and findings in a brown bag seminar format.

2. *Application of Integrated Population Model for RGSM in the MRG*

Describe decision support using the IPM. What questions does the model help to answer? How much error is associated with an estimate? Do the model outputs inform other decision support tools? What critical information is needed to improve the model estimates?

Objective of Task Two

Demonstrate the utility of the IPM and bridge the gap between the abstract modeling exercise and practical management application.

Deliverable(s):

- Presentation of the IPM framework, model outputs and decision support scenarios as a brown bag seminar
- One-to-two page fact sheet

3. *Completed IPM (at the discretion of the contracting officer)*

If given permission by the contracting officer (N.M. Interstate Stream Commission), the Collaborative Program will be given access to the completed IPM.

Timeline and Reporting Scheduling

Task	Subtask	Deliverable	To Be Completed By
Expert Elicitation		Report methods and findings in a brown bag seminar	March 2021
Application of IPM	Summary brief	1-2 page fact sheet	June 2021
	Oral presentation	Brown bag presentation	June 2021