



REQUEST FOR PROPOSALS (RFP)

Advancing Nature-Based Solutions by Assessing Long-Term Performance of Natural and Engineered Media (5257)

Date Posted

Monday, September 11, 2023

Due Date

Proposals must be received by 3:00 pm Mountain Time on Tuesday, November 14, 2023.

WRF Project Contact

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Project Sponsors

This project is funded by The Water Research Foundation (WRF) as part of WRF's Research Priority Program.

Project Objectives

This project will help utilities better understand the optimum media or engineered media combinations needed to remove particular constituents of concern (CECs) (e.g., per- and polyfluoroalkyl substances (PFAS), pharmaceuticals, etc.), as well as more common water quality measures such as nutrients and metals, using nature-based solutions (NbS) across different water matrices. Results from this work can be used to inform the operation and maintenance of nature-based solutions and explore the possibility of upscaling their performance to a larger scale (e.g., sub-watershed level, sewershed). Project objectives include the following:

- Perform a state-of-the-practice review of types of natural and engineered media most frequently used in nature-based retention, detention, and infiltration practices across different water matrices. One of the pollutants of focus in this study will be PFAS.
- Perform lab-scale and pilot-scale tests while considering future full-scale tests on most common media using different water matrices and quantify performance over time.
- Evaluate potential need for media extraction and disposal as well as risks and costs associated with media extraction and disposal after media has reached useful life.
- Holistically compare tradeoffs of different media types across different water matrices.

Budget

Applicants may request up to \$275,000 in WRF funds for this project.

Background and Project Rationale

Nature-based solutions are sustainable and cost-effective approaches that utilize natural processes to address various environmental challenges. The International Union for Conservation of Nature (IUCN) defines NbS as "actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits" (IUCN 2020).

Soil and other media, including engineered media, provide water quality treatment in nature-based solutions. Some examples of NbS include reforestation to mitigate climate change, restoring wetlands to improve water quality and flood control, creating green infrastructure in cities to enhance urban resilience, and practicing sustainable agriculture that mimics natural ecosystems. More specific to water quality are the following nature-based solutions:

- Constructed wetlands to treat wastewater and stormwater through biological and physical processes
- Native vegetation planted along water bodies to create buffer zones that act as natural filters to trap sediment, absorb nutrients, and filter pollutants before they reach the water
- Soil conservation practices—such as contour plowing, cover cropping, and agroforestry—to minimize soil erosion and to prevent sediment and nutrients from entering water bodies
- Floating wetlands—artificial platforms covered in vegetation that float on the water's surface—to help remove excess nutrients and pollutants from the water while providing habitat for aquatic organisms
- Buffer strips of vegetation along the edges of agricultural fields to prevent nutrient and pesticide runoff into water bodies

However, knowledge gaps remain in this area, particularly regarding the fate and effects of CECs (such as PFAS) in both natural and engineered media. The existing body of literature is dominated by studies completed over a limited timeframe, so there are uncertainties surrounding the long-term performance of systems using natural and engineered media.

Research is needed to better understand the following elements of NbS for treatment of PFAS as well as more common quality concerns such as nutrients and metals. The following information gaps have been identified on this topic:

- 1) Removal capacities and mechanisms of different media
- 2) Capacity changes over time and under
 - a. Different hydrological conditions (e.g., variable flow from stormwater vs. continuous flow from wastewater, contaminant type and concentration, and water matrices)
 - b. Different media characteristics (e.g., porosity, availability of biodegradable carbon, supply of iron as a terminal electron acceptor, etc.)
- 3) Risk associated with contaminant remobilization
- 4) Design factor considerations to achieve multiple long-term benefits from NbS projects
- 5) Metrics for evaluating long-term performance for PFAS and other CECs

Research Approach

This RFP is intentionally flexible in the research approach to encourage creativity and originality from proposers. However, proposals should include a combination of physical/chemical approaches and phytoremediation for enhanced removal of emerging contaminants such as PFAS. Proposers should describe how they will conduct the research to meet the objectives listed above. The following approach is intended as a starting point.

- Conduct a state-of-the-practice review, including the WRF-sponsored Stormwater Best Management Practice (BMP) Database
- Develop a comprehensive plan and perform lab-scale and pilot-scale tests on selected natural and/or engineered media
- Connect with utilities to provide feedback (e.g., review experimental plan)
- Summarize the results in a user-friendly final document that includes identified research needs and a recommended plan for full-scale tests in the future
- Conduct a webcast and submit a peer-reviewed open-access journal paper

Expected Deliverables

The list below includes types of recommended deliverables, but creative options for an improved user experience are encouraged to better convey the objectives, outcomes, and practical application of the project results:

- Literature review synthesis document (e.g., focusing on PFAS)
- Compendium document summarizing
 - Effectiveness of different media for removal of specific CECs—including PFAS—under various water quality and site conditions
 - Recommended strategies for full-scale testing
 - Disposal options and concerns for spent media
- Research report (must use WRF's Research Report Template, which can be found at <https://www.waterrf.org/project-report-guidelines#research-report-template>).
- Guidance manual
- Webcast, conference presentation, etc.
- Peer-reviewed journal article
- Web tool (must follow the criteria outlined for web tools presented in the *Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables* at <https://www.waterrf.org/project-report-guidelines#webtool-criteria>)

Communication Plan

Please review WRF's *Project Deliverable Guidelines* for information on preparing a communication plan. The guidelines are available at <https://www.waterrf.org/project-report-guidelines#project-deliverable-guidelines>. Conference presentations, webcasts, peer-reviewed publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 24 months from the contract start date.

