

Fiscal Planning Committee Meeting

November 1, 2022

Meeting Materials:

[Agenda](#)

[Minutes](#)

Revised FPC Charter [read-ahead, not included]

FPC Roster [read-ahead, not included]

[Draft Funding Matrix \[read-ahead, draft, spreadsheet\]](#)

[BEMP Proposed Research Project \[read-ahead\]](#)

[Revised FPC Roster \[follow-up\]](#)

[Updated BEMP Proposal \[follow-up, draft\]](#)

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

Agenda



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

Fiscal Planning Committee (FPC) November 1, 2022 9:00 AM – 11:00 AM

Location: Zoom Meeting

<https://west-inc.zoom.us/j/8983593120?pwd=bU54V3NGeG93bXVISlJFcElzcE9wZz09>

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

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

Meeting Objectives:

- Review action items from the May 16, 2022 FPC meeting.
- Approve May 16, 2022 Meeting Minutes.
- Review FPC charter for new members, introductions, and PST change in point of contact.
- Hear an update on the Draft Funding Matrix, impetus behind the matrix, and discuss possible next steps.
- Discuss Program Portal Funding status and post 2023 contingency planning.
- Hear about BEMP's proposed research project and the opportunity to partner on addressing a critical data need.

9:00 – 9:10	Welcome, Introductions, and Agenda Review <ul style="list-style-type: none">✓ Decision: Approve November 1, 2022 meeting agenda	<i>Grace Haggerty, Non-Federal Co-Chair; Debra Hill, Federal Co-Chair</i>
9:10 – 9:20	May 2022 Meeting Summary <ul style="list-style-type: none">• Action items review <p>Read-Ahead:</p> <ul style="list-style-type: none"><input type="checkbox"/> Draft May 16, 2022 Meeting Minutes✓ Decision: Approve May 16, 2022 meeting minutes	<i>Program Support Team (PST)</i>
9:20 – 9:35	New FPC Members & FPC Charter Review <ul style="list-style-type: none">• New members introductions• PST point of contact change• FPC duties (past & future) <p>Read-Ahead:</p> <ul style="list-style-type: none"><input type="checkbox"/> Revised FPC Charter<input type="checkbox"/> FPC Roster	<i>Grace Haggerty</i>
9:35 – 10:00	Update on Draft Funding Matrix <ul style="list-style-type: none">• Draft format and sample of funding opportunities	<i>PST Facilitated Discussion</i>

- Example: WaterSMART Funding
- Funding strategy discussion
- **Action Item:** PST updates to draft funding matrix and support on next steps

Read-Ahead:

- Draft Funding Matrix

10:00 – 10:20 **Program Portal Funding Options** *FPC Co-Chairs*

- After December 2023
- Develop a funding contingency plan
- **Action Item:** Co-chairs work with PST to develop a funding contingency plan

10:20 – 10:30 **Break**

10:30 – 10:45 **BEMP Project Proposal:** “Forecasting riparian community vulnerability to water supply and demand changes and identifying restoration opportunities in the upper and middle Rio Grande basin” *Kim Eichhorst, BEMP*

- Presenting a research partnership opportunity to address an important data gap

Read-Ahead:

- BEMP Proposed Research Project

10:45 – 10:50 **Announcements**

- Portal Data Updates underway
- Others?

10:50 – 11:00 **Meeting Summary and Action Items** *FPC Co-Chairs*

11:00 **Adjourn**

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

Minutes



Middle Rio Grande Endangered Species Collaborative Program

Est. 2000

Fiscal Planning Committee (FPC) Meeting Minutes

November 1, 2022; 9:00 AM – 11:00 AM

Location: Zoom Meeting

Decisions:

- ✓ Approval of November 1, 2022 FPC meeting agenda
- ✓ Approval of May 16, 2022 FPC meeting minutes

Action Items:

WHO	ACTION ITEM	BY WHEN
Program Support Team (PST)	Confirm contact numbers with all FPC members	11/3/2022
PST	Add contact information to the FPC roster and send it out as follow-up	11/3/2022
FPC	Send any comments on the FPC charter for additional discussion	11/18/2022
Kim Eichhorst	Send the revised riparian habitat project proposal for dispersal to the FPC	11/3/2022
Kim Eichhorst	Explore an option for using the New Mexico Riparian Map from Natural Heritage in the riparian habitat project proposal	TBD
PST	Schedule the next FPC meeting for January 2023	11/18/2022
FPC	Send any comments to improve the draft funding matrix or any opportunities to add to the funding matrix to the PST	11/30/2022
PST	Add opportunities to the funding matrix and ensure it is up-to-date	One week prior to next FPC meeting
PST	Translate the funding matrix to a calendar format	One week prior to next FPC meeting
PST	Explore option for adding a funding calendar to the Portal	One week prior to next FPC meeting
PST	Develop options to track non-funding resources for the FPC	One week prior to next FPC meeting
PST	Set up meeting with FPC Co-chairs to develop list of Portal funding options and share with FPC for review	One week prior to December Executive Committee (EC) meeting
FPC Co-chairs	Present Portal funding options at the December EC meeting	December EC meeting

Next Meeting: January 24, 2023

Meeting Minutes

Welcome, Introductions, and Agenda Review

Kevin Shelley, Program Support Team (PST), opened the meeting and reviewed the November 1, 2022 meeting agenda. The FPC approved the agenda with no amendments. Grace Haggerty, FPC Non-Federal Co-Chair, led introductions. Michelle Tuineau, PST, shared the new FPC Roster (see FPC Roster). All signatories were given the opportunity to appoint a point-of-contact to the FPC, which led to many new FPC members. The PST will confirm contact numbers for the FPC members and send the roster with contact information out as follow-up.

- ✓ **Decision:** Approval of November 1, 2022 FPC meeting agenda
- **Action Item:** PST will confirm contact numbers with all FPC members
- **Action Item:** PST will add contact information to the FPC roster and send it out as follow-up

May 2022 Meeting Summary

Kevin S. reviewed minutes and action items from the May 16, 2022 FPC meeting. All action items were completed. The FPC approved the May 16, 2022 meeting minutes with no amendments.

- ✓ **Decision:** Approval of May 16, 2022 FPC meeting minutes

New FPC Members & FPC Charter Review

Debbie Lee, PST, discussed the redistribution of responsibilities in the PST. Kevin S. took over as PST point-of-contact for the FPC in place of Debbie L., while she works on other tasks on the Middle Rio Grande Endangered Species Collaborative Program (MRGESCP) Work Plan. Debbie L. will continue to support the FPC at meetings.

Debbie L. reviewed the FPC charter (see Revised FPC Charter) to familiarize new members. The revised FPC Charter reflects the change to a set FPC membership. The purpose of the FPC is to build a diverse financial support system for priority MRGESCP activities as set forth in the Long-Term Plan. In practice, group members share their activities and note where there are resource shortfalls. Resources include funding and partnerships. The FPC tries to fill resource gaps and reports to the EC on the remaining gaps, as well as the activities being carried out.

Each MRGESCP signatory assigns one point-of-contact to the FPC. These points-of-contact attend meetings and update their organizations on FPC activities. They also tap others in their organizations to join meetings when needed. The FPC has a Federal and a Non-Federal Co-Chair, which are currently Debra Hill, U.S. Fish and Wildlife Service (USFWS), and Grace Haggerty, New Mexico Interstate Stream Commission (NMISC), respectively. The PST is the administrator for the FPC, and supports the group as needed. There is one FPC meeting per quarter. A proposed revision to the Biennial Schedule is up for approval at the December EC meeting, which would schedule all FPC meetings for the month after EC meetings. All FPC meetings are public, and meeting records are stored on the Program Portal. For any questions related to the Program Portal, contact Michelle Tuineau (mtuineau@west-inc.com).

