







# Pooled Monitoring Initiative's Restoration Research Award Program

## FY 27 Request for Proposals

Chesapeake Bay Trust

Maryland Department of Natural Resources

Anne Arundel County Maryland

Montgomery County Maryland

Maryland Department of Transportation State Highway Administration

United States Environmental Protection Agency

Chesapeake Bay Program
A Watershed Partnership

DPW Baltimore City Department of Public Works

Harford County Maryland

Prince George's County Maryland

Charles County Watershed Protection & Restoration

Frederick County, Maryland 1748

Maryland Department of the Environment

# Pooled Monitoring Initiative's Restoration Research Award Program

## At A Glance

**Program Summary:**

The Restoration Research Award Program funds research to answer key restoration questions focused on the effectiveness of watershed restoration practices.

**Information Sessions:**

December 11, 2026, 12 to 1 pm (EST)

January 8, 2027, 12 to 1 pm (EST)

**Deadline:**

**January 28, 2027, 4 pm (EST)**

**Submit Your Application:**

Follow the instructions online at www.cbtrust.org/grants/pooled-monitoring-initiatives-restoration-research-award-program/

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## Program Goals

Efforts to restore the Chesapeake Bay and its tributaries call for a significant increase in the number of watershed restoration projects intended to improve both water quality and habitat. The practitioner, regulatory, management, policy, and scientific communities are united in their desire to support the best, most cost-effective practices at the best sites. However, differences of opinion sometimes exist, and questions about the performance and function of some of these practices persist.

The Pooled Monitoring Initiative pools resources to support scientists who answer key restoration questions posed by the regulatory and practitioner communities through this Restoration Research Request for Proposals (RFP). The research teams then provide the answers back to those who asked the questions for direct application. The goal of the Restoration Research award program is to answer these key restoration questions that serve as a barrier to watershed restoration project implementation. Funding partners hope that answering these questions will ultimately lead to increased confidence in restoration project outcomes, clarification of the optimal site conditions in which to apply particular restoration techniques, how to bolster implementation using social science, information useful to regulatory agencies in project permitting, and information that will guide monitoring programs.

The ability to pool funding allows for rigorous research to address these complex, important questions require robust experimental design carried out by qualified research teams. The RFP research questions are the result of the top key restoration questions identified for a particular year. The previous RFP questions may be removed while research is ongoing to inform future research direction. See past research supported including their progress and final products at: https://cbtrust.org/grants/pooled-monitoring-initiatives-restoration-research-award-program-additional-information/.

This program is funded by the Chesapeake Bay Trust (the Trust), the Maryland Department of Natural Resources, the Environmental Protection Agency's Chesapeake Bay Program Office, Anne Arundel County, Baltimore City, Charles County, Frederick County, Harford County, Montgomery County, Prince George's County, and the Maryland Department of Transportation State Highway Administration. Additional funding partners are welcome, including Maryland Municipal Separate Storm Sewer System (MS4) permittees that opt in to the MS4 permit's Pooled Monitoring Program, federal organizations, states, municipalities, private sources, and others.

### Information Sessions

Two information sessions where the program will be described and questions from potential applicants will be answered will be held:

- December 11, 2026, from 12 pm to 1 pm (EST)
    - Register to attend at the following link: https://us02web.zoom.us/meeting/register/G3u-oxZ_Txa9Wv1XMtEeTw
- January 8, 2027, from 12 pm to 1 pm (EST)
    - Register to attend at the following link: https://us02web.zoom.us/meeting/register/2uHRkke8SNacujZ02OoieA

The registration links will take you to a page to register for the Zoom meeting. After you register, you will be sent a confirmation email containing information to join the meeting (meeting link, meeting ID, passcode). Any updates to these Information Sessions will be posted on this program's website.

## Eligible Applicants

Both not-for-profit entities (academic institutions, non-profit organizations) and for-profit entities are permitted to apply. The strongest proposals will show committed partnerships with various types of organizations. Organizations need not be based in Maryland, but the work must be relevant to Maryland's restoration, regulatory, and/or practitioner communities since many funders are based in this state.

## Eligible Project Types

Members of the regulatory and restoration communities have worked together to identify several key restoration questions that are challenging watershed restoration work in the Chesapeake (see "Key Restoration Questions" section). Investigators may request funds to undertake the following activities pertaining to any of these questions:

a) Conduct a literature review/synthesis, if the case can be made that enough is already known about a question ($50,000 maximum request);
b) Answer a component of the question with a research project in which specific hypotheses are tested. Research projects may include:
    i. experimental or descriptive work in the field;
    ii. experimental work in the laboratory;
    iii. modeling studies; and/or
    iv. use of existing data, if deemed appropriately suited (properly collected with appropriate metadata); or
c) Develop a regulatory or practitioner tool related to one or more of the questions that advances the pace or efficacy of the field in question, if the case can be made the tool is needed and you have ample information to support tool development.

