

Science and Adaptive Management Committee Meeting

May 27, 2021

Meeting Materials:

Agenda

Minutes

MRG AM Framework: Identifying Critical Scientific Uncertainties [read-ahead, not included]

Responses to PMWG Summary Report Findings and Recommendations [read-ahead, not included]

Climate Change Questions [read-ahead]

Information on Department of Defense Climate Assessment Tool [read-ahead]

Habitat Restoration Planning and Monitoring Considerations [read-ahead, draft]

Science Coordinator Update [presentation]

The SAMC's Role in the MRGESCP's AM Efforts [presentation]



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

**Science and Adaptive Management Committee (SAMC) Meeting
May 27, 2021
8:00 AM-12:00 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

Meeting Objectives:

- Hear presentation on SAMC roles and expectations, with opportunities for SAMC members to help develop the adaptive management processes for the Middle Rio Grande Endangered Species Collaborative Program (MRGESCP)
- Discuss data sources for Adaptive Management Relational Database (AMRDB)
- Discuss reviews, findings and recommendations from Rio Grande silvery minnow (RGSM) Population Monitoring Work Group (PMWG) Ad Hoc Group's summary report, and determine next steps
- Receive progress updates on Science & Technical (S&T) Ad Hoc Groups
- Discuss incorporation of climate change factors into MRGESCP science initiatives and choose Science Strategies for development in 2021
- Discuss revisions to the proposed workshop on 2021 Middle Rio Grande (MRG) Habitat Restoration (HR) Monitoring, and development of a standardized HR monitoring protocol

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| 8:00 – 8:10 | <p>Welcome, Meeting Objectives, and Agenda Review</p> <ul style="list-style-type: none"> ✓ Decision: Approve May 27, 2021 meeting agenda ✓ Decision: Approve April 22, 2021 meeting minutes <p>Read-ahead:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Draft April 22, 2021 meeting minutes | <p><i>Catherine Murphy, Program Support Team (PST)</i></p> |
| 8:10 – 8:40 | <p>SAMC Role in MRGESCP Adaptive Management Efforts</p> <ul style="list-style-type: none"> • SAMC member roles and expectations • Upcoming tasks • Group discussion | <p><i>Debbie Lee, PST</i></p> |

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| 8:40 – 9:10 | <p>Incorporate Findings and Recommendations into the Adaptive Management Relational Database (AMRDB)</p> <ul style="list-style-type: none"> • MRGESCP data sources and incorporation of information into the AMRDB • Discuss key tables within AMRDB and their functions <p>Read-aheads:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Middle Rio Grande Adaptive Management Framework: Identifying Critical Scientific Uncertainties (Caplan et al. 2018) – Tables 3, 4, 5 and 6 (pages 32, 52, 67, and 85, respectively) | <i>Catherine Murphy, PST</i> |
| 9:10 – 10:10 | <p>Review of Findings and Recommendations from RGSM PMWG Summary Report S&T Ad Hoc Group</p> <ul style="list-style-type: none"> • Ad Hoc Group feedback on findings and recommendations comment matrix and report review history • SAMC reviews of the summary report • Next steps prior to July EC meeting <p>Read-ahead:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Responses to PMWG Summary Report Findings and Recommendations comment matrix <ul style="list-style-type: none"> ✓ Decision: Approve next steps in preparing recommendations to EC ➤ Action: SAMC will consider PMWG findings and recommendations and provide feedback on the comment matrix ➤ Action: PST will draft a cover memo from the SAMC to the EC regarding PMWG findings and recommendations for SAMC review | <i>Facilitated discussion</i> |
| 10:10 – 10:20 | Break | |
| 10:20 – 10:40 | <p>Update on Science & Technical Ad Hoc Groups</p> <ul style="list-style-type: none"> • RGSM Population Modeling Ad Hoc Group • RGSM Conceptual Ecological Model/Genetics Ad Hoc • Southwestern Willow Flycatcher and Yellow-billed Cuckoo Conceptual Ecological Model Refinement Ad Hoc • Results of SAMC poll on Science Strategies <ul style="list-style-type: none"> ✓ Decision: Choose Science Strategies for ad hoc development ➤ Action: PST will draft ad hoc charges for chosen Science Strategies | <i>Catherine Murphy, PST</i> |

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| 10:40 – 10:50 | <p>Follow-up on Climate Change in Science Initiatives</p> <ul style="list-style-type: none"> • Discuss read-ahead materials on climate change • Potential incorporation of climate change questions in project development <p>Read-aheads:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Climate change questions suggested by Megan Friggens for project proposals <input type="checkbox"/> Information on Department of Defense Climate Assessment Tool provided by Ryan Gronewold <p>✓ Decision: Include climate questions when collecting project proposals? If yes, what questions?</p> <p>➤ Action: PST will add climate questions to the project data entry form and related AMRDB tables</p> | <i>Catherine Murphy, PST</i> |
| 10:50 – 11:50 | <p>2021 MRGESCP Approach to Standardizing Habitat Restoration (HR) Monitoring</p> <ul style="list-style-type: none"> • Proposed approach for developing a standardized monitoring plan for HR within the MRG • Draft template for HR considerations • Revised HR workshop and format <p>Read-aheads:</p> <ul style="list-style-type: none"> <input type="checkbox"/> DRAFT template for HR considerations <p>✓ Decision: Host a workshop to organize HR efforts within the MRG</p> <p>➤ Action: PST will plan a HR workshop hosted by the SAMC</p> <p>➤ Action: PST will finalize HR planning template and promote its use within the MRGESCP</p> | <i>Facilitated discussion</i> |
| 11:50 –12:00 | <p>Meeting Summary and Action Items Review</p> <p>➤ Next SAMC meeting: Thursday, June 24, 2021, 8am-noon</p> | <i>PST</i> |
| 12:00 | Adjourn | |



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

Science and Adaptive Management Committee (SAMC) Meeting Minutes

May 27, 2021; 8:00 AM–12:00 PM

Location: Zoom Meeting

Decisions:

- ✓ Approval of May 27, 2021 SAMC meeting agenda
- ✓ Approval of April 22, 2021 SAMC meeting minutes
- ✓ Approval of next steps on Population Monitoring Work Group (PMWG) summary report

Action Items:

| WHO | ACTION ITEM | BY WHEN |
|---|---|---------------|
| Program Support Team (PST) and Ari Posner | Discuss how to incorporate management actions into the SAMC's discussions of uncertainty and influence on species, and add the topic to a future meeting agenda | June 11, 2021 |
| PST and Rich Valdez | Compile the review history of the PMWG summary report | June 14, 2021 |
| PST | Individually contact PMWG members to request reviews of the summary report findings and recommendations | May 28, 2021 |
| PST | Contact absent SAMC members to discuss the next steps on the PMWG summary report | June 4, 2021 |
| SAMC | Provide feedback on the PMWG summary report findings and recommendations via a comment matrix | June 11, 2021 |
| SAMC | Discuss and provide the SAMC's synthesis, findings, and recommendations from the PMWG summary report to the Executive Committee (EC) | June 24, 2021 |
| PST | Draft a cover memo from the SAMC to the EC in coordination with R. Valdez. regarding the PMWG summary report for SAMC review | July 10, 2021 |
| PST | Revise the criteria for ranking science strategies based on SAMC discussion | June 17, 2021 |
| PST | Schedule and support the upcoming Rio Grande silvery minnow (RGSM) conceptual ecological model (CEM) ad hoc group meeting | June |
| PST | Schedule and support the upcoming avian CEM ad hoc group meeting | June |
| SAMC | Develop the New Mexico meadow jumping mouse (NMMJM) Science Strategy D-1.1a | June 17, 2021 |

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| PST | Revise climate questions based on SAMC discussion and add them to the project data entry form and related Adaptive Management Relational Database (AMRDB) tables | June 17, 2021 |
| PST | Revise the habitat restoration planning template based on discussion for review at the next meeting | June 17, 2021 |
| PST | Send out pre-workshop survey on HR planning considerations to the MRGESCP to help guide workshop discussion | July 30, 2021 |
| SAMC | Suggest any individuals to invite to participate in the HR workshop | June 24, 2021 |
| SAMC and PST | Develop a plan for the HR workshop to the EC for approval | July 14, 2021 |
| PST | Plan a HR workshop hosted by the SAMC | August/September |

Next Meeting: June 24, 2021

Meeting Summary

Welcome, Meeting Objectives, and Agenda Review

Catherine Murphy, PST Science Coordinator and SAMC Facilitator, opened the meeting and led introductions. Catherine M. reviewed the May 27, 2021 meeting agenda and objectives, and April 22, 2021 meeting minutes.

- ✓ **Decision:** The SAMC approved the May 27, 2021 SAMC meeting agenda
- ✓ **Decision:** The SAMC approved the April 22, 2021 SAMC meeting minutes

SAMC Role in MRGESCP Adaptive Management Efforts

Debbie Lee presented on the role of the SAMC in the MRGESCP's adaptive management (AM) efforts (see presentation). Summary points are below:

- A diagram from the U.S. Agency for International Development shows a framework for collaborating, learning, and adapting that can be applied to the MRGESCP. The SAMC plays a role in collaborating, learning, adapting, culture, and processes.
- The SAMC is a synthesizer and translator of science. It helps to build trust in the scientific process.
- To generate that trust, the SAMC ensures methodologies are unbiased and objective, processes for decision-making are transparent, and findings are clearly communicated and well documented.
- By informing and documenting AM, the SAMC is shifting the culture of the MRGESCP from reactive to proactive.
- The SAMC will help develop an AM process that uses a strategic approach for prioritizing and recommending projects, assist with development and utilization of the AMRDB, and update AM tools, such as conceptual ecological models.
- The next steps for the SAMC are developing science strategies to meet the science objectives and linking strategies to scientific uncertainties via the Project Bank.
- The SAMC will inform the development of standardized processes for peer review (including citations and references), prioritization of studies, AM recommendations, how to communicate scientific findings, development of project ideas, and updating MRGESCP plans and AM tools.