Grace H. added that the FPC is a forum for signatories to communicate funding and resource requests. For example, if a signatory needs a letter of support or proposal partner, etc., the FPC is the place to express that need and receive assistance. FPC members were asked to send any comments on the revised FPC Charter to Kevin S. and the FPC Co-Chairs.

- **Action Item:** FPC will send any comments on the FPC charter for additional discussion

Update of Draft Funding Matrix

Kevin S. presented the draft funding matrix (see Draft Funding Matrix) to the FPC. Kevin S. and the FPC Co-Chairs have discussed the purpose of matrix, which is to help users easily find funding resources that are summarized and regularly updated. Debbie L. explained the initial ask for the funding matrix, which came out of an EC meeting. The EC discussed funding needs presented by the FPC and the many large-scale grants available. The FPC was asked to track the available funding opportunities. The funding matrix developed by the FPC as a result of this ask will be presented to the EC.

The FPC reviewed the funding matrix and provided feedback. Summary points are below:

- The columns on the matrix are name/description, emphasis, project types/desired outcomes, potential benefit to MRGESCP, application deadline, project type cycles, funding source, funding duration, recipient eligibility criteria, eligible MRGESCP organizations, partnering or teaming (Y/N), current status and/or participating organizations, award, year, benefit to recipients, cost share, annual funding amount, and funding restrictions.
- Kevin S. asked for feedback on the content of the matrix, the type of information the matrix organizes, and the effectiveness of the matrix structure. The FPC agreed there was a lot of information on the draft that is helpful but the formatting needed work. An FPC member asked for more links that could cut down on text. They brought up that information can change and no longer apply, which would require work to update. The PST could set up a schedule to keep the table and links updated.
- Another FPC member asked about other entries/tables for state/local funding opportunities. It was stated that those have not yet been developed.
- An FPC member was not sure how to present all the information needed if not in tabular form. A link may not capture all the info needed. Several FPC members voiced support for a calendar format; the time scale could help set up what the FPC talks about at upcoming meetings. The funding calendar could possibly be included on the Program Portal.
- The New Mexico Department of Game and Fish (NMDGF) shared that the NMDGF has the Share with Wildlife Program, which would only be relevant during years when the NMDGF highlights species in the Middle Rio Grande as being of particular interest. Topics of interest change from year to year.
- There was interest in how to share information once an organization seeks and/or is awarded a grant. Currently, that is up to the individual signatories; they may be more or less comfortable sharing that information. The FPC can be a forum to discuss seeking grants. The FPC can also help coordinate if multiple signatories want to go after the same grant; signatories can combine efforts or ensure their efforts don't overlap.
- It would be useful to track the likelihood of an organization getting a grant and whether or not they did to learn from the experience. Once the funding matrix is complete, the FPC can invite those who successfully applied for the listed opportunities to give their insights.
- An FPC member shared that they have experience going after smaller grants, and the reporting process can be as cumbersome as for larger grants. It was advised that the funding matrix have a minimum grant value to avoid the smaller grants.
- There are non-funding resources that should be tracked as well, including information on how to lobby or fundraise.

- **Action Item:** FPC will send any comments to improve the draft funding matrix or any opportunities to add to the funding matrix to the PST
- **Action Item:** PST will add opportunities to the funding matrix and ensure it is up-to-date
- **Action Item:** PST will translate the funding matrix to a calendar format
- **Action Item:** PST will explore option for adding a funding calendar to the Portal
- **Action Item:** PST will develop options to track non-funding resources for the FPC
- **Action Item:** PST will schedule the next FPC meeting for January 2023

BEMP Project Proposal

Kim Eichhorst, Bosque Ecosystem Monitoring Program (BEMP), presented on a BEMP project proposal (see BEMP Proposed Research Project). BEMP was invited to submit a proposal to the Climate Adaptation Science Centers (CASC). There were changes in the proposal process, which led to the proposal not being submitted. BEMP is still interested in carrying out this work. The proposal is for a project led by Tina Mozelewski to look at modeling/forecasting for vulnerable riparian areas. The work focuses on determining water needs for vegetation communities and changes in the system. The work would develop a management tool for determining which areas could support native growth for habitat restoration projects. The work could also predict where a management strategy should shift. The work is in collaboration with Casey Brown, a modeler from the University of Massachusetts-Amherst, and Steven Sesnie from USFWS. This is a \$300,000 project over three years. The updated proposal will be shared with the FPC. BEMP is seeking funding to carry out this project. The project currently covers the upper southwest and Rio Grande, but it can be scaled down to a pilot area until additional funding is available.

Kim E. was asked to pitch the project to the FPC as a priority project. The MRGESCP sent a letter of support to assist in the initial CASC grant process. Debbie L. explained that multiple signatories have heard about the project and agreed looking into the future of vegetation communities would benefit habitat restoration projects. This project fills an important data gap.

An FPC member asked Kim E. about the baseline riparian dataset to be used for the project. The project would rely on an existing remote sensing dataset. The New Mexico Department of Game and Fish works with Natural Heritage's New Mexico Riparian Map (<https://nhnm.unm.edu/riparian/nmripmap>), which may be helpful. BEMP was encouraged to speak with Natural Heritage about incorporating the map data. Natural Heritage partnered with National Wildlife Federation on a project to identify conservation opportunity areas in the Upper Rio Grande riparian zone using the New Mexico Riparian Map. It may be good for BEMP to confer with Natural Heritage on this project as well to inform habitat restoration. A WaterSMART grant may be good for the project. Kim E. is exploring that option as well. Kim E. was advised to contact Ryan Gronewold, U.S. Army Corps of Engineers (USACE), when they have more information on funding in December.

- **Action Item:** Kim Eichhorst will send the revised riparian habitat project proposal for dispersal to the FPC
- **Action Item:** Kim Eichhorst will explore an option for using the New Mexico Riparian Map from Natural Heritage in the riparian habitat project proposal

Program Portal Funding Options

Debbie L. discussed Program Portal funding options. At the June EC meeting, the FPC was tasked with developing options for longer term Program Portal funding coverage. USACE is funding the Portal through December 2023. Nothing is lined up after this date. Base maintenance costs \$70k a year, which

includes licensing and server fees and U.S. Geological Survey (USGS) support. New developments and updates to the geospatial mapper increases the cost.

The FPC should consider the following information when developing a plan forward:

- USGS can only enter contracts with public agencies.
- The option of moving the Portal off the USGS server is difficult and may take a lot of time.

Currently, USACE is in an inter-agency agreement with USGS. In the recent past, the Albuquerque Bernalillo County Water Utility Authority picked up limited base funding at 15k. In response to a question about the possibility of including Portal costs in the U.S. Bureau of Reclamation's (Reclamation) third-party Program and Science Support (PASS) contract, the Reclamation representative stated that the agency is not currently in favor of increasing its funding support for the MRGESCP above the PASS contract amount. Some non-federal signatories, such as NMISC, have difficulty funding multi-year efforts. USACE may be able to fund past December 2023.

Options for Program Portal funding past December 2023 will need to be presented to the EC in December 2022 or March 2023. Grace H. and Debra H. will discuss Portal funding options to present to the EC. One option could be funding by grants, but we would need to determine how to deliver the funds to USGS. Signatories may also be able to pool contributions for the Portal.

- **Action Item:** PST will set up meeting with FPC Co-chairs to develop list of Portal funding options and share with FPC for review
- **Action Item:** The FPC Co-Chairs will present Portal funding options at the December EC meeting

Announcements:

There were no announcements.