## Funding Availability and Timeline

Funding partners have allocated an estimated $1,988,000 for this research program. Of the available funding at least $688,750 is designated to support Question 1: BMP Effectiveness Monitoring; $328,922 to support Question 2: Watershed Restoration Assessment / Question 3: Biological Community Restoration; and $83,287 to support Question 5a: Bacteria and Chloride as priority research areas funded by Maryland MS4 permittee funders. In addition, approximately $300,000 in anticipated funding will support the social science research Questions 6 and 7, provided by US EPA CBPO.

Project timeframe and funding requests are not set, and the research project funding request and timeline should correspond with the project goals.

## Ineligible Budget Items

<u>The following cannot be funded:</u>

- Endowments, deficit financing, building programs, or venture capital
- Food and beverages

- Mitigation activities
- Political lobbying
- Reimbursement for a project that has been completed or materials that have been purchased

## Key Restoration Questions

The following research questions are organized into three themes:

A. BMP Effectiveness Monitoring and Watershed Restoration Assessment
B. Effectiveness of restoration practices at the project scale
C. Social science questions to improve BMP adoption and sustained environmental outcomes
D. Quantifying net ecological benefits and trade-offs of restoration projects

### A. BMP Effectiveness Monitoring and Watershed Restoration Assessment

Questions 1 and 2 in this RFP are similar to the questions posed in the monitoring section of the Maryland MS4 permit. These two questions are extremely important in our understanding of whether stormwater best management practices (BMPs), including stream restoration practices, are effective and are working at the watershed scale.

1. BMP Effectiveness Monitoring: What is the effectiveness of stormwater best management practices (BMPs) designed and implemented consistent with the criteria in the Maryland Stormwater Management Design Manual or MDE's Accounting Guidance?

    a) How effective is the BMP (type) or suite of BMPs for reducing total suspended solids (TSS), total phosphorus (TP), or total nitrogen (TN)?
    b) Are BMPs designed to meet the channel protection volume standards actually effective in protecting outfalls and streams?
    c) Do BMP design variants such as soil media or vegetative cover (planting options) impact the pollution removal efficiencies? Are there other design variations or factors (e.g., size) that impact BMP performance?
    d) What is the effectiveness of new innovative stormwater BMPs (including nonstructural or natural filters) in reducing pollution and how does the performance compare with BMPs in the Maryland Stormwater Management Design Manual or MDE's Accounting Guidance? We are open to new, emerging innovative BMPs and State required data to move BMPs from the innovative side to the BMPs allowed for restoration.
    e) How do maintenance efforts impact the effectiveness of stormwater BMPs?

    This year, "How do we measure tree planting project success?" was removed from the trade-off question because this topic can be researched through Question 1 (Q1).

2. Watershed Restoration Assessment: What cumulative effects do restoration activities have on water quality, biology, and habitat conditions within a small (first order streams), headwater watershed?

    a) Can a signal from the restoration activities be measured relative to a control site (before vs after restoration activities)?
    b) What is the relationship between the density of stormwater upland BMPs and measured impacts (qualitative and quantitative) at the outfall? Is there a minimum density that must be achieved before the impact can be measured?
    c) Does a BMP type or suite of BMPs (e.g., Environmental Site Design (ESD) practices, stormwater wetlands, and other BMPs in the Accounting Guidance) influence that relationship?

d) How does the location of BMPs in the watershed and/or the proportion/distribution of impervious, pervious, and/or forested areas in the watershed impact the restoration outcomes?
e) Given the variability in watersheds over time, how can we use historic water quality conditions to determine the potential cumulative effects of restoration activities over long time scales (5, 10, or more years)?

We recognize these questions may require a long-term project and reviewers will consider proposals that establish the foundation for longer and/or a multi-phase study. The MS4s and Pooled Monitoring collaborators have data sets available (e.g., 10+ years of MS4 monitoring) for your project and study sites to consider.

**B. Effectiveness of restoration practices at the project scale**

3. Biological Community Restoration (Physical and Chemical): Recent research has shown that in many situations, especially in watersheds with relatively high impervious cover, stream restoration may result in improved physical habitats but not restored biological communities. These biological responses may include not only macroinvertebrates and fishes within the stream, but also flora and fauna in the adjacent riparian zones. The systems where restoration is installed may experience leaky sewer pipes, toxic contaminants in soils, extreme weather events, and water main breaks among other impacts that may impede the ability to isolate biological response to restoration practices. Also, the tools we use to assess responses such as the Benthic Index of Biotic Integrity (BIBI) are broad with perhaps metrics in the tools indicating functional changes.

   The reasons for a lack of restored biological communities after restoration are not yet clear, but three potential drivers are high flows (impact benthic drift behaviors, suspended sediment tolerance, available carbon, and appropriate structural habitat), the lack of source populations, and physiochemical habitat barriers (e.g., conductivity, temperature, and pollutants of emerging concern).

   Our two main questions are:
   a) We seek a research team to test the influence of physical and chemical features on stream biota in stream restoration projects to help identify how specific restoration techniques may be more effective at obtaining ecological uplift.

   b) We are also interested in comprehensive existing and novel metrics (e.g., community composition, species diversity, functional niches, and individual IBI components) that quantify change for both improvement and reduction of ecological benefits at the project scale, including projects that result in transition toward stage 0 condition or wetland-stream complexes where increased connectivity between the stream channel and adjacent habitats may alter ecological benefits in a manner that are not captured by conventional stream assessment metrics.