- After a Science & Technical (S&T) Ad Hoc Group finishes its work, the SAMC has multiple options for next steps on the S&T's deliverables.
- The PST will communicate with individual SAMC members between meetings, draft and document processes, track progress on work product deliverables, and communicate between the SAMC and other groups.

Comments:

- Are science and AM treated separately or together in the SAMC?
 - Science is integral to AM. AM informs decision-making through the iterative learning cycle, which is updated with scientific findings. Therefore, scientific studies need to address management questions.
 - The management piece was not mentioned in the presentation.
 - The MRGESCP is moving from a cost share-focus to a signatory contributions-focus. These contributions are findings (from implemented projects) that are reported to the MRGESCP and incorporated into the AMRDB to inform management recommendations. Findings can be linked to management, and can be used to inform future recommendations from the SAMC to the EC.
 - Signatories carry out their activities based on their own authorities and the MRGESCP carries out its own activities. The overlap between the two is where signatories share information and data, and the MRGESCP provides scientifically justified recommendations. The degree of overlap will vary among individual signatories.
 - Two ways to approach science and AM: 1) Use science to resolve uncertainties within CEMs and improve understanding of species natural history to inform management decisions and 2) Evaluate management actions with regard to MRGESCP goals and species response. There is concern that the iterative process of evaluating management activities could be lost when science is primarily focusing on basic research and natural history.
 - The RGSM CEM Ad Hoc Group is addressing management by adding propagation, augmentation, and genetic factors to the RGSM CEM. This may need to occur for the other CEMs as well.
 - Management actions and how they influence species needs to be mapped out. The system is complicated and difficult to map out.
 - This topic will be added to a future SAMC meeting agenda and Ari Posner, SAMC, will contribute to the conversation beforehand.
 - Signatories collect data around management actions and these activities have been included in the AMRDB via annual reports.
- **Action Item:** The PST and A. Posner will discuss how to incorporate management questions into the SAMC's discussions of uncertainty and influence on species, and add the topic to a future meeting agenda

Incorporating Findings and Recommendations into the AMRDB

C. Murphy presented on the information sources used to build the AMRDB and how to incorporate scientific findings and recommendations (see presentation). Summary points are below:

- The SAMC tasks ad hoc groups, compiles and translates results, and communicates and revisits recommendations to the EC. These processes are documented in the AMRDB.
- Sources for the AMRDB include recovery plans, biological opinions, independent science panel recommendations, MRGESCP annual reports, S&T Ad Hoc Group findings, and more.

- Within the AMRDB, the Project Bank acts as the hub of wheel with pathways leading to all other elements (e.g., science strategies, research hypotheses, critical uncertainties, science panel recommendations, CEMs, project findings, etc.).
- To contribute to the MRGESCP, signatories need to submit project findings, which can be used to develop management recommendations that address management actions. Changing a management action based on a recommendation is AM. This cycle can also be used to inform recovery criteria and goals.
- The findings and recommendations from the PMWG summary report will be added to AMRDB.

Comments:

- It is logical and useful to put all this information in one place.
- The controversial area of the AMRDB will be the critical uncertainties, as with the PMWG summary report. There may be disagreement over whether items are considered “critical”.
 - The SAMC needs to determine when CEMs are updated, which includes determining when sufficient evidence demonstrates that an uncertainty has been reduced.
 - The SAMC can review study designs, methods, and analyses to determine if they are sound.
 - The review process should be applied transparently and consistently.
- More things are known about the critical uncertainties in the AMRDB than are being shared with the Program. Additionally, knowing more about some uncertainties may not help better manage a species or system.
- Although recommendations and uncertainties from previous science panels should not be discounted, the critical piece missing so far has been findings.
 - Findings need to be reviewed and deliberated by the SAMC.
 - Regardless of their areas of expertise, all SAMC members should be able to scientifically evaluate whether research methods are sound, whether findings are supported, and whether findings can inform recommendations and/or understanding of an ecosystem.

Review of Findings and Recommendations from RGSM PMWG Summary Report S&T Ad Hoc Group

C. Murphy opened discussion on the findings and recommendations from the PMWG summary report (see presentation). Summary points are below:

- Two members of the PMWG Summary Report Ad Hoc Group submitted comments via the comment matrix (see read-ahead).
- Rich Valdez, SWCA Environmental Consultants, chair of the PMWG Summary Report Ad Hoc Group, is compiling the review history of the PMWG summary report.
- The PST will reach out one more time to individual members of the PMWG Summary Report Ad Hoc Group to garner additional responses.
- The SAMC will carry out these next steps on the findings and recommendations from the PMWG summary report: review the PMWG summary report via the comment matrix, decide which recommendations to endorse, draft and finalize a memo to the EC in coordination with R. Valdez, and form ad hoc groups to continue PMWG Task 3 (refinements to the fish monitoring plan), as needed.
 - The memo should be finalized by July 16th, to be sent as an EC read-ahead.
 - The message from the SAMC and R. Valdez should be unified and clear.

Comments:

- How will R. Valdez present the findings given the disagreements that exist?

- R. Valdez is not charged with reconciling disagreements. R. Valdez will present the report as is. The comment matrix was meant to document all comments with justifications to be shared with the MRGESCP.
- The SAMC will evaluate the list of findings and recommendations to decide next steps, with scientific justification.
- The SAMC will not be able to avoid contradicting R. Valdez's presentation to the EC.
 - R. Valdez produced a list of items to inform next steps for the PMWG's work. The role of the SAMC is to evaluate the list with all the feedback received and determine which items move forward and what the associated next steps should be. For example, the SAMC could form ad hoc groups to address them. The SAMC then proposes its plan to the EC.
 - The SAMC could also choose to rank the list to prioritize the items.
- Adding SMART goal elements to the findings and recommendations would make them less vague.
 - It would also make it easier to form ad hoc groups around them.
- The SAMC should think at the level of the EC when reviewing the findings and recommendations in the comment matrix.
 - Next steps for higher-ranking items will be presented as priority to the EC.
- **Decision:** The SAMC approved next steps on the PMWG summary report
- **Action Item:** The PST and R. Valdez will compile the review history of the PMWG summary report
- **Action Item:** The PST will individually contact PMWG members to request reviews of the summary report findings and recommendations
- **Action Item:** The PST will contact absent SAMC members to discuss the next steps on the PMWG summary report
- **Action Item:** The SAMC will provide feedback on the PMWG summary report findings and recommendations via a comment matrix
- **Action Item:** The SAMC will discuss and provide the SAMC's synthesis, findings, and recommendations from the PMWG summary report to the Executive Committee (EC)
- **Action Item:** The PST will draft a cover memo from the SAMC to the EC in coordination with R. Valdez regarding the PMWG summary report for SAMC review

Update on S&T Ad Hoc Groups

- C. Murphy gave an update on the S&T Ad Hoc Groups (see presentation). Summary points are below:
- RGSM Population Modeling Ad Hoc – Charles Yackulic (lead), U.S. Geological Survey, will check-in in June/July.
 - RGSM CEM/Genetics Ad Hoc
 - Wade Wilson (lead), U.S. Fish & Wildlife Service (USFWS), has assembled the following group members: Eric Gonzales (U.S. Bureau of Reclamation), Jane Rogosch (Texas Tech University), Megan Osborne (University of New Mexico), and Manuel Ulibarri (USFWS).
 - The first meeting was on May 19, 2021.
 - Former members of the Genetics Work Group and the Science Work Group that developed the RGSM CEM will be invited to review this S&T Ad Hoc Group's deliverables.
 - Avian CEM Refinement Ad Hoc

- The PST reached out to potential members and the following group was assembled: Amy Erickson (lead; Audubon Southwest), Ondrea Hummel (TetraTech), Jenny Davis (USFWS), Dave Moore (U.S. Bureau of Reclamation), and Meaghan Conway (New Mexico Department of Game and Fish).
- The group’s task is primarily a desk exercise. They are working to add level of uncertainty to the variable relationships in the SWFL and YBCU CEMs.
- The group asked to push back the June 30th deadline and will hold at least one virtual meeting.
 - To accommodate field season, the group may set a new deadline upon meeting, which will be sent to the SAMC for approval.
- Results of the SAMC Poll on Science Strategies
 - Five SAMC members filled out the poll and ranked science strategies based on their own criteria.
 - One additional purpose of the poll was to determine criteria for prioritization.
 - Top criteria were feasibility, level of effort, achievable measurable outcomes, reasonable timeline, already in progress (being done by an organization and awaiting results), modification to existing protocol, related to multiple aspects of ecosystem, and suited to the MRGESCP.
 - The SAMC may be able to use the exercise to develop weighted criteria for prioritization of science strategies and other MRGESCP products.
 - The SAMC will develop one or two science strategies initially to frame the process before tasking S&T Ad Hoc Groups to develop the others.
 - The SAMC will develop NMMJM Science Strategy D-1.1a: Expand on existing vegetation/habitat monitoring efforts to include vegetation characteristics relevant to NMMJM (e.g. herbaceous vegetation).
 - The SAMC has two steps on the science strategies: 1) developing/refining science strategies with SMART goals for each science objective and 2) proposing project ideas based on the science strategies to populate the Project Bank.

Comments:

- Before using the poll exercise to develop weighted criteria, the group needs to account for any lack of context that affected their responses.
 - The criterion “need more information” could be added.
- Other suggested criteria:
 - Whether an item addresses a critical uncertainty and how important that uncertainty is, or addresses a science panel recommendation.
 - “Hierarchy” or “dependence,” for items that address things we need to know before any next steps.
 - “Bang for buck,” for items that address bigger uncertainties and provide more information.
 - The AMRDB links related projects, which together can account for larger uncertainties that influence others.
 - Whether an item addresses a knowledge gap about fundamental life history, like where a species occurs.
 - Whether an item is related to management actions.
 - There is limited information to connect management actions. There needs to be more work on this.
- A comparative matrix could be used to develop weighted criteria.