Meeting Participants

FPC Representative

Debra Hill, Federal Co-Chair
Grace Haggerty, Non-Federal Co-Chair
Anne Marken
Dustin Chavez-Davis
Kim Eichhorst
Lynette Giesen
Mark Kelly
Quantina Martine
Thomas Turner
Virginia Seamster

Organization

U.S. Fish and Wildlife Service
New Mexico Interstate Stream Commission
Middle Rio Grande Conservancy District
City of Albuquerque, Open Space Division
Bosque Ecosystem Monitoring Program
U.S. Bureau of Reclamation
Albuquerque Bernalillo County Water Utility Authority
Audubon Southwest
University of New Mexico
New Mexico Department of Game and Fish

Support

Debbie Lee
Kevin Shelley
Michelle Tuineau

Organization

Program Support Team
Program Support Team
Program Support Team

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

Draft Funding Matrix [read-ahead, draft, spreadsheet]

Name/Description	Emphasis	Project Types/Desired Outcomes	Potential Benefit to MRGESP	Application Deadline	Project Type Cycles	Funding Source	Funding Duration	Recipient Eligibility Criteria	Eligible MRGESP Organizations	Partnering OR Teaming Opportunity (Y/N)	Current Status and/or Participating Organizations	Award	Yr	Benefit to Recipient(s)	Cost Share	Annual Funding Amount	Funding Restrictions	
America the Beautiful Challenge: Public-Private grant program intended to streamline grant funding opportunities by consolidating/merging funding lines of multiple federal agencies & private sectors to design and develop large-scale projects encompassing both public and private lands involving new conservation & restoration projects	<ul style="list-style-type: none"> watershed resilience resilience equitable access workforce development corridors & connectivity collaborative conservation 	<ul style="list-style-type: none"> Conserving and restoring rivers, coasts, wetlands, and watersheds ecosystems that serve as carbon sinks Connecting and reconnecting wildlife corridors, large landscapes, watersheds, and seascapes Improving ecosystem and community resilience to coastal flooding, drought, and other climate-related threats Expanding access to the outdoors, particularly in underserved communities 		7/21/2022	o 12-18 mos (engagement & project design) o 24-48 mos (implementation)	WAFWA	5 years (2022-2027)	o State government agencies, territories of the United States, and Indian Tribes are eligible to apply for all four grant categories. o Non-profit 501(c) organizations, local governments, municipal governments, and educational institutions are eligible to apply for grants in categories (3) Grants to Buffer and Benefit Public Lands, and (4) Private Forests and Farmland.	DGF					o DOD Conservation & Restoration: 100% fed o DOI Conservation & Restoration: States (90%/fed/10%/non-fed), Tribes (97%/3% non-fed) o NRCS Tech. Assistance Funds: all entities (50.50 fed/non-fed) o USFS Conservation & Technical Assistance (80% fed/20% non-fed)	\$65 M			
Recovering America's Wildlife Act: The Act redirects existing revenues annually through from the development of energy and mineral resources on federal lands and waters to be dedicated to the Wildlife Conservation Restoration Program, an authorized subaccount under the Pittman-Robertson Wildlife Restoration Program, to conserve the full array of fish and wildlife.	Funds are for implementing the State Wildlife Action Plans that identify species of greatest conservation need and priority, habitats, state-led projects and expenditures under the program. States can also use funds on wildlife conservation education; up to 10% of the funds on wildlife-associated recreation; and also for the recovery of federally listed ESA species.	<ul style="list-style-type: none"> Conserve and manage on state and private lands the full array of diverse fish and wildlife species that are identified as state species of greatest conservation need, and their habitats, as determined by each State fish and wildlife agency. Work with private landowners to implement voluntary conservation and management actions without requiring public access. Conduct research, monitoring, restoration, and management actions needed to understand and reverse population declines. Develop, revise, and implement a wildlife conservation strategy of a state, otherwise known as State Wildlife Action Plans and Comprehensive Wildlife Conservation Strategies. Carry-out, revise, or enhance existing wildlife conservation and restoration programs and to develop and implement new programs to manage fish and wildlife species of greatest conservation need. Create and implement wildlife conservation education programs and projects, including public outreach intended to foster natural resource stewardship. Nature centers and educational displays, programs for children and the public, community-based engagement and collaboration, etc. Up to 10% of the funding can be used for outdoor activities associated with wildlife such as: <ul style="list-style-type: none"> hikeation, fishing, and wildlife observation and photography 			Annual	Wildlife CRP (P-R Act)	12 mos	State Fish and Wildlife Management Agencies and any academic institutions and Tribes that may partner with the States on projects.	DGF				States would be responsible for a 25% non-federal match (\$440 million) that would spur voluntary, incentive-based and on-the-ground partnerships to implement the needed proactive conservation work by state fish and wildlife agencies.	\$1.3 B (Funds are apportioned annually to the state fish and wildlife agencies based on a formula of 50% proportion of land area and 50% proportion of population.)	Funds are prohibited from being used for education efforts, projects, or programs that promote or encourage opposition to the regulated taking of fish and wildlife.			
US Fish & Wildlife Service, Tribal Wildlife Grants	Tribal Wildlife Grants are used to provide technical and financial assistance to Tribes for the development and implementation of programs that benefit fish and wildlife resources and their habitat.	Planning for wildlife & habitat conservation, F&W conservation & management actions, F&W related laboratory & field research, natural history studies, habitat mapping, field surveys and population monitoring, habitat preservation, and public education that has project relevance	The funds may be used for salaries, equipment, consultant services, subcontracts, acquisitions (e.g., project materials, goods and services) and travel. Land acquisitions are not allowed.	24-Jun-22	Annual	DOI, USFWS	12 mos	The grant provides a competitive funding opportunity for Federally recognized Tribal governments to develop and implement programs for the benefit of wildlife and their habitat, including species of Native American cultural or traditional importance and species that are not hunted or fished.	Pueblos	?	Pueblo Santa Ana	\$165,526	FY 22	The funding builds the Pueblo's capacity to 1) provide for the benefit and protection of wildlife and 2) educate the community about mountain lions on their land. Lastly, the proposed project will contribute to improving local and regional management plans for mountain lion and ungulates by contributing science-based information on kill rates and prey composition of mountain lions in New Mexico		\$5.9 million awarded in 2022	Limited to Federally recognized Tribes	
US Bureau of Reclamation, WaterSmart Program Funding Opportunities	Water and Energy Efficiency Grants	On-the-ground water management improvement projects, including projects that conserve water and address water supply reliability									FY22 selections were announced on May 16 and June 21, 2022. 35 projects were selected to receive \$42.5 million in federal funding. A Funding Opportunity to allocate FY23 appropriations and Bipartisan Infrastructure Law funding was posted on grants.gov on May 2, 2022. Applications received by July 28, 2022, are currently under review.			Up to \$500,000 for projects to be completed within two years; up to \$2 million for projects to be completed within three years; and up to \$5 million for large projects to be completed within three years. Non-Federal Cost Share: 50% or greater.				
	Small-Scale Water Efficiency Projects	Small water efficiency improvements that have been identified through previous planning efforts.						Category A Applicants: States, Indian tribes, irrigation districts, water districts, or other organizations with water or power delivery authority. Category B Applicants: Nonprofit conservation organizations that are acting in partnership and with the agreement of an entity described above. Applicants must be located in the Western United States or United States Territories specifically: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming (the "17 Western States"), Alaska, Hawaii, American Samoa, Guam, the Northern Mariana Islands, the Virgin Islands, or Puerto Rico.				FY22 Funding Opportunity was posted to grants.gov on February 24, 2022. Applications received by April 28, 2022, are currently under review.			Up to \$100,000 for projects to be completed within two years. Total project costs should generally be less than \$225,000. Non-Federal Cost Share: 50% or greater.			
	Water Marketing Strategy Grants	Planning activities to develop water marketing strategies that establish or expand water markets or water marketing activities between willing participants									The next Funding Opportunity is expected in winter 2022/2023			Up to \$200,000 for projects to be completed within two years; or up to \$400,000 for projects to be completed within three years. Non-Federal Cost Share: 50% or greater.				
	Drought Resiliency Projects	Funding for on-the-ground projects and modeling tools that will increase water reliability and improve water management.									A Funding Opportunity to allocate FY23 appropriations and Bipartisan Infrastructure Law funding was posted to grants.gov on March 24, 2022. Applications received by June 15, 2022 are currently under review.			Up to \$500,000 for projects to be completed within two years; up to \$2 million for projects to be completed within three years; and up to \$5 million for large projects to be completed within three years. Non-Federal Cost Share: 50% or greater.	Reclamation's FY 2022 spend plan for Bipartisan Infrastructure Law funding includes \$160 million for grants through the six funding opportunities described to the left. The FY 2023 Bipartisan Infrastructure Law spend plan includes an additional \$150 million.	Consistent with the Bipartisan Infrastructure Law, 25% of that amount will be designated for Environmental Water Resources Projects that improve natural infrastructure. \$18 million available for cooperative watershed management projects under the Bipartisan Infrastructure Law in FY 2022, and \$20 million available in FY 2023, will also be allocated through the Environmental Water Resources Projects funding opportunity. These funding opportunities will also be used to allocate available FY22 and FY23 appropriations. Each funding opportunity includes further details.		
	Environmental Water Resources Projects	Environmental Water Resources Projects, including water conservation and efficiency projects that result in quantifiable and sustained water savings and benefit ecological values, water management or infrastructure improvements to mitigate drought-related impacts to ecological values, and watershed management or restoration projects benefitting ecological values that have a nexus to water resources or water resources management.						Applicant eligibility is as described above with the addition of Category C Applicants as described below. Category C Applicants: Nonprofit conservation organizations submitting an application for a project to improve the condition of a natural feature without a category A partner must demonstrate that entities described in Category A in the applicable service area have been notified of the project and do not object.				FY22 Funding Opportunity selections were announced July 5, 2022. 27 projects were selected to receive \$36.1 million in federal funding. A Funding Opportunity to allocate FY23 and Bipartisan Infrastructure Law funding is anticipated in late fall 2022.			Up to \$5 million for projects to be completed within two years. Non-Federal Cost Share: 25 - 50%			
	Applied Science Grants	Projects to develop hydrologic information and water management tools and to improve modeling and forecasting capabilities.						States, Indian tribes, irrigation districts, water districts, universities, non-profit research institutions, organizations with water or power delivery authority, or non-profit organizations located in the 17 Western States, Alaska, Hawaii, American Samoa, Guam, the Northern Mariana Islands, the Virgin Islands, or Puerto Rico.				FY22 Funding Opportunity selections were announced August 24, 2022. 8 projects were selected to receive \$1.2 million in federal funding.			Up to \$200,000 per agreement for a project that can be completed within two years. Non-Federal Cost Share: 50% or greater.			
US Bureau of Reclamation, WaterSmart Program Funding Opportunities	Cooperative Watershed Management Program - Phase I	Watershed group development, watershed restoration planning, and watershed management project design.						States, Indian tribes, local and special districts (e.g., irrigation and water districts), local governmental entities, and non-profit organizations that are located in the 17 Western States, Alaska, Hawaii, American Samoa, Guam, the Northern Mariana Islands, the Virgin Islands, or Puerto Rico.				FY22 Funding Opportunity selections were announced September 14, 2022. 21 projects were selected to receive \$3.8 million in federal funding. A schedule for the FY23 Funding Opportunity to allocate FY23 and Bipartisan Infrastructure Law funding is currently under development.			Up to \$200,000 may be awarded to an applicant per year, for a period of up to two years. Non-Federal Cost Share: No non-Federal cost-share required.	The FY22 Funding Opportunity is being used to allocate FY22 appropriations.		
	Title XVI Authorized Projects	Funding for planning, design, and construction of specific congressionally authorized water recycling and reuse projects						Sponsors of water reclamation and reuse projects specifically authorized for funding under Title XVI of P.L. 102-576.				FY22 Funding Opportunities selections were announced August 18, 2022. 26 water reuse projects were selected to receive \$310 million in federal funding. This announcement included congressionally authorized Title XVI project selections.			Federal funding is limited to 25% of the total project cost, up to \$20 million, unless otherwise specified by Congress. Non-Federal Cost Share: 75% or greater.	These FY22 Funding Opportunities were used to allocate FY22 appropriations and a portion of the Bipartisan Infrastructure Law (BIL) funding available for the Title XVI Program, which includes \$550 million over the next five years.		
	VI WIIN Act Water Reclamation and Reuse Projects	Funding for planning, design, and construction of WIIN Act water recycling and reuse projects						Sponsors of water reclamation and reuse projects with completed feasibility studies that have been submitted to Reclamation for review. Entities must be located in the 17 Western States, Hawaii, American Samoa, Guam, the Northern Mariana Islands, or the Virgin Islands.				FY22 Funding Opportunities selections were announced August 18, 2022. 25 water reuse projects were selected to receive \$310 million in federal funding. This announcement included WIIN Act Title XVI project selections.			Federal funding is limited to 25% of the total project cost, up to \$30 million. Non-Federal Cost Share: 75% or greater.			
	Desalination Construction	Funding for planning, design, and construction of WIIN Act brackish groundwater and ocean desalination projects						Sponsors of desalination with completed feasibility studies that have been submitted to Reclamation for review. Entities must be located in the 17 western states, American Samoa, Guam, the Northern Mariana Islands, or the Virgin Islands.				FY22 Funding Opportunity was posted to grants.gov on January 14, 2022. Applications received by March 15, 2022 are currently under review.			Federal funding is limited to 25% of the project cost, up to \$50 million. Non-Federal Cost Share: 75% or greater.	The FY22 Funding Opportunity is being used to allocate FY22 appropriations and \$15 million included for Desalination Projects in the FY22 Bipartisan Infrastructure Law Spend Plan.		
	Drought Contingency Planning	Funding for development, or update, of comprehensive drought plans						States, Indian tribes, irrigation districts, water districts, or other organizations with water or power delivery authority located in the 17 Western States, Hawaii, American Samoa, Guam, the Northern Mariana Islands, or the Virgin Islands.				FY22 selections were announced on August 2, 2022. Six projects were selected to receive \$865,480 in federal funding.			Up to \$200,000. Non-Federal Cost Share: 50% or greater.	The FY22 Funding Opportunity was being used to allocate FY22 appropriations.		
	Drought Emergency Response Actions	Emergency response actions undertaken by Reclamation to minimize losses and damages resulting from drought						States and Indian tribes located in the 17 Western States, Hawaii, American Samoa, Guam, the Northern Mariana Islands, or the Virgin Islands.				Reclamation will accept emergency assistance requests on an on-going basis.			Funding availability is dependent on appropriations. No cost-share is required.			