   Note that funders await findings from three ongoing eDNA studies to inform next year's research questions for this monitoring method.

4. Changing environmental condition impacts to restoration practice: Climate models predict that the frequency and intensity of rainfall events will increase, the growing season will lengthen, droughts will intensify, and other environmental processes will shift – all of which can influence the effectiveness of restoration practices. As a result, there is a need to evaluate the collection and conveyance system, determine flood attenuation benefits, and examine the role of larger vegetation in stormwater management. The three questions of interest are:

a) How does the collection and conveyance system design influence BMP performance during high intensity storm events?
b) How do erosion and sediment transport, both overland and in-stream, vary under different storm scenarios (current design storms, projected design storms under changing environmental conditions including droughts, and high-intensity microburst events), and how can watershed restoration and flood mitigation strategies influence or reduce these effects?
c) How will increasing environmental stressors, such as intensified rainfall and drought cycles, altered soils, pest outbreaks, maintenance needs, and land use changes, affect the capacity of trees and shrubs to provide expected flood attenuation, water quality, and habitat benefits?
d) How can restoration practices (e.g., living shorelines) be designed to persist to 2050 and beyond while minimizing impacts to existing resources?

5. Pollutants of Emerging Concern: Fecal indicator bacteria; chloride; temperature; and toxics, particularly polychlorinated biphenyls (PCBs) and PFAS (per- and polyfluoroalkyl substances) have been identified as "emerging pollutants" of concern by the restoration community, beyond the "traditional" pollutants of nitrogen, phosphorus, and sediment that have been the focus of much of the research to date. Therefore, questions within this area are:

   a) **Bacteria and Chloride** – To better inform choices of existing management options, funders participating in the Pooled Monitoring option in Maryland's MS4 permit are interested in research that advances existing science related to the baseline conditions and sources of bacteria and/or chloride in streams. Funders want to use this research to enhance existing management strategies that reduce bacteria and chloride concentrations, identify new management strategies, and/or bolster monitoring methods all to reduce bacteria and chloride in the receiving waters.

      Questions for researchers to address are:
      i. What are the major bacteria sources and their relative contributions for urban watersheds?

         Of interest are the major contributors, their sources, and if the management efforts are effective (e.g., sanitary sewer infrastructure and septic system upgrades/connections and the co-benefits for TN and TP reductions; wildlife management; pet waste management programs; and public education campaigns). Funding partners need research results that will help us reduce bacteria. Funders are also looking for novel monitoring methods to quantify the bacteria sources.

      ii. Which salt application strategies will result in less chloride loading to streams? What are the effects of salt reduction strategies on in-stream chloride concentrations?

         Funders are interested in the: 1) amount of salt delivered from the application point to the stream and the time this takes; 2) baseline conditions and the change from salt application accounting for geological variations like karst that elevate baseline specific conductance independently of chloride; and 3) assessment of new strategies to reduce chloride entering streams. Salt reduction strategies should align with the MS4 permit's pollution prevention and good housekeeping control measures (e.g., brine application). The MDE monitoring guidelines may be used as reference and can be found here.

   b) **Thermal** – What best management practice design and siting methods will reduce thermal impacts to streams, and in Maryland there is interest in Maryland's Use III and IV streams (see the Maryland Stormwater Design Manual Section 4.1), and to the watershed? Management practice design/strategy examples to test include various wet pond retrofits, surface ponding and discharge structure configurations, use of submerged gravel wetlands, and specific stream restoration design

methods (e.g., those that retain trees), and other innovative strategies (e.g., adjacent impervious surface color).

Current state (Maryland) modeling exercises in urban watersheds indicate that reductions in heated surface runoff and increases in riparian forest buffers are necessary to meet thermal water quality endpoints (68$^{o}$ F or 20$^{o}$ C for Use Class III streams). What is the thermal load to and the cumulative impact of thermal mitigation practices in urban and rural watersheds? If possible, explain how practices were combined to reduce thermal impacts to streams.

c) **Toxics** – Many regional water bodies have toxic substance impairments, particularly for PCBs. Some progress has been made in identifying the influence of specific land uses, industry types, and development age on toxic contaminant loadings. However, there are still many unknowns related to contributions of land disturbances and demolitions as well as the fate, transport, capture, and impact of toxic pollutants. For instance, it is often unknown whether practices used to reduce sediment and nutrient loads can also reduce toxic contaminant loads. Similarly, for innovative stormwater designs or erosion and sediment controls specifically aimed at reducing toxic contaminants, it is unknown exactly how effective these practices can be.