- Does the SAMC need to come up with a template for getting the information needed for the AMRDB?
 - The PST is developing a template. Old information has been retrofitted for the AMRDB, but future proposals should be formatted to easily integrate into the Project Bank.
- **Action Item:** The PST will schedule and support the upcoming RGSM CEM ad hoc group meeting
- **Action Item:** The PST will schedule and support the upcoming avian CEM ad hoc group meeting
- **Action Item:** The PST will revise the criteria for ranking science strategies based on SAMC discussion
- **Action Item:** The SAMC will Develop the NMMJM Science Strategy D-1.1a

Follow-up on Climate Change in Science Initiatives

C. Murphy opened a follow-up discussion on incorporating climate change questions into project development. Summary points are below:

- C. Murphy presented Department of Defense (DoD) climate assessment tool fact sheet (see read-ahead).
 - The actual tool is not accessible to non-DoD users.
 - The DoD identified criteria to consider for climate change.
 - The tool uses a spatial scale to change the resolution depending on the size of the installation you are managing. It is applied from the broadest overall DoD level to the site level.
 - By applying the tool to all applications, the DoD is collecting standardized information that can be used to plan for the future.
- C. Murphy presented potential climate change questions for project proposal provided by Megan Friggens (see read-ahead).
 - M. Friggens included specific and generic question streams.

Comments:

- The specific questions can help guide responses more. Responders may not be able to think of the ways their projects are addressing climate change without guiding questions. Responders could also add elements to their projects to address climate change after reading the questions.
- Suggestion to split out the species traits (physiological) versus the ecosystem effects in the first specific question.
- Suggestion to talk about drought directly in the questions. Example: Does your research consider the potential for ongoing drought?
 - The questions can be tailored more to the Middle Rio Grande (MRG).
 - The absence of water would have dramatic impacts and we need to prepare for that possibility. We should be planning for the worst-case scenario.
 - This concept applies directly to the efforts within the MRGESCP to incorporate forecasting and scenario planning.
- There has been pushback on forecasting and scenario planning as it is perceived as difficult, but it is integral to AM to consider all potential conditions.
- The handbook *Climate-Smart Conservation* (National Wildlife Federation et al. 2014) discusses scenario-based planning using a four-quadrant matrix displaying plausible future scenarios.
 - A similar approach can be applied to the MRG based on temperature, water, snowmelt, precipitation, etc. The MRGESCP could plan for science activities under different condition sets.

- Two approaches should be done for incorporating scenario planning: 1) Characterize science activities for different conditions and 2) Develop an emergency action plan under different conditions (e.g., conditions for the jiggle).
 - Under certain conditions, water management may have little impact on the RGSM population and species management. That should be kept in mind when scenario planning.
 - All opportunities for flexibility in the management of the system are not fully documented. The MRGESCP can get some of that information from individual signatories and the Minnow Action Team.
 - The MRGESCP needs to document why management decisions are made in order to inform future recommendations.
- **Action Item:** The PST will revise the climate questions based on SAMC discussion and add them to the project data entry form and related AMRDB tables

2021 MRGESCP Approach to Standardizing HR Monitoring

C. Murphy opened discussion on holding a HR workshop aimed at standardizing HR in the MRG.

Summary points are below:

- Based on previous feedback from the SAMC, the PST compiled a list of considerations for people doing future HR projects (see read-ahead).
- SAMC members were asked if they view HR as a management action, management tool, or field experiment.
 - Members viewed HR differently, as either a tool, a tool and an experiment, or all three.
 - Although HR is often used as a management tool, it can be an experiment with pre- and post-construction data collection and comparison with control sites.
- To be able to show whether HR is successful, success needs to be defined before HR begins.
- The list of considerations includes restoration targets, including spatial scale, temporal scale, biotic response, targeted species of concern, targeted invasive species, and ecosystem goods and services.
 - Ecosystem goods and services encapsulates other benefits of HR ancillary to the project's intended goals, as well as non-site-specific benefits that affect the larger ecosystem.
- The list also includes restoration goals, monitoring goals, and project planning considerations.
 - The scope of monitoring goals can either be construction monitoring, performance monitoring, or monitoring to support AM. The scope determines the level of monitoring needed.
 - Benefits of different monitoring goals should be considered.
 - Organizations may not have the resources to monitor in support of AM, but if there is interest, the MRGESCP can help coordinate.
- The HR workshop would be organized by the PST and hosted by the SAMC.
- Workshops serve dual purposes of addressing the main topic and giving all of the MRGESCP the opportunity to get involved.
- The workshop would invite HR site managers to explain how they define success and what data they are collecting. That would lead to a group discussion on how to demonstrate HR success through data collection and monitoring, metrics of HR success, and on measuring less expensive metrics that inform the larger ecological picture.
- To help guide workshop discussion, the PST will send out a pre-workshop survey on HR planning considerations to the MRGESCP.

- The SAMC should suggest any people who would be interested in participating in the HR workshop.

Comments:

- It is a good idea to ask HR site builders to consider how they fit into the bigger HR picture for that species. The SAMC connects to this more through the CEMs and critical uncertainties, as the SAMC can use those to link an HR site to the larger picture.
 - Suggestion to ask questions that are tailored to fit projects into the larger picture. This could help them think through the design and monitoring of the site in a way that connect to other sites.
 - What is the purpose of the considerations template?
 - The overall goal of this effort is to set up each HR site for success.
 - The template can serve as a checklist of things to consider and HR builders can ask the MRGESCP for help with design, monitoring and analysis.
 - It can also encourage the idea of measuring inexpensive metrics that holistically contribute to the larger understanding of the ecosystem.
 - The SAMC can help determine alternative/additional response and environmental metrics that would be useful to HR site builders and the larger ecological picture.
 - The Bosque Ecosystem Monitoring Program (BEMP) has developed a variety of rapid protocols and variables that could be applied to HR projects.
 - People have questions about the appropriate level of monitoring and the common denominator monitoring that is most/least useful. A workshop where people can discuss that would be helpful.
- **Action Item:** The PST will revise the habitat restoration planning template based on discussion for review at the next meeting
 - **Action Item:** The PST will send out a pre-workshop survey on HR planning considerations to the MRGESCP to help guide workshop discussion
 - **Action Item:** The SAMC will suggest individuals external to the MRGESCP to invite to participate in the HR workshop
 - **Action Item:** The SAMC and PST will develop a plan for the HR workshop to be up for EC approval
 - **Action Item:** The PST will plan a HR workshop hosted by the SAMC

Meeting Participants

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|-------------------|--|
| Alan Hatch | EC <i>Ex Officio</i> Member |
| Ara Winter | Statistics/Modeling Expert |
| Ari Posner | Geomorphology Expert |
| Catherine Murphy | Program Support Team, SAMC Facilitator |
| 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 |
| Thomas Archdeacon | Aquatic Ecology Expert |

The following are proposed question streams intended to collect information about climate change engagement from Collaborative Program participants submitting project/study ideas for the Adaptive Management Relational Database Project Bank. We want to capture studies that explicitly address climate change, but also those that will contribute important knowledge, but may not list climate change or adaptive planning as a research objective.

Specific question stream:

1. Does this project address climate change issues?
2. If yes, please select all that apply:
 - Basic research that increases knowledge of existing climate related drivers in ecosystems and populations (physiological models/studies, habitat suitability, hydrology, etc.)
 - Projecting or assessing future climate change impacts (e.g. hydrological, changes to species' range or niche, predicting disturbance interactions)
 - Applied research to inform adaptive management
 - Applied research that measures success of adaptive management actions
 - Development of software or applications to increase research and manager access to climate change information
 - Other

Generic alternative:

1. Does this project address issues relating to climate change impacts?
 - Directly? If Yes, please specify:
 - Indirectly? If Yes, please specify:
2. Will results of this project help inform climate change adaptation?
If Yes, please specify:



DoD Climate Assessment Tool

WHAT IS THE DoD CLIMATE ASSESSMENT TOOL?

A CAC-enabled, web-based collection of scientific climate data to support research, analysis, and decision making about exposure to historical extreme weather and reasonably foreseeable climate effects.

WHAT IS THE PURPOSE OF THE CLIMATE TOOL?

Enables Military Departments and their installation personnel to deliver consistent exposure assessments and identify regions or installations for additional climate-related studies.

HOW WILL THE TOOL SUPPORT ANALYSIS AND DECISION MAKING?

The tool uses data from past extreme weather events (e.g., hurricanes, tornado tracks) and the effects of future changes in sea levels, riverine flooding, drought, heat, land degradation, energy demand, and wildfires to produce hazard indicators. The data supports a screening-level assessment of installation vulnerability expressed as a combination of exposure (designated by the tool) and sensitivity. This high-level assessment is useful for long-term planning and informed decision making. In the report accompanying the tool, an example installation illustrates the concept of sensitivity with different types of military assets (e.g., airfields, piers, training and testing areas).

The Climate Assessment Tool provides an important component towards understanding an installation's vulnerability to climate-related hazards. Other crucial vulnerability considerations include validating climate-related impacts through additional site-specific analysis; determining potential mission impacts; and conducting detailed engineering studies to assess which adaptation strategies may be effective to reduce risk. Using the Climate Assessment Tool as part of a comprehensive analysis will help the Department determine where best to apply resources to improve climate adaptation and resiliency.

Vulnerability is determined by three components—**exposure**, **sensitivity**, and **adaptive capacity**:



Exposure is the degree to which an installation, due to its location, may be susceptible to a climate or weather phenomenon (e.g., Is the installation located in a flood-prone region?)