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

BEMP Proposed Research Project [read-ahead]

Proposed Research Project
For November 1, 2022 Fiscal Planning Committee Discussion

Title: Forecasting riparian community vulnerability to water supply and demand changes and identifying restoration opportunities in the upper and middle Rio Grande basin

Abstract: Rivers are essential to life in southwestern United States, growing food, supplying cities, and sustaining an incredible diversity of wildlife. Due to increasing water demands and decreasing water supplies as human populations grow and the planet warms, this critical resource is reaching a threshold. Decades of diverting water for agricultural and municipal uses have drastically changed the Rio Grande River basin, drying river reaches that were once permanent and dynamic features of the landscape. Climate change will exacerbate this, reducing water availability as the Southwest becomes hotter, drier, and more drought prone. Riparian corridors are both vulnerable to these changes and valuable in the midst of them, providing habitat that is cooler and moister than surrounding areas and buffering against environmental change. As the Rio Grande riparian ecosystem is threatened both by increasing water demand and climate change-driven shortages in water supply, riparian conservation and restoration have become a priority. There is an urgent need to identify where along the river native riparian forests will persist, where opportunities for future restoration might be, and where restoration could be a waste of time and money without changes to the water budget to support conservation decisions that are both effective and efficient under global change. We propose to map future changes to riparian communities along the Rio Grande in New Mexico as water supplies and demands shift, highlighting opportunities for conservation and restoration and identifying riparian loss zones. In doing so, we hope to support proactive, future-focused management of the Rio Grande riparian corridor, helping natural resource managers to identify and prioritize conservation actions that can withstand social and environmental change. In doing so, we aim to facilitate climate adaptive conservation and help practitioners get a bigger bang for their conservation buck.