A frequent limitation to optimal stormwater monitoring protocols and design implementation is the availability of funds and personnel. Considering those challenges, what innovative techniques that are affordable and of simple installation and maintenance could the monitoring community use to measure PCB concentrations during storm events in outfalls, pipes, BMPs, and/or inlets? What recommended strategies exist to use these monitoring results to reduce/control PCBs?

d) **PFAS** – Environmental Occurrence, Monitoring, and Research Gaps - The Pooled Monitoring Initiative acknowledges the need for PFAS research and new this year requests literature reviews for the following question: What are the sources, transport pathways, and fate of PFAS in urban stormwater and receiving waters within the Chesapeake Bay watershed, and what is the current evidence for the effectiveness of stormwater BMPs in reducing PFAS loads?

Literature reviews should address these three topics:

i. PFAS sources and transport through stormwater runoff, sediments, and receiving waters;
ii. PFAS retention, transformation, or release in bioretention, filtration, and other stormwater BMPs; and
iii. Monitoring methods and data gaps that limit assessment of PFAS removal and downstream impacts.

**C. Social science questions to improve BMP adoption and sustained environmental outcomes**

6. Practice adoption: The adoption of certain practices by individuals (residents, business owners, landowners, etc.) can play a large role in accomplishing big picture watershed restoration goals. Many practices can be adopted at the individual level, and many jurisdictions have developed programs to encourage them, such as rebate programs. However, the likelihood of adoption and barriers to adoption of those practices is not always known. If barriers to adoption and adoption rates were better known, the design of incentive programs could be optimized, and outcomes of those programs could be better quantified. In addition, we would like to know what program elements could be enhanced that lead to greater implementation.

While many practices need additional study, this program intends to focus on three key practices of particular interest that are litter reduction, pet waste removal (which reduces bacteria contamination), and reduction of flushing fats oils and grease (FOG) down drains (which can lead to sanitary sewer overflows).

For one of the three practices, quantify adoption rates under certain program designs. Ideally, programs with different types and numbers of interventions designed to address adoption barriers would be compared, e.g., program designs that test and involve in-person interactions (e.g., door knocking, workshops, demonstrations) versus remote interventions (e.g., email, mailers, phone calls, door hangers).

Our questions are:

a) Which program elements increase the practice adoption rates? When combined with existing information about BMP effectiveness these results will lead to quantify environmental outcomes such as reductions in nutrients, sediment, bacteria, and/or litter.

   We are seeking rigorous, field-ready experimental designs that evaluate and compare the effectiveness of passive vs intentional social diffusion methods in accelerating the adoption of residential stormwater BMPs.

b) What social diffusion strategies, including passive approaches (e.g., yard signage, visible front yard infrastructure etc.) and active approaches (e.g., block leader programs, influencer models, etc.), are most effective at increasing BMP implementation cost-effectively? Findings will inform how existing programs incorporate passive and active social diffusion strategies to increase BMP implementation and retention rates.

7. Cost-effective verification of BMPs and sustained environmental outcomes: Jurisdictions need reliable, cost-effective methods to verify that practices installed remain in place and continue to deliver intended environmental benefits. The level and frequency of verification needed to maintain confidence in credited practices, however, may vary by practice type, verification method, if the property ownership changed, and other factors. We need to test verification approaches that maximize confidence in reported environmental outcomes while minimizing public-sector staff time and costs.

   Our question is: What level and frequency of verification are needed to maintain confidence in credited practices and maximize verified environmental outcomes per dollar?

   Studies should use an experimental design that compares verification approaches and quantifies the relationship between verification effort, confidence in reported practices and outcomes, and overall costs. Approaches could include different levels of inspection coverage, remote verification methods, and verification conducted by trained or trusted local intermediaries, such as resident networks.

   Findings will help jurisdictions determine how to allocate limited resources to BMP verification while maintaining confidence in restoration outcomes. Findings may also inform future approaches to verifying practices following property transfers or other events that could affect their continued use.

## D. Quantifying net ecological benefits and trade-offs of restoration projects

8. Resource trade-offs in different types of restoration projects. The decision to implement a restoration project at a given site necessarily involves modifying, replacing, or improving existing conditions. Restoration is intended to produce a *net* ecological improvement, and the assessment of that improvement requires value judgments about both the existing condition and the desired post-

restoration condition. However, lack of quantitative information sometimes prevents these judgments from being supported by science.

The "net" part of "net ecological improvement" at times means that there are trade-offs among ecological resources and functions, with one or more declining in quality in favor of increasing another to a greater extent. For example, removing trees to create or restore wetland habitat may improve hydrologic or water-quality functions while reducing tree canopy, carbon storage, or other ecological functions. A **key challenge is that the resources gained and lost are often measured in different units, making it difficult to determine whether the overall ecological outcome represents a net benefit**. For example, the success of a project intended to restore a stream may be measured in terms of pounds of nitrogen reduced but the resources "traded-off" may be measured in terms of percent tree canopy.

**The goal of this research question is to develop approaches for quantitatively comparing ecological resources and functions before and after restoration using common or comparable ecological metrics.** Research should evaluate individual functional components and then assess their combined effects to estimate the net ecological change associated with a restoration project. Where possible, multiple resources should be evaluated using a common metric or framework that allows positive and negative effects to be considered together.