Sensitivity is the degree to which an installation could be affected by a climate or weather phenomenon (e.g., Are assets located in flood hazard areas? Are assets already elevated above the flood hazard area? How much damage could be caused to important assets?)



Adaptive capacity is an installation's existing ability to address the potential impacts (e.g., Can important assets be relocated out of the flood hazard area? Do redundant capabilities exist to cover the most important installation functions?)

DoD Climate Assessment Tool Use To Date

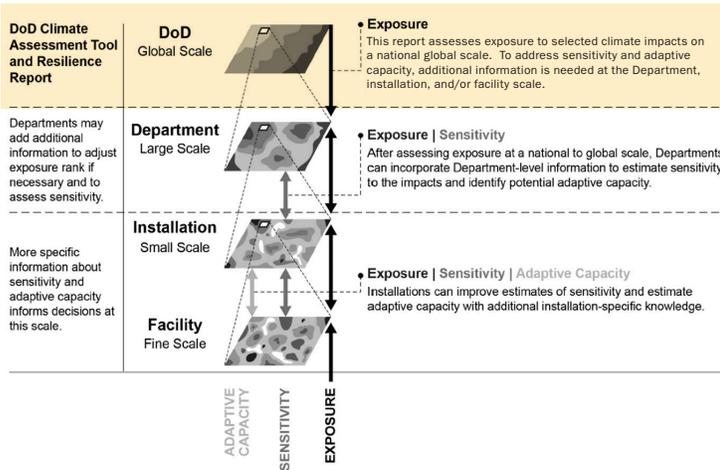
- Number of installation users is growing with currently over 300 users
- Rate of use for site assessments has increased sevenfold; 180 completed in the first year, 1210 completed in the last three months
- Data included in the Secretary of Defense's Advana Dashboard, a centralized data and analytics platform providing DoD users with data and tools to support policy and decision making
- DoD energy and sustainability teams beginning to use the tool's exposure information for decisionmaking

| Climate Assessment Tool Users | Impacts on Decision Making |
|---|---|
| Installation-level Planners and Engineers | <ul style="list-style-type: none"> Analyze an installation's exposure or susceptibility to climate and extreme weather events. Use this information to help inform planning and land use recommendations, and support resilient design, engineering, and construction. Add separate geographic information system (GIS) layers (e.g., flooding) available for Military Department-specific GIS systems used at the installation level. |
| Military Department Headquarters | <ul style="list-style-type: none"> Identify regions or installations for focused attention, such as performing detailed studies to determine mission impacts and strategies to mitigate exposure. |
| DoD Leadership | <ul style="list-style-type: none"> Compare exposure across the Department to answer questions from Congress. Inform investment and policy decisions. |

Below are examples of how the tool provides installation-specific data and mapping, as well as visualization of global trends.

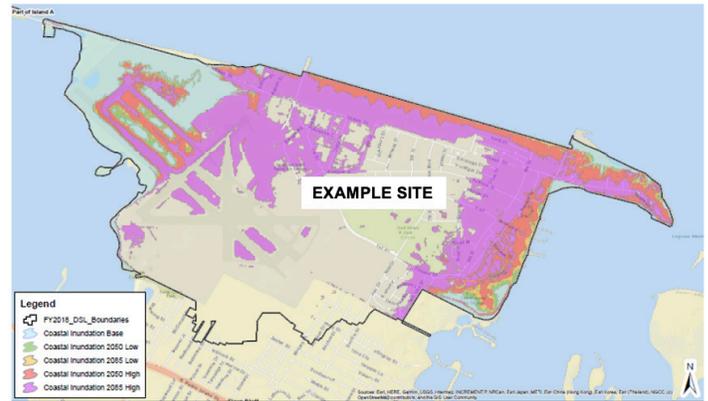
Variation between DoD Global and Installation-specific Assessments and Reporting

Climate exposure occurs on different scales. On a global scale, trends such as hurricanes, warming global average temperatures, and changing sea level are evident. More apparent at smaller scales are impacts such as soil moisture, precipitation effects, temperature effects, and local relative sea-level rise that can affect ecosystems and social systems important to how installations and facilities function.



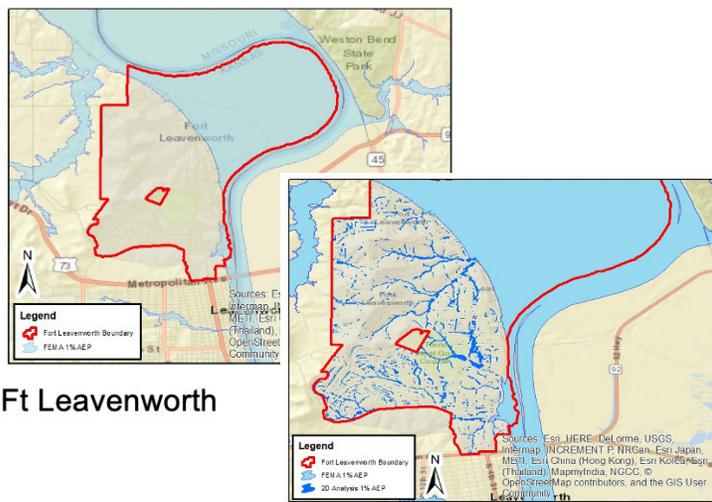
Installation-level Flood Mapping

GIS shapefiles are available for local, installation-level mapping of coastal and riverine flooding. The maps provide planners and engineers with the percent of installation area inundated.



Installation-level Flood Mapping

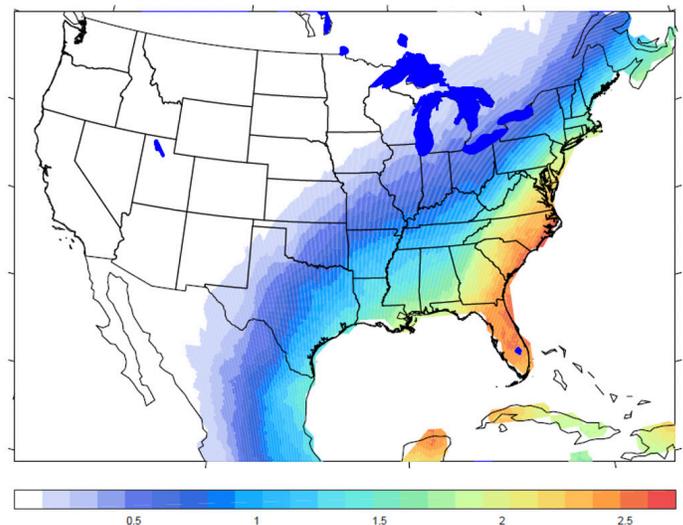
The tool provides flood plain maps using a combination of Federal Emergency Management Agency and U.S. Army Corps of Engineers data to depict the flooding exposure on tributaries and rivers.



Ft Leavenworth merged

Historical Extreme Weather Events across the United States

The tool incorporates historical data on landfalling tropical storms between 1948 and 2018 across the United States into an extreme weather indicator.



Ft Leavenworth

The Climate Assessment Tool will generate reports at the Military Department or installation level to help DoD understand and manage exposure from climate-related hazards.

Department of Defense Climate Exposure Report: Summary of exposure information for 1391 global DoD installations and related sites. Contains examples of resilience measures and rough order magnitude of costs. The report enhances DoD leadership awareness of climate exposure and supports adaptation planning.

Military Department Summary Report: High-level exposure analysis and report for each Military Department.

Middle Rio Grande Endangered Species Collaborative Program

Habitat Restoration Planning and Monitoring Considerations

Desired Restoration Targets (select all that apply)

Spatial Scale: Range Basin Reach Site

Temporal Scale: ≥1 Year 2-5 Years 6-10 Years >10 Years

Biotic Response: Ecosystem Terrestrial Riparian Aquatic

Threatened/Endangered/Species of Concern:

RGSM SWFL YBCU NMMJM PESU

Other _____

Invasive/Non-Native Species: List _____

Ecosystem Goods and Services (benefits obtained from functional ecosystems):

Goods (products obtained from ecosystems):

Food, Fiber, Fuel Genetic Resources Biochemicals

Fresh Water Other _____

Regulating Services (benefits from regulation of ecosystem processes):

Invasion resistance Herbivory Pollinator Support Seed Dispersal

Climate Regulation Pest Regulation Disease Regulation

Natural Hazard Protection Erosion Control Water Purification

Air Purification Other _____

Supporting Services (services necessary for production of all other ecosystem services):

Primary Production Establishment of Habitat Nutrient Cycling

Soil Amendment Biomass Production Other _____

Cultural Services (non-material benefits to humans):

Spiritual Educational Recreational Aesthetic

Knowledge Systems Other _____

Middle Rio Grande Endangered Species Collaborative Program

Desired Restoration Goals

Goal Statement 1: _____

Goal Statement 2: _____

Desired Monitoring Goals (select all that apply)

Scope:

- Construction Monitoring -- to determine whether a particular project was completed as specified in the restoration plan
- Performance Monitoring -- to evaluate the performance of a restoration project relative to the project objectives
- Monitoring to support adaptive management -- to learn from the restoration effort in structured ways to enhance the effectiveness of restoration efforts over the long-term.

Benefit:

- Satisfy Endangered Species Act requirement or recommendation
- Establish desired habitat features
- Collect data necessary to properly evaluate HR success at the site-level
- Account for restoration benefits and ecosystem services beyond the site-level targets of the project
- Evaluate impacts from acute disturbances such as wildfires
- Evaluate impacts from chronic disturbances such as invasive species or climate change
- Inform/Improve restoration best practices by defining what works and what doesn't
- Provide region-wide insights beyond the temporal and spatial scale of individual projects and the MRG

Other _____

Middle Rio Grande Endangered Species Collaborative Program

Project Planning Considerations (select all that apply):

Factors that influence site selection:

- Property Acquisition Access Proximity to _____
- Existing Data Landscape Features Habitat Features Site Maturity
- Species Presence Species Absence Experimental Design
- Other _____

Factors that influence monitoring investment:

- Time Constraint Funding Manpower Expertise Logistics
- Equipment Data Management Ability to Partner
- Other _____

Project-specific questions:

How is the habitat used by the target species (ex., reproduction, refuge, feeding)?