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

Revised FPC Roster [follow-up]

**Middle Rio Grande Endangered Species Collaborative Program
Fiscal Planning Committee Roster**

Federal Co-Chair

Debra Hill, U.S. Fish & Wildlife Service
Email: debra_hill@fws.gov
Phone: 505-761-4719

Non-Federal Co-Chair

Grace Haggerty, New Mexico Interstate
Stream Commission
Email: grace.haggerty@state.nm.us
Phone: 505-553-2436

Audubon Southwest

Quantina Martine
Email: quantina.martine@audubon.org
Phone: 206-459-1949

**Albuquerque Bernalillo County Water
Utility Authority**

Mark Kelly
Email: mkelly@abcwua.org
Phone: [Office] 505-289-3434
[Cell] 505-382-2914

**Bosque Ecosystem Monitoring
Program**

Kim Eichhorst
Email: kimde@unm.edu
Phone: 505-277-0758

City of Albuquerque

Dustin Chavez-Davis
Email: dchavezdavis@cabq.gov
Phone:

**Middle Rio Grande Conservancy
District**

Anne Marken
Email: anne@mrgcd.us
Phone: 505-247-0234

NM Office of the Attorney General

Bill Grantham
Email: wgrantham@nmag.gov
Phone: 505-717-3520

Pueblo of Sandia

Michael Scialdone
Email: mscialdone@sandiapueblo.nsn.us
Phone: 505-771-5046

University of New Mexico

Thomas Turner
Email: turnert@unm.edu
Phone: 505-277-7541

U.S. Army Corps of Engineers

Ryan Gronewold
Email: ryan.p.gronewold@usace.army.mil
Phone: 505-342-3340

U.S. Bureau of Reclamation

Lynette Giesen
Email: lgiesen@usbr.gov
Phone: 505-453-7018

[Link to full Meeting Materials List](#)

Fiscal Planning Committee Meeting
November 1, 2022

See the following meeting material on the page below:

Updated BEMP Proposal [follow-up, draft]

Project title: Forecasting riparian community vulnerability to water supply and demand changes and identifying restoration opportunities in the upper and middle Rio Grande basin

Principal investigator (PI): Tina Mozelewski* (* = early career)

Email and Phone number of PI: tina@csp-inc.org, 314-791-0634

PI Affiliation: Conservation Science Partners (North Central CASC consortium institution)

Project Administrative Contact: Mary Forsyth, Business Manager, mary@csp-inc.org

CASC(s) to which the SOI is responding and associated Priority Topics: South Central Climate Adaptation Science Center; **Priority 4.1)** Investigate the vulnerability of stream systems in the Rio Grande Basin to climate change and effects on watershed, hydrology, riparian community, and fish and wildlife resources and identify restoration and adaptation strategies to increase resilience. **AND Priority 4.2)** In the Rio Grande Basin, increase our understanding of ecological transformation and threshold dynamics in forests and riparian habitat (including characterizing current and future trends and impacts) and identify viable pathways and best practices to resist, accept and direct these changes.

Names/Affiliations of Co-PIs:

Co-Applicant Name	Affiliation	Email Address	Funded By Project?	Early Career?
Maguire, Andrew*	Conservation Science Partners	andy@csp-inc.org	yes	yes
Lacey, Mae*	Conservation Science Partners	mae@csp-inc.org	yes	yes
Lawler, Joshua	U of Washington	jlawler@uw.edu	in-kind	No
Olden, Julian	U of Washington	olden@uw.edu	in-kind	No

Names/Affiliations of other cooperators and partners:

Name	Affiliation	Email	Brief summary of contribution (e.g., advisory technical, etc.)
Brown, Casey	University of Massachusetts-Amherst	casey@umass.edu	Dr. Brown will provide technical guidance and access to the model and modeled results of a suite of water use and demand scenarios for for the Rio Grande using his hydrologic model, ERG Future
Eichorst, Kim	Bosque Ecosystem Monitoring Program	kimde@unm.edu	Dr. Kim Eichorst has been working in riparian systems on the Rio Grande for more than 25 years and brings an extensive background in riparian restoration and monitoring as well as science communication and stakeholder engagement. Kim will be critical to expanding the reach of our project and for securing participation from a diverse group of

			stakeholders in the development of our model scenarios.
Sesnie, Steven	US Fish and Wildlife Service	Steven_Sesnie@fws.gov	Dr. Steve Sesnie is a spatial ecologist with a breadth of expertise in remote sensing and has led the development of new approaches for vegetation classification using satellite imagery. He will help to co-develop a remote sensing workflow for the identification and classification of riparian vegetation on the Rio Grande.
Bachus, Jen	Bureau of Reclamation		Ms. Bachus has extensive knowledge of the hydrology, ecology, and restoration history of the middle Rio Grande. She will serve in an advisory capacity and facilitate connections between agencies and organizations working on restoration in the Rio Grande and this project team.
Tashjian, Paul	NM Audubon	paul.tashjian@audubon.org	A representative from the New Mexico Audubon society will serve in an advisory capacity on this project, helping to guide the selection of river reaches to model and ensuring that results and data products have direct applications for on the ground conservation and management.

Proposed start date and estimated duration of project period: August 1, 2023; 24 months

Total project funding requested from the CASC: \$255,331.80

Keywords: riparian restoration; water budget; conservation triage

Project Summary: Rivers and their associated riparian areas are keystone ecosystems of the southwestern United States, providing water for people and wildlife along with a vast array of other ecosystem services. Due to increasing water demands from agricultural and municipal uses and declining water supplies as climate change drives hotter, drier, and more drought prone conditions, these systems are in jeopardy. Hydrologic regime changes have resulted in riparian ecosystem declines along the Rio Grande River, prompting cross-agency responses including significant investments in riparian restoration. With accelerating anthropogenic stressors expected to act synergistically, compounding riparian declines, there is a critical need to identify where native riparian tree galleries will persist, opportunities to restore riparian forests, and locations of riparian community loss where, without additional water inputs, restoration is likely to be unsuccessful. Such projections can support on the ground conservation planning and prioritization, enabling place-based investments in climate-adaptive conservation where the system can continue to support riparian forests. To meet this challenge, we propose to study **how changes in water use and climate-driven changes in water**

supply will alter riparian area persistence and composition, modeling riparian corridor responses to differing water budgets along the Rio Grande in New Mexico. Leveraging a cutting-edge model being developed for the Rio Grande basin, we will forecast changes to the hydrologic regime under different water demand/availability scenarios. These scenarios will be co-developed with natural resource managers and decision makers actively engaged in riparian restoration and water management in the Rio Grande basin to maximize relevance and yield actionable science. Using model outputs, we will forecast changes to riparian communities over time, validating our projections with both remotely sensed data and field surveys enabled by partnerships with practitioners throughout the Rio Grande. We will highlight riparian refugia to conserve and connectivity gaps where restoration efforts should be targeted and identify areas of projected riparian loss for each scenario, along with identifying areas of complementarity across scenarios. Results will be shared in a workshop during which stakeholders will decide how they want the data displayed and shared to maximize its usability. We will also record a webinar documenting our modeling process and the results it yielded. The webinar, along with all code and model results will be made publicly available. The goal of this study is both to assess how changing water demand and availability will impact the capacity of the Rio Grande to support riparian bosques and facilitate climate adaptation *and* to serve as a broader framework for riparian conservation prioritization across the desert southwest, informing water policy and conservation planning in a rapidly changing world.