The research should address a fundamental management question: **When a particular restoration practice or project is implemented, do the ecological benefits outweigh the ecological impacts and trade-offs associated with implementation?** Relevant resources and functions may include pollutant load reduction, habitat, hydrology, biological resources, vegetation, tree canopy, and tree loss, among others.

Ultimately, this research should help identify which restoration practices and project types are best suited to specific management needs, improve understanding of the ecological trade-offs associated with implementation, and increase confidence in recommended practices and projects. Applications should clearly explain how the proposed research will inform restoration practices and project selection and how the results will support decision-making by the regulators and managers who will evaluate and apply the findings.

This year we are seeking proposals to address the following two topics:

a) Stream restoration projects with tree removal: A Science and Technical Advisory Committee defined stream restoration as "an intervention to move a degraded ecosystem to a trajectory of recovery as informed by a reference condition considering local and global environmental change" (Noe et al., 2024[1]). Many stream restoration practices in wooded areas, result in tree removal for reasons such as: 1) construction access; 2) methods in nontidal forested wetlands; 3) to accomplish legacy sediment removal; and 4) trees, even when remaining after restoration, may experience mortality due to higher water levels/inundation.

   **What is the water quality and habitat cost of stream restoration with tree removal compared to the benefit of the other elements of the restoration practice?** Elements to consider include TN, TP, and TSS loads, habitat factors, and water quality criteria such as temperature, pH, conductivity, etc. Funders are interested in temporal and spatial changes over time.

[1] Noe, G., N. Law, J. Berg, S. Filoso, S. Drescher, L. Fraley-McNeal, B. Hayes, P. Mayer, C. Ruck, B. Stack, R. Starr, S. Stranko, and T. Thompson. 2024. The State of the Science and Practice of Stream Restoration in the Chesapeake: Lessons Learned to Inform Better Implementation, Assessment, and Outcomes. STAC Publication Number 24-006, Edgewater, MD. 96 pp. Available here.

b) Living shorelines: The purpose of living shorelines is to protect land from erosion using techniques that have higher net habitat value relative to traditional shoreline armor. Generally, living shoreline designs require more cross-shore space than traditional armor, with an intertidal component that must extend either "down" into the subtidal zone or "up" into the riparian zone, both valuable habitats themselves, ideally "connecting" with those two habitats. This extension, by definition, can transform the subtidal and/or the riparian zone into intertidal (or supra-tidal) habitat. Debate exists about resource tradeoffs associated with this habitat transformation: Generally, intertidal marsh species benefit from a living shoreline, at the potential expense of subtidal and riparian flora and fauna. The foundation species in all three habitats have declined in the Bay: intertidal wetland plants, SAV and oysters in the subtidal, and trees in the critical area. While all potentially affected species are of great interest, given both national and local discourse, this year this RFP is specifically focusing on potential tradeoffs between intertidal wetland habitat created by living shorelines and potential loss of SAV habitat.

i. **When, if ever, is it ecologically beneficial to construct a living shoreline (to gain intertidal wetland) physically over top of 1) unvegetated subtidal bottom that is unlikely to serve as SAV habitat in the near future, 2) unvegetated subtidal bottom that may in the near future serve as SAV habitat, or 3) subtidal bottom with existing SAV habitat?** To answer this question, we envision coupling likelihood indices of SAV recolonization with a comparison of the value of all three habitats (intertidal wetland, unvegetated subtidal bottom, and vegetated subtidal bottom (SAV)). Ideally, this comparison would use a common metric or approach across all three habitats, preferably one that is associated with species having direct (e.g., striped bass, blue crab) or indirect (e.g., forage fish production) commercial/recreational value. This question may be addressed with either modeling or empirical studies or a combination of both.

ii. **Can SAV recover in or recolonize areas affected by living shoreline construction, and are certain living shoreline design types (e.g., tombolo designs, offshore reef) that offer more protected very shallow water area more conducive to SAV "success" (colonization in cases where it was not present initially or recolonization in cases when SAV existed in the now-filled shallows prior to living shoreline construction) than other design types (e.g., continuous sills with windows)?** This question is likely best addressed empirically, with either a descriptive or manipulative study. Partners of this program can help identify potential study sites, and it will be important to identify sites where SAV can be expected to occur (e.g., waterways where in general SAV is frequently found).

iii. **Is traditional shoreline armor more or less impactful to SAV than living shorelines?** Given that shoreline landowners generally have the right to protect their shorelines from erosion (i.e., resources managers generally do not have the option to require a shoreline to remain "natural," unprotected), is the potential for harm to existing or potential SAV habitat greater with traditional armor or living shorelines? What is the net ecological outcome of living shorelines vs traditional shoreline armor when SAV is or could be (right conditions, but no SAV) present (i.e., revetments could be even worse or could be better for SAV). This question is likely best addressed empirically with either a descriptive or manipulative study, though modeling exercises will be considered. Partners of this award program can help identify potential study sites, and it will be important to identify sites where SAV can be expected to occur (e.g., waterways where in general SAV is frequently found). Given previous related research, this work should focus on mesohaline or oligohaline low-energy environments.