How do you define success for your project?

Which habitat features are you modifying?

What biotic and abiotic response metrics will you measure?

At what spatial and temporal scales do these metrics respond?

How do you expect the habitat to change over time?

Are you comparing your site to a control site?

Are you comparing your site to a reference site?

MIDDLE RIO GRANDE ENDANGERED SPECIES COLLABORATIVE PROGRAM

Science & Adaptive Management Committee Meeting

MAY 27, 2021

SCIENCE COORDINATOR UPDATE





Per S&AM Plan, SAMC responsibilities include:

- tasking ad hoc groups,
- compiling and translating results,
- communicating and revisiting recommendations to EC.

The tool to document this process is the Adaptive Management Relational Database (AMRDB).

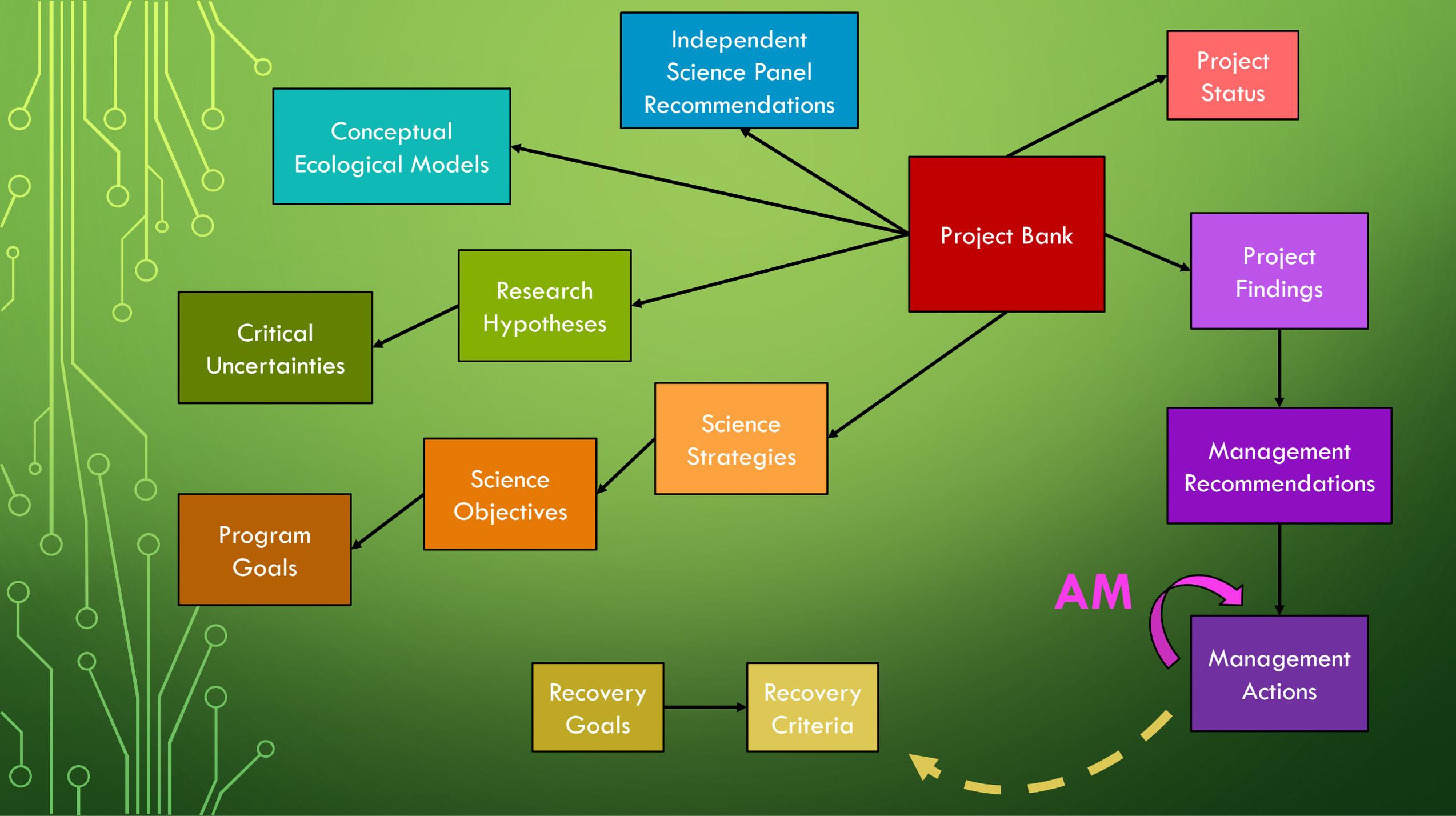
Discussion:

- Existing information sources used to build AMRDB
- Incorporate scientific findings and recommendations



Existing information sources used to build AMRDB:

- USFWS species recovery plans, critical habitat designations and biological opinions
- Independent Science Panel recommendations (e.g., Fraser et al. 2016, Hubert et al. 2016, Noon et al. 2017)
- MRGESCP annual reports
- MRG Adaptive Management Framework: Identifying Critical Scientific Uncertainties (Caplan et al. 2018) – primarily Tables 3, 4, 5 and 6
- Science & Technical Ad Hoc Group findings





Existing information sources used to build AMRDB:

- USFWS species recovery plans, critical habitat designations and biological opinions
- Independent Science Panel recommendations (e.g., Fraser et al. 2016, Hubert et al. 2016, Noon et al. 2017)
- MRGESCP annual reports
- **MRG Adaptive Management Framework: Identifying Critical Scientific Uncertainties (Caplan et al. 2018) – primarily Tables 3, 4, 5 and 6**
- **Science & Technical Ad Hoc Group findings**

Table 3. Study framework attributes for critical scientific uncertainties for the New Mexico Meadow Jumping Mouse.

| Uncertainty Statement/Study Question | Management Relevance | Study Type | Measurement Attributes | Temporal and/or Spatial Scale | Study Design Considerations | Priority |
|--|---|---|--|---|--|----------|
| Where are MRG populations located? | <ul style="list-style-type: none"> Few reliable surveys done Essential for population identification and protection Opportunity to research habitat selection and population dynamics if a large, sustainable population is discovered | <p>Field surveys:</p> <ul style="list-style-type: none"> Historical sites (where there is potential habitat) Priority potential habitat <p>Model development:</p> <ul style="list-style-type: none"> Inform screening criteria to map potential habitat at different scales Prioritize field survey areas | <p>Field studies:</p> <ul style="list-style-type: none"> Detection/Non-Detection with habitat data (soil moisture; herbaceous/shrub layer composition, density, height; tree canopy cover) <p>Modeling:</p> <ul style="list-style-type: none"> Probability of Occurrence Relative Occurrence Rate Habitat Suitability Index (HSI) | <ul style="list-style-type: none"> Multi-year All MRG reaches | <ul style="list-style-type: none"> Access/landownership issues Permitting requirements Distribution and habitat difficult to model Vegetation type and microhabitat dependent Need info on spatial habitat requirements for modeling | Level 1 |
| What is the genetic variation within and between populations? | <p>Level of inbreeding due to:</p> <ul style="list-style-type: none"> Isolation Small population size <p>Relationships among persisting populations to manage:</p> <ul style="list-style-type: none"> Inbreeding depression Translocations Captive breeding program Habitat restoration for population connectivity and gene flow | <p>Genetic analysis:</p> <ul style="list-style-type: none"> Fine-grained evaluation of genetic health (inbreeding) Estimate contemporary gene flow among populations Estimate evolutionary divergence of populations | <ul style="list-style-type: none"> Inbreeding Gene flow Divergence Relatedness | <p>Range-wide:</p> <ul style="list-style-type: none"> Population comparisons Identify potential source populations for translocation/captive breeding programs | <ul style="list-style-type: none"> Difficult to obtain adequate sample sizes Need surveys to identify all current populations Invasive methods discouraged given small population size Weigh risks/benefits of invasive methods | Level 1 |
| How do <i>Invasive survey methods</i> (trapping, telemetry) compare to <i>Non-invasive methods</i> (e.g., models, remote cameras, track plates)? | <p>Invasive:</p> <ul style="list-style-type: none"> Serious risk to the health of captured animals Damage to sampled habitats Some populations too small <p>Non-invasive:</p> <ul style="list-style-type: none"> Develop reliable detection methods Other uses (population trend monitoring and size estimation, habitat selection) | <ul style="list-style-type: none"> Field surveys | <ul style="list-style-type: none"> Detection rate Effort required to document at a site if present Biological (non-target species, competitors, predators), Environmental (habitat quality), and Surveyor (expertise) factors that influence detection Sources of bias and error rates Flexibility and efficacy of method | <ul style="list-style-type: none"> Multi-year <p>Non-invasive:</p> <ul style="list-style-type: none"> Develop different techniques Different studies for each technique Test in multiple populations Represent array of situations | <ul style="list-style-type: none"> The only currently known population in the MRG (BdANWR) is very small Difficult to obtain adequate sample sizes Invasive methods discouraged per small size and high risk of extinction Conduct in other, larger populations with low threats | Level 2 |
| What are the attributes for foraging, day nesting, maternal nesting, and hibernation habitats in the MRG? | <ul style="list-style-type: none"> Very little known Current habitat selection info (use vs availability) based on a single study of radio-collared individuals at BdANWR Specific habitat uses and relations vary within and across ecotypes Must fully understand habitat relations to understand threats, or develop conservation/mitigation measures | <ul style="list-style-type: none"> Resource selection study design Field study using telemetry Explore non-invasive detection methods (e.g., combo of fine scale spatial models and using detections from remote cameras) | <p>Dependent variable:</p> <ul style="list-style-type: none"> Occurrence: preferably as corrected by detection probability <p>Independent variables:</p> <ul style="list-style-type: none"> Soil moisture, type Herbaceous/Shrub layer composition, density, height Tree canopy cover, woody debris, hydrology, vegetation community | <ul style="list-style-type: none"> Multi-year Include several reaches Different, discrete studies in each area to better understand the range of variation in habitat attributes | <ul style="list-style-type: none"> Only currently known population in the MRG (BdANWR) is very small Difficult to obtain adequate sample sizes Invasive methods discouraged given small population, high risk of extinction | Level 3 |