Plain Language Public Summary (max. 300 words): Rivers are essential to life in southwestern United States, growing food, supplying cities, and sustaining an incredible diversity of wildlife. Due to increasing water demands and decreasing water supplies as human populations grow and the planet warms, this critical resource is reaching a threshold. Decades of diverting water for agricultural and municipal uses have drastically changed the Rio Grande River basin, drying river reaches that were once permanent and dynamic features of the landscape. Climate change will exacerbate this, reducing water availability as the Southwest becomes hotter, drier, and more drought prone. Riparian corridors are both vulnerable to these changes and valuable in the midst of them, providing habitat that is cooler and moister than surrounding areas and buffering against environmental change. As the Rio Grande riparian ecosystem is threatened both by increasing water demand and climate change-driven shortages in water supply, riparian conservation and restoration have become a priority. There is an urgent need to identify where along the river native riparian forests will persist, where opportunities for future restoration might be, and where restoration could be a waste of time and money without changes to the water budget to support conservation decisions that are both effective and efficient under global change. We propose to map future changes to riparian communities along the Rio Grande in New Mexico as water supplies and demands shift, highlighting opportunities for conservation and restoration and identifying riparian loss zones. In doing so, we hope to support proactive, future-focused management of the Rio Grande riparian corridor, helping natural resource managers to identify and prioritize conservation actions that can withstand social and environmental change. In doing so, we aim to facilitate climate adaptive conservation and help practitioners get a bigger bang for their conservation buck.

Objectives/Justification: Rivers are the lifeblood of the southwestern United States, growing food, supplying cities, and sustaining an incredible diversity of wildlife. Due to increasing water demands and declining water supplies as human populations grow and the planet warms, this critical resource is reaching a threshold¹. Every year, agricultural and municipal users withdraw more water than many rivers can sustain, turning river reaches that were once permanent and dynamic features of the landscape into highly regulated water delivery systems². Climate change will exacerbate this trend, reducing water availability as the Southwest becomes hotter, drier, and more drought prone³. Riparian corridors are both vulnerable to these changes and valuable in the midst of them. They provide substantial ecological benefits disproportionate to their limited linear acreage, serving as essential habitat for over half of all species in the desert southwest and buffering against disturbance and pollutants^{4,5}. Crucially, riparian ecosystems are also expected to act as key facilitators of climate adaptation, promoting biological resilience to change⁶. Riparian areas provide microclimates that are significantly cooler and more humid than surrounding areas, which will function as microclimatic refugia as the planet warms⁷. They span the climatic gradients that species are likely to follow tracking their climate envelopes creating climate migration corridors, and reduce climate-driven impacts of stream warming^{8,9}.

The riparian ecosystem of the Rio Grande has been significantly impacted by anthropogenic factors including wetland loss, channel stabilization, levee constrictions, upstream and downstream impoundments, loss of hydrograph variability, and drought¹⁰ with climate change projected to intensify these impacts. The resulting riparian decline has been coupled with endangered species listings (e.g., the southwestern willow flycatcher (*Empidonax traillii extimus*) and Rio Grande silvery minnow (*Hybognathus amarus*))¹⁰, prompting a widespread, multi-agency emphasis on riparian conservation and restoration especially in New Mexico. Yet as both riparian declines and water supply and demand shortages persist, there is an immediate need for future-focused conservation planning to protect highly imperiled riparian systems and for the selection of strategies that will be effective and actionable across scenarios of social and global change. To meet this challenge, we will 1) assess how changes in water use, shifting agricultural practices, and dynamic municipal demand will shape the presence, persistence, and species composition of riparian corridors, 2) identify critical riparian areas to protect, 3) highlight opportunities to improve landscape connectivity for climate adaptation, and 4) identify areas where riparian forests are unlikely to persist without additional instream or groundwater flows.

Geographic Scope: This proposal will cover the Rio Grande River riparian corridor from where it enters New Mexico to Elephant Butte Reservoir. We anticipate that our modeling framework will support actionable, climate-adaptive conservation in dryland river systems throughout the SC CASC's footprint and the western U.S.

Background: River systems and their associated riparian areas are keystone ecosystems of the American Southwest¹¹. They serve as vital water sources for municipalities, irrigation, and hydropower; improve water quality and increase groundwater recharge; and provide critical habitat and migration routes for both aquatic and terrestrial species^{12,13}. The river systems of the Southwest also some of the most critically imperiled ecosystems in the world¹⁴, having undergone extensive changes because of alternations to natural flow regimes¹⁵. Dams and diversions have been the catalyst for significant alterations to riparian vegetation as instream

flows were restricted¹⁶. Increasing drought from climate change coupled with water withdrawals for agriculture and municipal use is expected to compound these declines as demands for water rise and the timing and frequency of precipitation shifts^{17,18}.

With ongoing investments in conservation and restoration to stop riparian decline along the Rio Grande in central New Mexico, there is a pressing management need to identify where will remain ecologically viable to sustain existing riparian forest communities or support new restoration plantings, and where investments in conservation may result in wasted time and money without additional water. We will leverage a model under development for the Rio Grande by Dr. Casey Brown at the University of Massachusetts-Amherst that couples a hydrologic model with a systems model to forecast changes to the hydrologic regime from both environmental (e.g., climate change and drought) and anthropogenic (e.g., water diversions for agricultural and municipal uses) drivers. Partnering with Dr. Brown, we will forecast system responses to a suite of stakeholder-driven water supply and demand scenarios and use these forecasts to predict riparian community change over time. We will utilize existing BEMP sites and satellite imagery to establish initial riparian conditions and validate our model hydrologic/vegetation relationship parameters.

Climate-Informed Management/Partner Relevance: In addition to the partners listed, we will leverage the well-established relationships that BEMP has with Rio Grande stakeholders including: Bosque School, Sevilleta Long-Term Ecological Research site, US Army Corps of Engineers, US Fish and Wildlife Service National Wildlife Refuges, Pueblo of Santa Ana, Pueblo of Santo Domingo, Pueblo of Sandia, Middle Rio Grande Conservancy District, Mid Rio Grande Stormwater Quality Team, Greater Rio Grande Watershed Alliance, City of Albuquerque Open Space, Valencia Soil and Water Conservation District, New Mexico State Parks, Rio Grande Phenology Trail, City of Albuquerque Fire Department, Bernalillo County Open Space, and New Mexico Interstate Stream Commission to assemble a group of stakeholders actively engaged in river operations and management and riparian conservation along the upper and middle Rio Grande in New Mexico. This team of stakeholders will engage in co-developing water use/demand scenarios to capture a range of possible futures in the basin, highlighting focal areas of the river where modeling is most needed to inform on the ground conservation and management, and informing how results should be packaged to be most useful for geospatial prioritization of conservation.

This project will address decision-making needs about where the social and ecological values provided by native riparian forests are expected to persist, where resources invested in restoration are more likely to yield a return on investment, and where native riparian trees are unlikely to survive in the future. It addresses SC CASC Priority 4.1) by leveraging an emergent model that characterizes Rio Grande stream system responses to climate change and dynamic human water demand and forecasting effects on riparian communities to ultimately support the identification of restoration and adaptation strategies to increase resilience. AND Priority 4.2) by characterizing where ecological transformation from native riparian forest to other community types is likely to occur, characterizing current and future trends in community composition and identifying place-based options for practitioners seeking to resist, accept or direct these changes. Project-specific findings and our modeling framework can be used to inform conservation triage of other dryland river systems in the southwest.