*Potential sites to study*: The Maryland Department of Natural Resources (MD DNR), the Chesapeake Bay Trust, and other members of the PMAC have funded hundreds of living shoreline projects, mostly in Maryland but some in VA, over the past 20 years. MD DNR is actively collecting pre-restoration data (assessments of vegetation, elevation surveys, and soil nutrient/carbon composition) at several sites. We encourage applicants to reach out to the program managers if interested in including these sites in your study.

If you have other resource trade-off project ideas, contact the Trust to discuss before submission.

This research should allow restoration practitioners and permitters to more accurately calculate the resource's functional uplift at a particular site in order to optimize system functions in decision making.

## Experimental Design Guidance

This program supports research that addresses the key restoration question(s) in this RFP. Applicants must provide a graphical or tabular description of the study design. Experimental designs shall be robust and must be tailored to deliver the answer to the question. Applicants should build on previous Pooled Monitoring Initiative program research findings. Guidance for sampling is provided to support your study design.

*Methodological Guidance*

- Levels of the factor(s) to be compared must be clearly articulated in the description of the experimental design and a justification provided for their selection. Potentially confounding factors must be considered, discussed in the application, and, if sample size does not allow it, kept constant. Additional factors can be added as sample size allows.
- The strongest proposals will use paired series (Osenberg, et al., 2006[2]) or BACI (before-after-control-impact) designs with sufficient replication to capture variability and control sites to capture variability due to other factors. However, "space for time" experimental design will be considered, if justified (i.e., no "before" data were collected, but the sites provide a particularly good opportunity to test the research question).
- Sample size must be justified. As discussed above, applicants are encouraged to perform a power analysis to determine whether the sample size chosen/possible is enough to be able to detect differences among treatments.
- **All water quality sampling projects intended to quantify loads must include methodology that captures both base flow and storm flow in a representative way**. The best way to achieve this standard is flow-paced sampling using automated samplers. See Thompson, et al. (2014[3]) for water quality sampling methods, associated error, and optimal sampling to reduce error.
- See also the Pooled Monitoring program's **Monitoring & Data Optimization Science Synthesis**.
- Studies that simply produce nutrient and sediment reduction values for one site/catchment in one set of site conditions will typically not be supported. We are looking for comparative studies.

[2] Osenberg, C.W., B.M. Bolker, J.S.S. White, Colette M. St. Mary, and J.S. Shima. 2006. Statistical Issues and Study Design in Ecological Restorations: Lessons Learned from Marine Reserves. Foundations of Restoration Ecology. Eds. Donald A. Falk, Margaret A. Palmer, and Joy B. Zedler. Washington, D.C.: Island Press. pp. 280-302.

[3] Thompson, Joshua, Rachel Cassidy, Donnacha G. Doody, Ray Flynn. 2014. Assessing suspended sediment dynamics in relation to ecological thresholds and sampling strategies in two Irish headwater catchments. Science of Total Environment (468-469): 345-357.

## Possible Elements of the Experimental Design

To support your understanding of the research questions and to guide setting up your research project, we provide "Possible Elements of the Experimental Design" for questions one through seven (Q1 to Q7):

Q1 Possible Elements of the Experimental Design: Conduct a study that applies a Before-After-Control-Impact (BACI) design or, where appropriate, a paired-series monitoring approach to quantify the effectiveness of BMP implementation on the removal of TN, TP, and TSS. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of BMPs to study, samples, and sampling years required to detect the anticipated effect size associated with the BMP implementation, type, design, or maintenance with 80% power. Ensure adequate replication by selecting study sites with comparable characteristics, including drainage area size, gray infrastructure, % impervious cover, land use, BMP type, and design criteria. When assessing pollutant concentrations or loads, use the highest practicable temporal sampling frequency or sub-hourly in-situ monitoring (e.g., UV nitrate sensor), and consider using turbidity as a surrogate measurement for sediment and phosphorus. Apply an appropriate statistical framework (e.g., ANCOVA or Randomized Intervention Analysis) to evaluate the effects of BMP implementation, design, and maintenance on flow-weighted concentrations, pollutant loads, and runoff characteristics, controlling for confounding variables and comparing pre- and post-implementation data to control sites. Compare BMP performance to expected performance based on the design criteria.

Q2 Possible Elements of the Experimental Design: Conduct a study that applies a Before-After-Control-Impact (BACI) design or, where appropriate, a paired-series monitoring approach to quantify the cumulative effect of BMP implementation at the watershed scale. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of study watersheds, samples, and sampling years required to detect the anticipated effect size associated with watershed-wide BMP implementation with 80% power. Ensure adequate replication by selecting watersheds with comparable characteristics, including drainage area size, gray infrastructure, and land use. When assessing pollutant concentrations or loads, use the highest practicable temporal sampling frequency or sub-hourly in-situ monitoring (e.g., UV nitrate sensor), and consider using turbidity as a surrogate measurement for sediment and phosphorus. BMP implementation data should be gathered from geospatial data that is submitted to MDE by MS4 jurisdictions. Using the geospatial data together with MDE's Accounting Guidance, determine both the acres of impervious surface treated and percentage of impervious area treated by upland BMPs within each watershed. Determine from the geospatial data the location of BMPs within the watersheds, their density, and whether BMPs form a treatment train. Study watersheds should vary in the total percentage of impervious acres from 0 to at least 30%. Apply an appropriate statistical framework to evaluate the effects of BMP implementation on flow-weighted concentrations, pollutant loads, stream biology, or bank stability. The statistical framework should be appropriate to the timing of BMP implementation (e.g., whether all BMPs are implemented within one hydrological season or over multiple years) and control for confounding variables to determine the cumulative effect of BMP implementation.