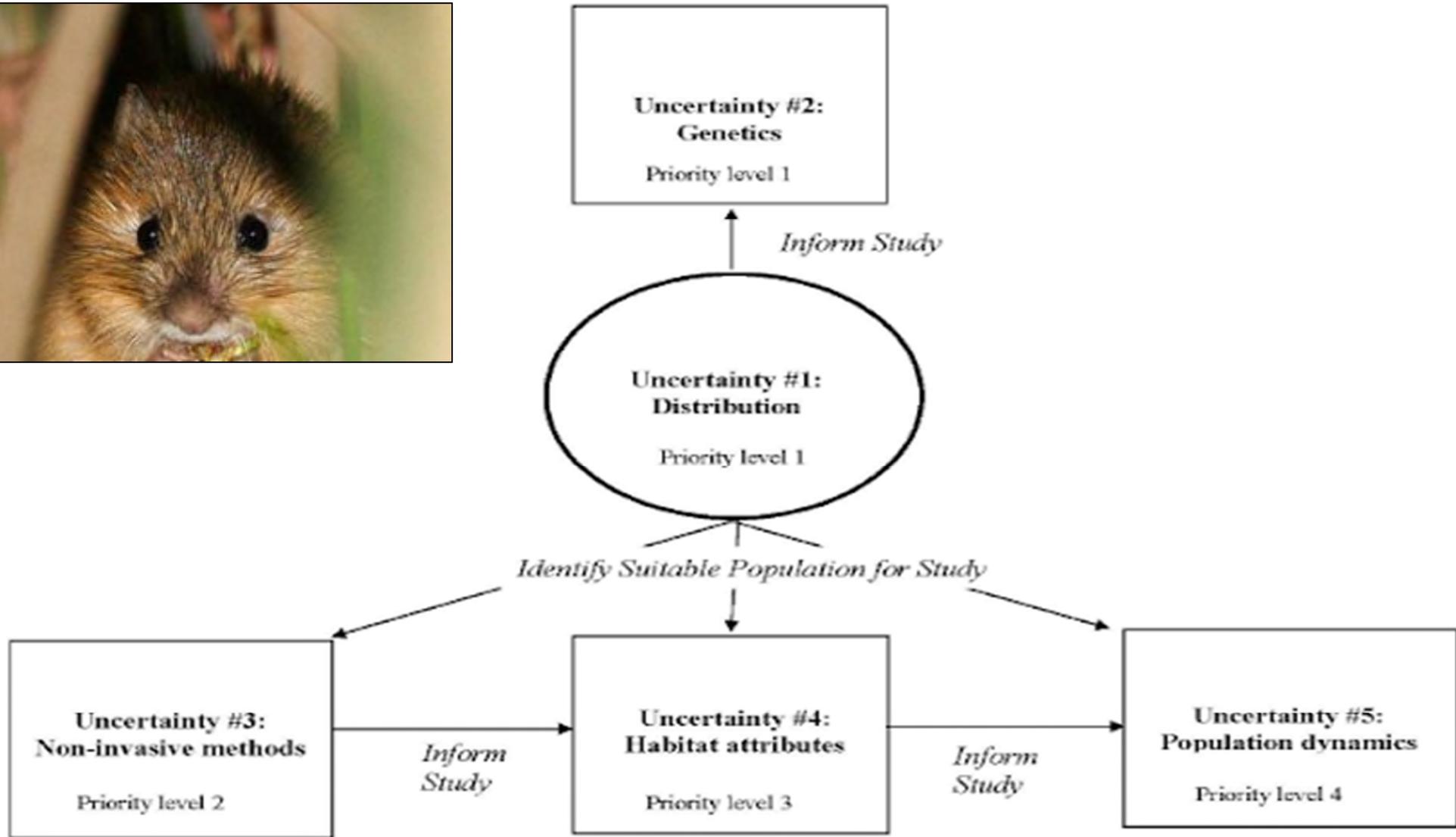
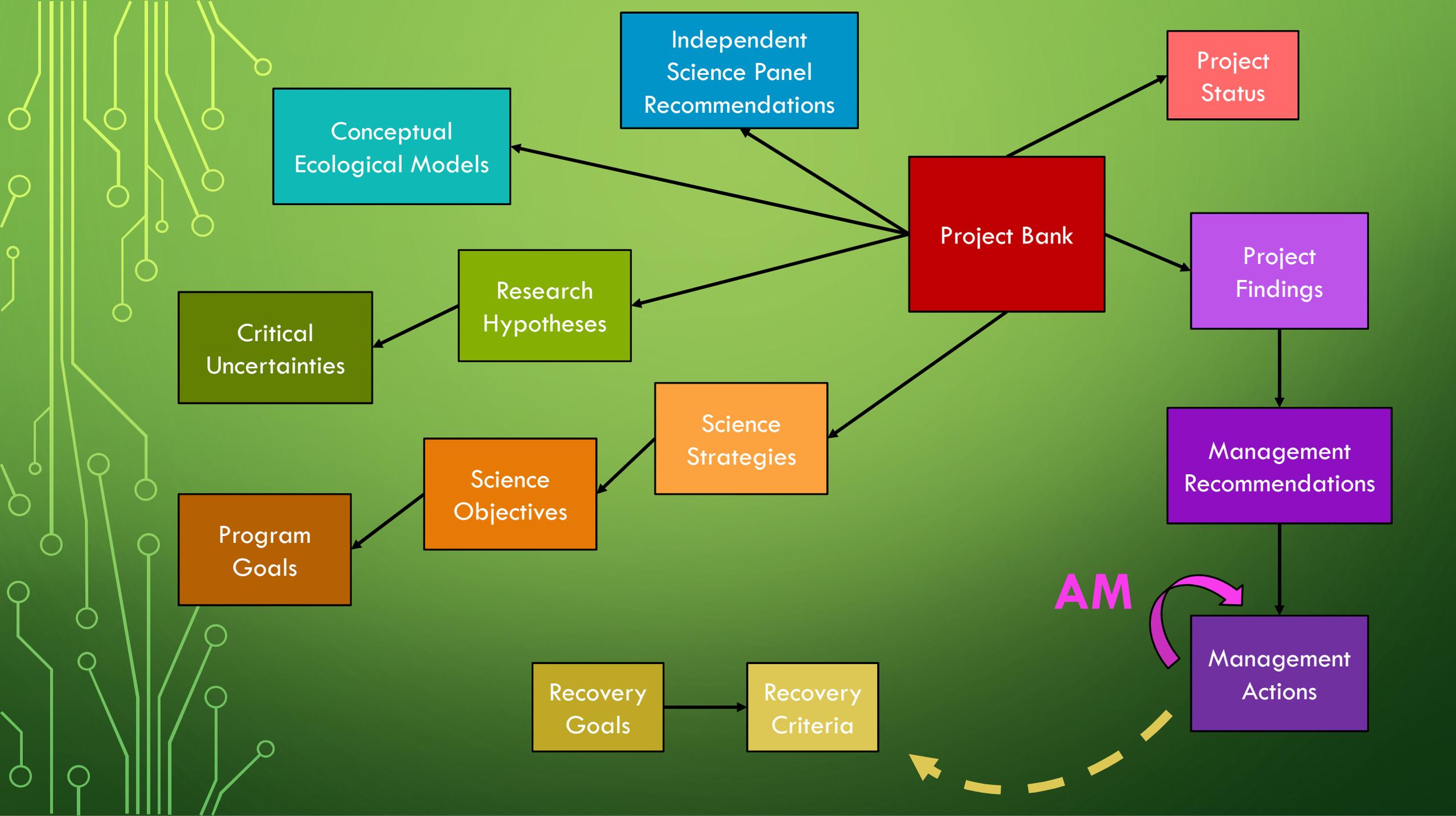