References and Resources

The following list includes examples of research reports, tools, and other resources that may be helpful to proposers. It is not intended to be comprehensive, nor is it a required list for consideration.

- Cassin, J. 2021. Chapter 9 - Nature-based solutions for source water protection in North America. Edited by J. Cassin, J. H. Matthews, E. L. Gunn. *Nature-based Solutions and Water Security*: 179-214. Elsevier.
- Federal Emergency Management Agency. 2021. *Building Community Resilience with Nature-Based Solutions: A Guide for Local Officials*. US Department of Homeland Security. https://www.fema.gov/sites/default/files/documents/fema_riskmap-nature-based-solutions-guide_2021.pdf
- White House Council on Environmental Quality, White House Office of Science and Technology Policy, White House Domestic Climate Policy Office. 2022. *Opportunities to Accelerate Nature-based Solutions: A Roadmap for Climate Progress, Thriving Nature, Equity, & Prosperity*. Washington, D.C.: Report to the National Climate Task Force. <https://www.whitehouse.gov/wp-content/uploads/2022/11/Nature-Based-Solutions-Roadmap.pdf>
- Hale, S. E., L. von der Tann, A. J. Rebelo, K. J. Esler, A. P.M. de Lima, A. F. Rodrigues, A. E. Latawiec, N. A. Ramírez-Agudelo, E. R. Bosch, L. Suleiman, N. Singh, and A. M. P. Oen. 2023. Evaluating Nature-Based Solutions for Water Management in Peri-Urban Areas. *Water*, 15 (5): 893. <https://doi.org/10.3390/w15050893>
- International Union for Conservation of Nature and Natural Resources (IUCN). 2020. IUCN Global Standard for NbS. IUCN.

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the Problem and Responsiveness to RFP (maximum 20 points)
- Technical and Scientific Merit (maximum 30 points)
- Qualifications, Capabilities, and Management (maximum 15 points)
- Communication Plan, Deliverables, and Applicability (maximum 20 points)
- Budget and Schedule (maximum 15 points)

PROPOSAL PREPARATION INSTRUCTIONS

Proposals submitted in response to this RFP must be prepared in accordance with WRF's *Guidelines for Research Priority Program Proposals*. The current version of these guidelines and the *Instructions for Budget Preparation* are available at <https://www.waterrf.org/proposal-guidelines>. The guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the *Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables* at <https://www.waterrf.org/project-report-guidelines#webtool-criteria>.

Eligibility to Submit Proposals

Proposals will be accepted from both U.S.-based and non-U.S.-based entities, including educational institutions, research organizations, governmental agencies, and consultants or other for-profit entities.

WRF's Board of Directors has established a Timeliness Policy that addresses researcher adherence to the project schedule. The policy can be reviewed at <https://www.waterrf.org/policies>. Researchers who are late on any ongoing WRF-sponsored studies without approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards

WRF's research program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. These standards are referenced in WRF's *Guidelines for Research Priority Program Proposals*, and include specific guidelines outlining the requirements for indirect cost negotiation agreements, financial statements, and the Statement of Direct Labor, Fringe Benefits, and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits, and General Overhead. Well in advance of preparing the proposal, your research and financial staff should review the detailed instructions included in WRF's *Guidelines for Research Priority Program Proposals* and consult the *Instructions for Budget Preparation*, both available at <https://www.waterrf.org/proposal-guidelines>.

Budget and Funding Information

The maximum funding available from WRF for this project is \$275,000. The applicant must contribute additional resources equivalent to at least 33% of the project award. For example, if an applicant requests \$100,000 from WRF, an additional \$33,000 or more must be contributed

by the applicant. Acceptable forms of applicant contribution include cost share, applicant in-kind, or third-party in-kind that comply with 2 CFR Part 200.306 cost sharing or matching. The applicant may elect to contribute more than 33% to the project, but the maximum WRF funding available remains fixed at \$275,000. Proposals that do not meet the minimum 33% of the project award will not be accepted. Consult the *Instructions for Budget Preparation* available at <https://www.waterrf.org/proposal-guidelines#RPP-instr-budget-prep> for more information and definitions of terms.

Period of Performance

It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its sub-recipients have a contractual obligation to adhere to the agreed-upon schedule. Under WRF's No-Cost Extension Policy, a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted. The policy can be reviewed at <https://www.waterrf.org/policies>.

Utility and Organization Participation

WRF encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 3:00 pm Mountain Time on Tuesday, November 14, 2023.

The online proposal system allows submission of your documents until the date and time stated in this RFP. To avoid the risk of the system closing before you press the submit button, do not wait until the last minute to complete your submission. Submit your proposal at <https://forms.waterrf.org/cbruck/rfp-5257>.

Questions to clarify the intent of this RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Ms. Mary Messec Smith at 303.347.6134 or msmith@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at 303.347.6118 or cbruck@waterrf.org.

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The following utilities have indicated interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization submits a volunteer form, and this RFP will be re-posted with the new information. **(Depending on your settings, you may need to click refresh on your browser to load the latest file.)**

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