Q3 Possible Elements of the Experimental Design: Conduct a study that applies a Before-After-Control-Impact (BACI) design or, where appropriate, a paired-series monitoring design to quantify how stream restoration design influences ecological uplift. The study should evaluate at least one of the potential drivers (high flows, lack of source populations, or physiochemical habitat barriers). The study should also account for external stressors (e.g., gray infrastructure, extreme weather events, toxic contaminants in soils, and water quality conditions) that may confound or limit biological recovery. Based on the proposed hypotheses and statistical framework, perform a statistical power analysis to estimate the minimum number of restoration sites, samples, and monitoring years required to detect the anticipated effect size in biological response with 80% power. Ensure adequate replication by selecting restoration and control sites with comparable characteristics, including drainage area size, impervious cover, land use, and infrastructure condition. Apply an appropriate statistical framework to evaluate the influence of restoration design features on biological communities, comparing pre- and post-restoration data

to corresponding control sites. The framework should support inference on both ecological structure and function to determine which restoration techniques most effectively promote sustained biological recovery.

Q4 Possible Elements of the Experimental Design: Conduct a comparative study of multiple BMPs with contrasting conveyance system and treatment train configurations. Assess BMP performance, both individually and as components of treatment trains, across storm events spanning a range of magnitudes, intensities, and antecedent conditions. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of BMPs to study, sampled storm events, and sampling years required to detect the anticipated differences in BMP performance associated with conveyance system and treatment train configurations with 80% power. Ensure adequate replication by selecting BMP study locations with comparable characteristics, including drainage area size, % impervious cover treated, and land use. When assessing pollutant concentrations or loads, use the highest practicable temporal sampling frequency or sub-hourly in-situ monitoring (e.g., UV nitrate sensor), and consider using turbidity as a surrogate measurement for sediment and phosphorus. Apply an appropriate statistical framework (e.g., hierarchical linear mixed model) to quantify how BMP flood attenuation and sediment retention vary with storm magnitude and intensity. Compare fitted regressions and interaction effects across conveyance and treatment train configurations to evaluate differences in BMP responses under changing rainfall patterns.

Q5ai Possible Elements of the Experimental Design: Conduct a bacterial source tracking (BST) study that applies a Before-After-Control-Impact (BACI) monitoring design. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of study watersheds, samples, and sampling years required to detect the anticipated effect size associated with watershed-wide program implementation with 80% power. Ensure adequate replication by selecting watersheds with comparable characteristics, including drainage area size, gray infrastructure, % impervious cover treated, and land use. Ensure that samples are collected under both baseflow and storm conditions to capture temporal and hydrologic variability. Coordinate with a local government agency to select study watersheds that coincide with the implementation of a pet waste management program. Use BST techniques to identify and quantify the relative contributions of fecal inputs from humans, pets, wildlife, and other sources within the control and impact study watersheds. Apply an appropriate statistical framework (e.g., ANCOVA or Randomized Intervention Analysis) to evaluate the relative source contributions before and after program implementation, controlling for confounding variables and comparing pre- and post-program implementation data to control sites.

Q5aii Possible Elements of the Experimental Design: Conduct a study applying a Before-After-Control-Impact (BACI) design or, where appropriate, a paired-series monitoring approach to evaluate salt reduction strategies and their effects on chloride loading to streams and in-stream chloride concentrations. Study sites should be selected in areas known to be impacted by salt application. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of study sites, samples, and sampling years required to detect the anticipated effect size with 80% power. Ensure adequate replication by selecting study sites with comparable characteristics, including drainage area size, gray infrastructure, percentage of impervious cover, land use, and physiographic region. Quantify salt application rates and assess chloride loading and in-stream concentrations before and after implementation of salt reduction strategies. When assessing chloride concentrations or loads, use the highest practicable temporal sampling frequency and, where appropriate, sub-hourly in-situ conductivity monitoring as a surrogate measurement for chloride. Apply an appropriate statistical framework (e.g., ANCOVA or Randomized Intervention Analysis) to evaluate the effects of salt reduction strategies, controlling for confounding variables.