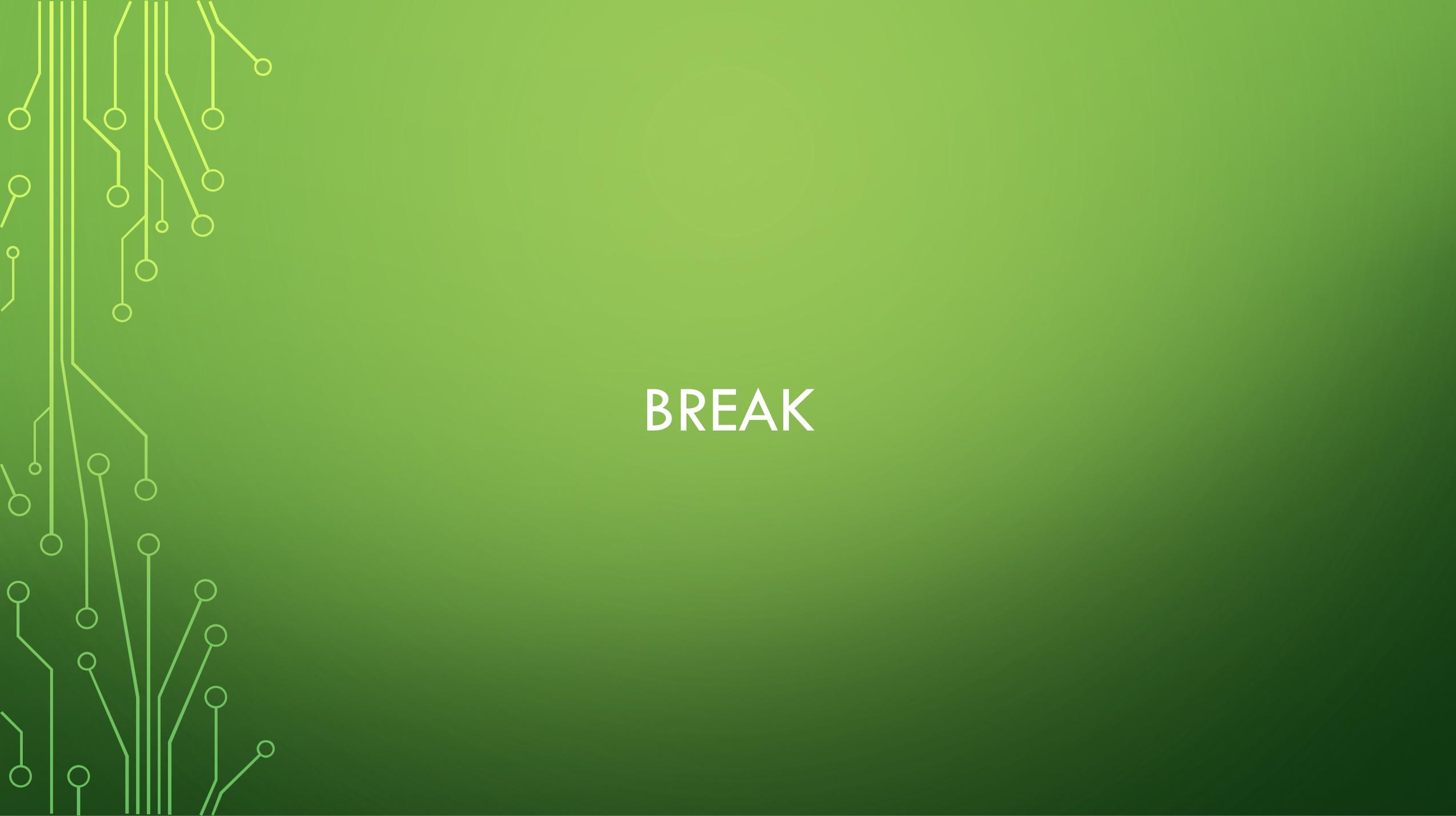
Figure 4. Relationships among critical scientific uncertainties influencing management and recovery of the New Mexico Meadow Jumping Mouse in the Middle Rio Grande, New Mexico.





Review of Findings and Recommendations from RGSM PMWG Summary Report S&T Ad Hoc Group

- Ad Hoc Group feedback on findings and recommendations comment matrix and report review history
- SAMC reviews of the summary report
- Next steps prior to July EC meeting:
 - Decide which recommendations to endorse (use matrix)
 - Draft memo to EC – coordinate message with R. Valdez at June SAMC meeting
 - Review and finalize memo for July EC meeting
 - Form Ad Hoc Groups for PMWG Task 3 (refinements)



BREAK

Update on Science & Technical Ad Hoc Groups

- RGSM Population Modeling Ad Hoc Group
Charles Yackulic (USGS) – Lead
Expecting model update in June
- RGSM Conceptual Ecological Model/Genetics Ad Hoc
- Southwestern Willow Flycatcher and Yellow-billed Cuckoo Conceptual Ecological Model Refinement Ad Hoc



Update on Science & Technical Ad Hoc Groups

- RGSM Population Modeling Ad Hoc Group
- RGSM Conceptual Ecological Model/Genetics Ad Hoc

Wade Wilson (USFWS) - Lead,
Eric Gonzales (USBR),
Jane Rogosch (TX Tech Univ.),
Megan Osborne (UNM),
Manuel Ulibarri (USFWS)



First meeting: May 19, 2021; Next meeting: TBD June

- Southwestern Willow Flycatcher and Yellow-billed Cuckoo Conceptual Ecological Model Refinement Ad Hoc

Update on Science & Technical Ad Hoc Groups

- RGSM Population Modeling Ad Hoc Group
- RGSM Conceptual Ecological Model/Genetics Ad Hoc
- Southwestern Willow Flycatcher and Yellow-billed Cuckoo Conceptual Ecological Model Refinement Ad Hoc

Amy Erickson (Audubon) - Lead,
Ondrea Hummel (TetraTech),
Jenny Davis (USFWS),
Dave Moore (USBR),
Meaghan Conway (NMDGF)



SAMC Ranking of Science Strategies

| | Member 1 | Member 2 | Member 3 | Member 4 | Member 5 |
|------------|----------|----------|----------|----------|----------|
| RGSM A-4 | 2 | | 4 | 1 | 1 |
| SWFL B-1 | 5 | | 1 | | 2 |
| SWFL B-3 | 1 | 1 | 6 | 2 | 5 |
| NMMJM D-1 | 3 | 2 | 2 | 3 | 3 |
| PESU E-1 | 4 | 3 | 3 | | 4 |
| OTHER F-1 | 6 | 6 | 6 | | |
| OTHER H-1b | 7 | 4 | 5 | | |
| OTHER H-1c | 8 | 5 | 7 | | |

CRITERIA USED IN RANKINGS:

Feasibility

Level of effort

Achievable measurable outcomes

Reasonable timeline

Already in progress

Modification to existing protocol

Related to multiple aspects of ecosystem

Suited to MRGESCP



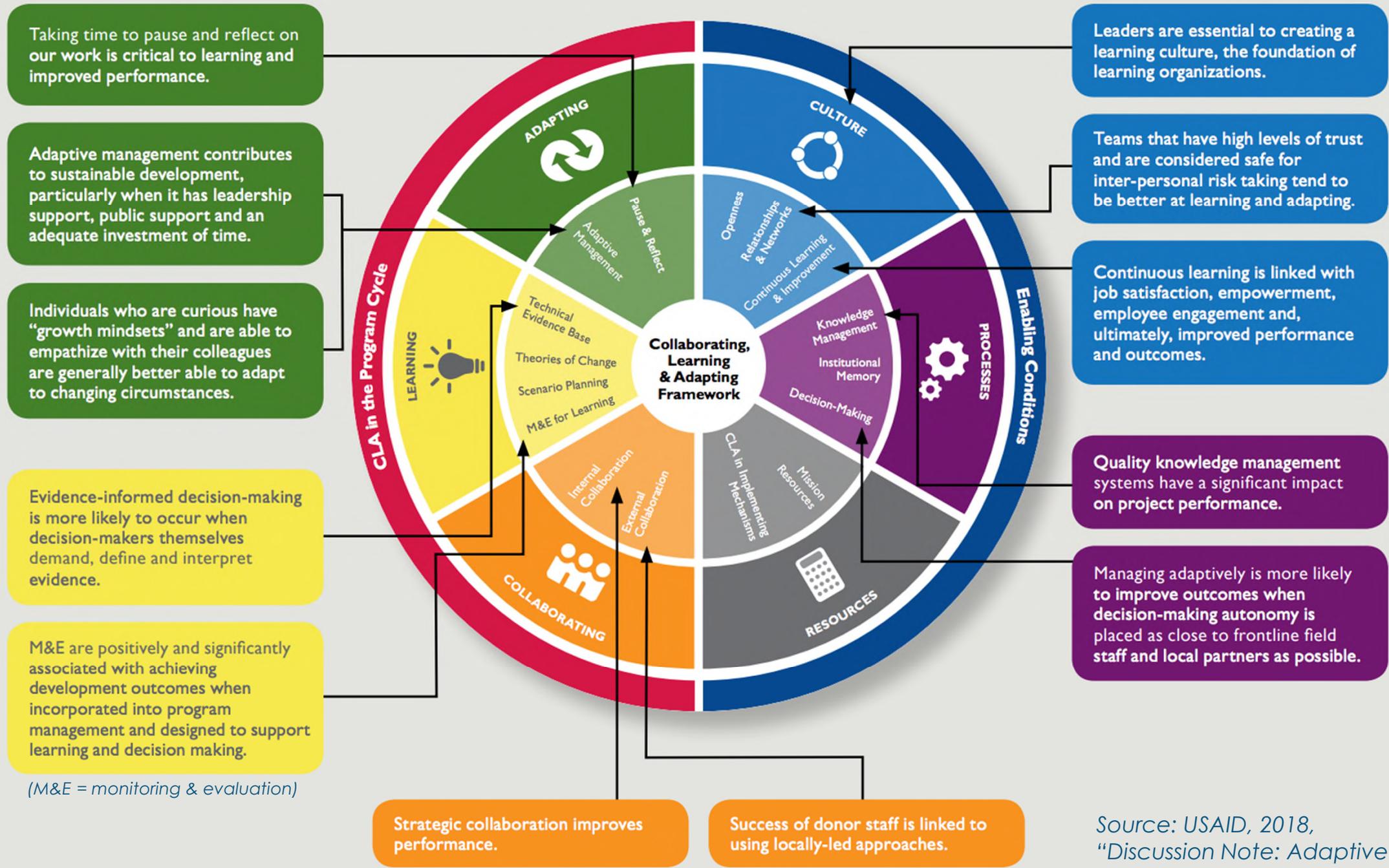
The SAMC's Role in the Collaborative Program's Adaptive Management Efforts

SCIENCE AND ADAPTIVE MANAGEMENT COMMITTEE

MAY 27, 2021

Adaptive Management ...