Collaborations and Engagement for Actionable Science: This project will directly lead to actionable science by providing maps of riparian refugia and connectivity gaps over time across different social-ecological futures, clarifying where riparian areas are most at risk, where they are well-established, and where they are likely to disappear and informing the geospatial prioritization of actionable conservation and restoration efforts in the upper and middle Rio Grande. We are expecting a high level of engagement from key collaborators including the US Fish and Wildlife Service, Bosque Ecosystem Monitoring Program, and University of Massachusetts-Amherst that are essential for successfully modeling Rio Grande responses to climate change and shifting water uses and validating our projections of current and future riparian community composition. We anticipate a moderate level of collaboration from other stakeholders which could include New Mexico Audubon, natural resource managers from Pueblo tribes, the New Mexico Interstate Stream Commission, the US Bureau of Reclamation, and others to co-develop the water supply/demand scenarios most relevant to project partners ensuring that forecasts inform management decisions and basin planning the future during a stakeholder workshop in Albuquerque. While we intend to model riparian corridor dynamics along the Rio Grande from Elephant Butte to northern New Mexico, we will also rely on stakeholders to guide prioritization of sections of the river most useful for on the ground management planning if time constraints require us to focus our modeling efforts to a smaller geographic scope. Results will be shared with stakeholders at a second workshop in Albuquerque where stakeholders will dictate the most useful ways to have results packaged. We will also hold a recorded webinar to communicate the results to a wider audience.

Procedures/Methods: Our proposed work has two primary components: 1) modeling riparian corridor responses to changing water budgets and 2) identifying riparian refugia to conserve and prioritizing connectivity gaps to target restoration. We will also identify areas of complementarity across scenarios to highlight riparian habitat strongholds and areas of riparian forest loss. We will partner with Dr. Casey Brown at the University of Massachusetts-Amherst, who is developing URG Futures, a hydro-ecologic-economic digital (computer) model of the Rio Grande River basin that simulates hydrologic, infrastructure, agriculture and municipal processes and calculates the report card performance metrics. URG Futures simulates the major indicators across the Rio Grande - beginning in the headwaters in Colorado, south to Fort Quitman in Texas. To do this, URG Futures contains digital representations of the natural hydrology in the headwater basins, infrastructure operations (including the policies that determine such operations), and agricultural and municipal water use that divert and return water at key reaches along the river. URG Futures brings together the state-of-the-art understanding, data, and mathematical modeling techniques from different stakeholders within the basin (including the Middle Rio Grande Conservancy District, the US Bureau of Reclamation, the US Army Corps of Engineers, the US Geological Survey, the Office of the State Engineer, as well as other academic institutions). Through a stakeholder workshop, we will identify a suite of water supply and demand scenarios that encompass both different climate futures and feasible shifts in water use across agricultural and municipal sectors. We will then partner with Dr. Brown and his graduate students to run the model using these scenarios, yielding monthly estimates of streamflow and ground water availability.

Using established riparian vegetation-hydrology relationships¹⁹⁻²¹, we will develop relationships between hydrologic variables and riparian vegetation in the Rio Grande to forecast spatially explicit, hydrologically compatible areas where riparian vegetation could grow along the Rio Grande in New Mexico. Combining these feasible riparian zones with a map of stream channel geomorphological characteristics from the USGS's National Hydrography Dataset Plus High Resolution²² and land use change projections from the EPA's Integrated Climate and Land Use Scenarios²³, we will build a predictive model to forecast riparian vegetation presence, persistence, and forest associations at 5-year time steps to 2080. Current riparian community composition will be determined using remote sensing and normalized difference vegetation indices (NDVI).

Not all vegetation that occurs along riparian corridors is equally beneficial. We will distinguish between conditions that contribute to favorable cottonwood/willow habitat and those that contribute to non-native salt cedar using winter flood frequency, spring streamflow rates, and depth to ground water as higher flood frequency and flow rates have been shown to favor cottonwood/willow. We will validate our hydrology-vegetation relationships, projections of existing riparian areas, and the differentiation between cottonwood/willow and salt cedar using NDVI, field visits conducted by Dr. Sesnie (USFWS), and BEMP field site data that has been collected across 33 sites for the past 26 years.

To identify riparian areas that will serve as microclimatic refugia, we will identify cottonwood/willow stands that persist for at least 60% of consecutive riparian vegetation projection time steps. We will assess connectivity using Circuitscape software, a current flow model based on circuit theory, to plot potential movement routes and identify connectivity gaps along riparian areas adjacent to the Rio Grande. To assess climate-migration facilitation, we will plot connectivity at 5-year time steps for each scenario, resulting in spatiotemporally dynamic forecasts of potential connectivity as water supplies and demands change.

Knowledge/Technology Transfer Products for Actionable Science: Collaborators and partners will be essential to this project to ensure that the science produced is useful and useable, ensuring that results inform management decisions and basin planning the future. We will hold two stakeholder workshops guided by translational ecology principles (Enquist et al. 2017) to 1) work with natural resource managers and decision makers on the Rio Grande to establish the current state of restoration efforts in the Rio Grande Basin, map out future planned restoration efforts, and co-develop a suite of water use and demand scenarios that characterize the most decision-relevant water budget futures for the Rio Grande from northern New Mexico down to Elephant Butte and 2) present projections of riparian change over time, highlighting areas of native riparian forest persistence where conservation should be prioritized, opportunities for restoration to fill in connectivity gaps, and areas where restoration is unlikely to be successful without additional water. In our second workshop, we will also work with stakeholders to identify the best way to package map products to maximize their use in conservation decision making on the Rio Grande, supporting actionable science. Additionally, we will hold a recorded webinar to communicate our results to a wider audience of stakeholders. Our hope is that this workshop facilitates broader discussion of the implications of increasing water demands and climate change-driven shifts in water supply on riparian communities in the desert southwest and provides a means for this framework to be broadly adopted across other dryland river

systems, furthering actionable, proactive riparian conservation efforts. We will work with our project partners and stakeholders to ensure that this webinar is stored in a place that is freely accessible to anyone who wants to use it as a resource which could include on the BEMP website, on CSP’s website, on YouTube, or on another platform. This project will further BEMP’s mission to combine long-term ecological research with citizen/community science and education outreach by involving K-12 students, their teachers, and undergraduate and graduate students at the University of New Mexico in monitoring key indicators of structural and functional change in the Rio Grande riparian forest. Finally, this project will support the mentorship and career development of three early career researchers.

Expected Results and Science Products: This project will result in the development of a cutting edge, multi-model approach to anticipate riparian change over time and support more effective conservation triage of the Rio Grande riparian corridor. Forecasts of future riparian community change will serve as the basis for identifying riparian refugia and prioritizing gaps in riparian corridors where protection, conservation, and restoration efforts may be warranted. Forecasts will also provide crucial information on locations where, without additional streamflow or groundwater inputs, conservation investments in riparian restoration may be wasted. We will develop maps of riparian refugia, connectivity gaps, and native riparian tree loss zones for each water supply/demand scenario along with a map showing complementarity across scenarios. These maps will provide a decision support tool to clarify where riparian areas are most at risk and to inform the geospatial prioritization of actionable conservation and restoration efforts in the Rio Grande basin in New Mexico. Additionally, we will explore, with our collaborators, the possibility of translating these maps into an easily accessible, interactive online tool if it is useful. We will also investigate the feasibility of using our modeling framework to project what areas of native riparian tree loss might become in the future. These outputs can support Resist-Accept-Direct management decisions, helping collaborators to make informed, purposeful choices about how to respond to the trajectory of riparian community change and supporting resource managers in collaborating at larger scales across jurisdictions. Our model framework, parameterizations, and code will be made freely available via GitHub so that other practitioners can utilize a similar decision support approach, broadening the reach of our research. Additionally, this project will result in at least two peer-reviewed publications.