- ▶ Is a collaborative process
- ▶ Is a structured decision-making process:
 - ▶ Making decisions based on clearly articulated fundamental objectives,
 - ▶ Recognizing the role of scientific predictions in decisions,
 - ▶ Dealing explicitly with uncertainty, and
 - ▶ Responding transparently to societal values in decision making.
- ▶ Requires clear ground rules on roles, responsibilities, and communication norms
- ▶ Fails without *good faith* participation



Taking time to pause and reflect on our work is critical to learning and improved performance.

Adaptive management contributes to sustainable development, particularly when it has leadership support, public support and an adequate investment of time.

Individuals who are curious have "growth mindsets" and are able to empathize with their colleagues are generally better able to adapt to changing circumstances.

Evidence-informed decision-making is more likely to occur when decision-makers themselves demand, define and interpret evidence.

M&E are positively and significantly associated with achieving development outcomes when incorporated into program management and designed to support learning and decision making.

(M&E = monitoring & evaluation)

Leaders are essential to creating a learning culture, the foundation of learning organizations.

Teams that have high levels of trust and are considered safe for inter-personal risk taking tend to be better at learning and adapting.

Continuous learning is linked with job satisfaction, empowerment, employee engagement and, ultimately, improved performance and outcomes.

Quality knowledge management systems have a significant impact on project performance.

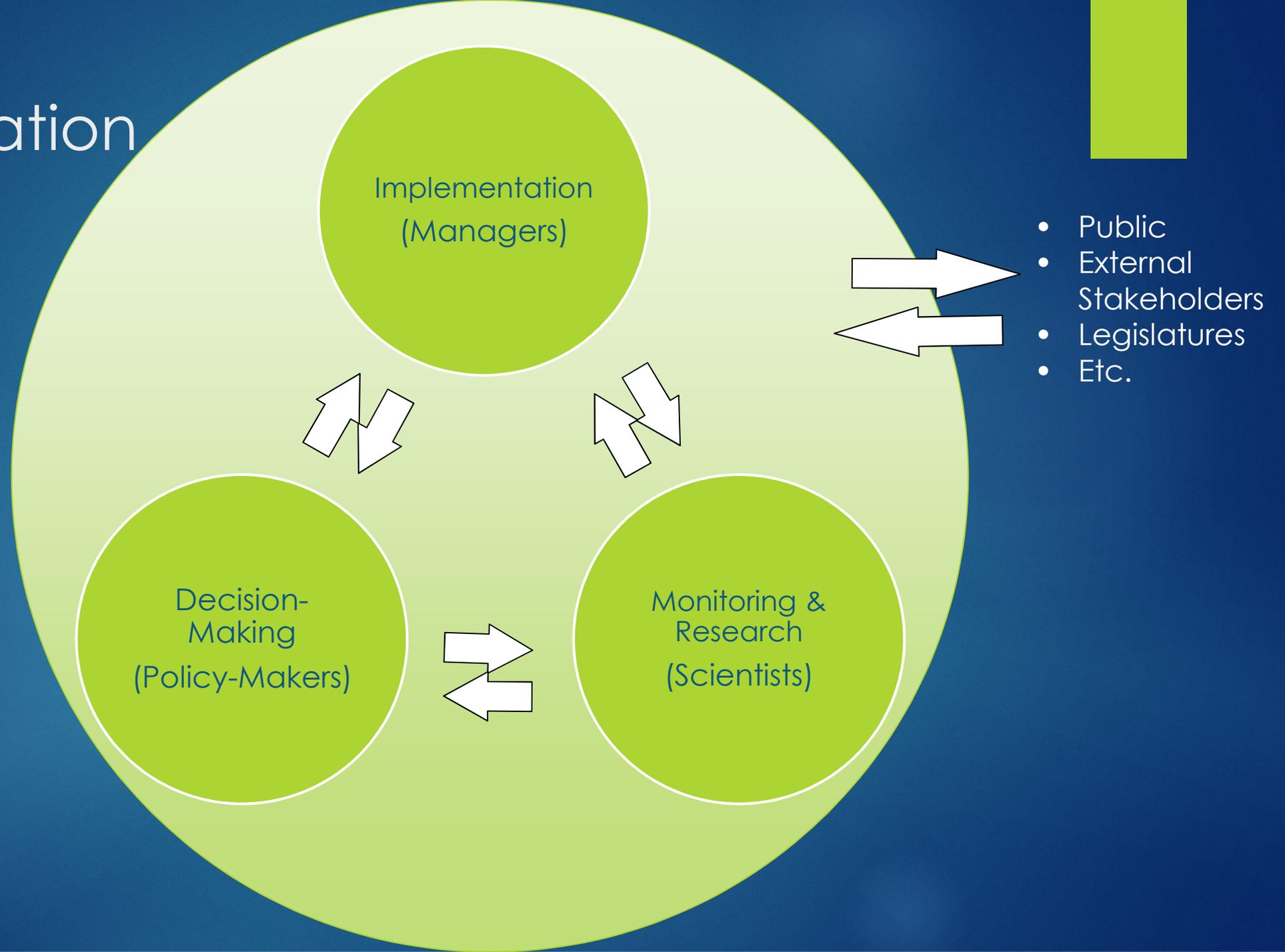
Managing adaptively is more likely to improve outcomes when decision-making autonomy is placed as close to frontline field staff and local partners as possible.

Strategic collaboration improves performance.

Success of donor staff is linked to using locally-led approaches.

Source: USAID, 2018, "Discussion Note: Adaptive Management"

Science Communication Triangle



The SAMC...

- ▶ Science synthesizer and translator
 - ▶ To the Executive Committee
 - ▶ To other scientists/disciplines
- ▶ Ensures good scientific practice
- ▶ Ensures all have equal access to data and information required for discussions
- ▶ Ensures a common understanding
- ▶ Creates trust in the Program's scientific process, and the science it promotes

Creating trust in the science

- ▶ Unbiased and objective science
- ▶ Transparent process and decision-making
- ▶ Clear documentation
- ▶ Clear, concise, and complete communication

- ▶ Structured decision-making for:
 - ▶ Determining the best available science
 - ▶ Evaluating new scientific findings and determining how to apply new information
 - ▶ Interpreting scientific findings to better inform management activities

Implementing Adaptive Management

▶ FROM:

- ▶ Reactive
- ▶ Ad hoc
- ▶ Project-specific
- ▶ Localized spatial scale
- ▶ Short-term

▶ TO:

- ▶ Planned
- ▶ Standardized protocols and procedures
- ▶ Putting projects into the larger system-wide context
- ▶ Planning for long-term
- ▶ Documented

AM Process

- ▶ Top-down approach to develop and prioritize scientific projects
 - ▶ Standardized, unbiased
 - ▶ Addressing reducible critical uncertainties
 - ▶ Management-relevant
 - ▶ Hypothesis-driven
- ▶ AM Relational Database
 - ▶ Central repository of information on relationships among objectives, strategies, uncertainties, projects
- ▶ Conceptual Ecological Models
 - ▶ Document the current state of understanding on the relationships among drivers, stressors, and species response in the ecosystem

MRGESCP Guiding Principles

▶ **Mission:**

The Middle Rio Grande Endangered Species Collaborative Program provides a collaborative forum to support scientific analysis and implementation of adaptive management to the benefit and recovery of the listed species pursuant to the Endangered Species Act within the Program Area, and to protect existing and future water uses while complying with applicable state, federal and tribal laws, rules, and regulations.

▶ **Goals:**

- ▶ Establish and maintain a self-sustaining population of endangered RGSM distributed throughout the MRG.
- ▶ Maintain and protect the MRG recovery unit goals for endangered SWFL.
- ▶ Maintain and protect suitable threatened YBCU habitat in the MRG.
- ▶ Establish and maintain a self-sustaining endangered NMMJM population in the MRG.
- ▶ Maintain and protect the threatened PESU in the MRG.
- ▶ Avoid the future listing or up-listing of species in the Collaborative Program area.
- ▶ Manage available water to meet the needs of endangered species and their habitat.

▶ **Science Objectives**

Strategies

- ▶ Developed from the objectives
- ▶ Used to develop project ideas to go into the AM Relational Database Project Bank

Scientific Uncertainties

- ▶ Linked to strategies via the Project Bank
- ▶ Identified from:
 - ▶ Murray et al. (2011) AM Plan version 1
 - ▶ Peer review reports
 - ▶ Caplan et al. (2018) AM Framework
 - ▶ Conceptual ecological models

Standardized Processes to Develop

- ▶ Internal and external peer review
 - ▶ Document review
- ▶ Prioritization of proposed projects (based on links to objectives, uncertainties, and management relevance)
- ▶ Recommendations to EC (documenting evidence for and against)
- ▶ Citations and references
- ▶ Science communication
- ▶ Updates to S&AM Plan, LTP, CEMs, AMRDB
- ▶ Project idea development (questions for consideration, including monitoring protocols)

S&T Ad Hoc Group Deliverable Next Steps

- ▶ Peer review of deliverables by other Program subject matter experts
- ▶ Synthesize and deliberate on findings and recommendations
- ▶ Identify the key findings to bring to the EC
- ▶ Determine areas of SAMC agreement and disagreement
- ▶ Deliberate on recommendations to bring to the EC
- ▶ Draft cover memo summarizing key findings and recommendations, with dissenting opinions documented
- ▶ Incorporate findings into the CEMs, highlighting areas of uncertainties that still need to be addressed
- ▶ Input uncertainties into AMRDB, and develop testable hypotheses
- ▶ Populate Project Bank with proposed science activities to test hypotheses

The PST will:

- ▶ Be reaching out to SAMC members in-between meetings for input on work products, for help thinking through processes, to get general feedback and questions, and to prep for meetings
- ▶ Take the lead in developing and documenting the processes, with SAMC input
- ▶ Keep track of deadlines and work product deliverables in the Program work plan and Long-Term Plan, and work to ensure the SAMC meets critical milestones
- ▶ Communicate between the SAMC and the EC/FPC on progress, areas for input, and the development of related processes and procedures