Facilities/Equipment/Study Area(s): For the computationally intensive components of this project, processing satellite imagery to characterize current riparian community composition and running connectivity models, we will utilize the high-speed cloud computing resources available to CSP through Google’s cloud computing platform. Field study sites are already established and regularly surveyed by our project collaborators at BEMP.

Work and Reporting Schedule: PI Mozelewski will be responsible for reporting, data management, and product delivery.

Objectives	Activities	2023		2024				2025	
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Classify existing riparian communities	Develop remote sensing indices	X	X						

	Scale up to Rio Grande in New Mexico	X	X						
	Validate with site visits		X	X					
Hydrologic modeling	Co-develop water use/demand scenarios (workshop)		X	X					
	Hydrologic modeling			X	X	X			
Forecast future riparian	Develop hydrology-vegetation relationships				X	X			
	Project future riparian conditions				X	X	X		
	Validate with BEMP data				X	X	X		
Identify connectivity gaps	Connectivity modeling							X	X
	Stakeholder workshop								X
Present findings	Webinar recording								X
	Manuscript prep					X	X	X	X

Qualifications of Project Personnel: Dr. Tina Mozelewski (CSP) has extensive experience working as a conservation practitioner on the riparian restoration of dryland river systems in the southwestern U.S. and in working with CASC stakeholders to produce actionable science as a postdoc with the NE CASC. She also brings a background in predictive modeling of landscape responses to global change (Mozelewski and Scheller 2021) and modeling dynamic connectivity under environmental change (e.g., Mozelewski et al. 2022). Tina is an early career researcher (PhD 2021) and this project will provide training in interdisciplinary project management and translational ecology. Dr. Andy Maguire (CSP) is a data scientist and ecologist with expertise in remote sensing, cloud computing, and spatial data processing. Andy’s research focuses on evaluating plant-environment interactions through spectral remote sensing (e.g., Maguire et al. 2021). He is an early career researcher (PhD 2020) who will receive training in cross-sectional stakeholder engagement through this project. Mae Lacey (CSP) brings expertise in combining big data analytics with science communication to make data products more accessible and useful for stakeholders. Mae is an early career researcher (MS 2022) and will receive training in project management and proposal development through this project. Drs. Josh Lawler and Julian Olden (UW) will serve as mentors to the lead PI (Dr. Mozelewski), providing support and guidance in transdisciplinary, multi-agency project management. Josh also brings years of experience in cutting edge connectivity modeling across systems and scales (see CV). Julian has extensive research experience studying dryland river system responses to environmental change and evaluating river system dynamics in response to multiple threats (see CV).

Legal and Policy-Sensitive Aspects: It will not be necessary to obtain any state or federal permits for this project. Arrangements have been made for access to field sites through the Bosque Ecosystem Monitoring Program.

Animal Use or Human Subjects: This work will not require any animal or human subjects.

Citations

- 1) Perry, L.G. *et al.* Vulnerability of riparian ecosystems to elevated CO₂ and climate change in arid and semiarid western North America. *Global Change Biology* **18**, 821-842 (2012).
- 2) Jones, K. B. *et al.* Riparian habitat changes across the continental United States (1972–2003) and potential implications for sustaining ecosystem services. *Landscape Ecology* **25**, 1261-1275 (2010).
- 3) Naiman, R. *et al.* The role of riparian corridors in maintaining regional biodiversity. *Ecological Applications* **3**, 209–212 (1993).
- 4) Sweeney, B. W. *et al.* Riparian deforestation, stream narrowing, and loss of stream ecosystem services. *PNAS* **101**, 14132–14137 (2004).
- 5) Brown, D. E. *et al.* Southwestern riparian communities: their biotic importance and management in Arizona. In *Importance, preservation and management of the riparian habitat: a symposium*, eds. R. R. Johnson & D. A. Jones. Rocky Mountain Forest and Range Experimental Station, Fort Collins, Colorado (1977).
- 6) Krosby, M. *et al.* Identifying riparian climate corridors to inform climate adaptation planning. *PLOS ONE* **13**, e0205156 (2018).
- 7) Keppel, G. *et al.* Refugia: identifying and understanding safe havens for biodiversity under climate change. *Global Ecology and Biogeography* **21**, 393-404 (2012).
- 8) Fremier, A. *et al.* A riparian conservation network for ecological resilience. *Biological Conservation* **191**, 29-37 (2015).
- 9) Lawrence, D. J. *et al.* The interactive effects of climate change, riparian management, and a non-native predator on stream-rearing salmon. *Ecological Applications* **24**, 895-912 (2014).
- 10) Weber, M.A. and Stewart, S. Public values for river restoration options on the Middle Rio Grande. *Restoration Ecology* **17**, 762-771.
- 11) Stromberg, J. C. *et al.* Effects of stream flow patterns on riparian vegetation of a semiarid river: Implications for a changing climate. *River Research and Applications* **26**, 712-729 (2010).
- 12) Stromberg, J.C. *et al.* Importance of low-flow and high-flow characteristics to restoration of riparian vegetation along rivers in arid south-western United States. *Freshwater Biology* **52**, 651-679 (2007).
- 13) Elmore, W. & Beschta, R. L. Riparian areas: Perceptions in management. *Rangelands* **9**, 260-265 (1987).
- 14) Poff, B. *et al.* Threats to Riparian Ecosystems in western North America: An analysis of existing literature. *J. of the American Water Resources Association* **47**, 1241-1254 (2011).
- 15) Sabo, J. L. *et al.* Reclaiming freshwater sustainability in the Cadillac Desert. *PNAS* **107**, 21263-21269 (2010).
- 16) Shafroth, P. B. *et al.* Riparian vegetation response to altered disturbance and stress regimes. *Ecological Applications* **12**, 107–123 (2002).
- 17) Perry, L.G. *et al.* Vulnerability of riparian ecosystems to elevated CO₂ and climate change in arid and semiarid western North America. *Global Change Biology* **18**, 821-842 (2012).
- 18) Jones, K. B. *et al.* Riparian habitat changes across the continental United States (1972–2003) and potential implications for sustaining ecosystem services. *Landscape Ecology* **25**, 1261-1275 (2010).

- 19) Hamada, Y. *et al.* Detecting Tamarisk species (*Tamarix* spp.) in riparian habitats of Southern California using high spatial resolution hyperspectral imagery. *Remote Sensing of Environment* **109**, 237-248 (2007).
- 20) Lytle, D. A. *et al.* Linking river flow regimes to riparian plant guilds: a community-wide modeling approach. *Ecological Applications* **27**, 1338-1350 (2017).
- 21) Nagler, P. L. Leaf area index and normalized difference vegetation index as predictors of canopy characteristics and light interception by riparian species on the Lower Colorado River. *Agricultural and Forest Meteorology* **125**, 1-17 (2004).
- 22) US Geological Survey. National Hydrography Dataset Plus High Resolution.
<https://www.usgs.gov/core-science-systems/ngp/national-hydrography/nhdplus-high-resolution>
- 23) US Environmental Protection Agency. Integrated Climate and Land Use Scenarios.
https://iclus.epa.gov/#v=map&b=gray-vector&l=4!8!9!6&x=-100.27!-77.03!-75.55!-122.4&y=39.87!38.7!40.43!37.78&m=1&s=ssp2!ssp2!ssp2!ssp2&d=land_use!land_use!land_use!land_use&o=giss_e2_r!giss_e2_r!giss_e2_r!giss_e2_r&a=0&z=2