Q5b Possible Elements of the Experimental Design: Conduct a study that applies a Before-After-Control-Impact (BACI) design or, where appropriate, a paired-series monitoring approach to understand how BMP design increases or decreases thermal load at both the BMP outfall and watershed scale. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of study watersheds, BMPs, and sampling years required to detect the anticipated effect size associated

with watershed-wide BMP implementation with 80% power. Ensure adequate replication by selecting watersheds with comparable characteristics, including drainage area size, gray infrastructure, % impervious cover treated, and land use. Use sub-hourly in-situ stream and ambient air temperature monitoring. Apply an appropriate statistical framework to evaluate the effects of BMP implementation on the thermal load at the BMP and watershed scale. The statistical framework should be appropriate to the timing of BMP implementation (e.g., whether all BMPs are implemented within one hydrological season or over multiple years) and control for confounding variables to determine the effect of cumulative effect of BMP implementation on the thermal load.

Q5c Possible Elements of the Experimental Design: Conduct a study using a paired-series monitoring approach to quantify the effectiveness of BMP implementation on the capture and fate of PCBs using a combination of sediment traps and passive samplers. Specifically, the study should evaluate whether PCB retention within BMPs is transient (e.g., re-mobilized during high-flow events) or represents a long-term sequestration mechanism contributing to sustained PCB reduction. Study sites should be selected in areas known to be impacted by PCBs and monitoring should capture temporal variability across a range of hydrological conditions. Based on the proposed hypotheses and selected statistical framework, perform a statistical power analysis to estimate the minimum number of BMPs to study, samples, and sampling years required to detect the anticipated effect size associated with the BMP implementation with 80% power. Ensure adequate replication by selecting study sites with comparable characteristics, including drainage area size, gray infrastructure, % impervious cover, known or suspected PCB sources, BMP type, and design criteria. Apply an appropriate statistical framework to evaluate the effects of BMP implementation on PCB capture.

Q6 Possible Elements of an Experimental Design: Select one of the three practices identified above and develop an experimental design to compare program elements and social diffusion strategies intended to increase adoption. Where feasible, randomly assign households or other eligible participants to different intervention groups, such as passive approaches (e.g., yard signage or visible front-yard infrastructure), active approaches (e.g., block leader programs or influencer models), and combinations of interventions that vary in type or intensity. Include a comparison group where appropriate. Select a target audience and study area that minimizes confounding factors (e.g., geographic area, demographics, lot size, and impervious area), or account for these factors in the study design and analysis. Measure adoption rates using direct observation, surveys, or other appropriate verification methods, and assess differences among intervention groups. Where feasible, evaluate practice retention over time and quantify the costs of each approach, including program delivery and verification costs, to compare cost-effectiveness. Based on the proposed hypotheses and statistical framework, determine the sample size needed to detect meaningful differences in adoption rates. If the study design allows, also consider evaluating additional factors that may influence practice adoption, such as the presence or type of incentives, in-person versus remote engagement, and participant-installed versus contractor-installed practices.

Q7 Possible Elements of an Experimental Design: Design a study that compares different BMP verification approaches, including varying inspection frequencies and levels of coverage, remote verification methods, and verification conducted by trained or trusted local intermediaries. Develop a framework to assess the accuracy of each approach in determining whether credited practices remain in place and continue to deliver intended environmental benefits. Based on the proposed hypotheses and statistical framework, conduct a statistical power analysis to estimate the number of BMPs and verification events needed to detect meaningful differences among approaches. Select a representative sample of BMPs that accounts for differences in practice type, verification method, property ownership changes, and other factors that may influence practice persistence or verification accuracy. Quantify the relationship between verification effort, the accuracy and confidence of reported practices and environmental outcomes, and associated costs, including staff time. Compare approaches to identify the level and frequency of verification that maximizes confidence in reported environmental outcomes and verified outcomes per dollar. Where feasible, assess whether verification needs change following property transfers or other events that could affect practice persistence.

## Resources to Support Proposal Development

*Current Research*

Sixty-eight projects focusing on these and related research questions have been funded over the past twelve years. To become acquainted with the scope of ongoing work, forge partnerships, and avoid duplication of effort, visit https://cbtrust.org/grants/pooled-monitoring-initiatives-restoration-research-award-program/ and see the "Additional Information on Projects" section.

Supporting information from past projects to address questions three through eight, including direct links to the most recent resources, is provided in Appendix A.

*Restoration Project Sites*

Given budget constraints, investigators are encouraged to combine efforts with planned or completed restoration projects where appropriate. The Trust and collaborators will work to provide project sites and/or list(s) of relevant restoration projects for your project. Reach out to the program's point of contact(s) for assistance.

## Proposal Narrative Format

All proposals shall be organized as follows:

I. Introduction and Literature Review: Begin with a short review of the literature to support the research direction and methodology chosen.

II. Hypothesis Section: Clearly identify the research question addressed and specific hypothesis to be tested. Hypotheses proposed must be directly linked to one or more of the RFP research questions.

III. Methods – Data Collection: Contain a **robust and scientifically defensible methods section**, including:
   - A narrative describing the experimental design and justification of sample size to be used given existing spatial/temporal variability (power analysis highly encouraged for relevant studies).
   - A tabular or graphical depiction of the experimental design – **provide reviewers with a picture of exactly what the experimental design is that you are proposing**; unknown or unclear experimental designs will not be funded. Reviewers will include technical experts in your field; however, members of the management and regulatory communities who are not necessarily scientific experts in your specific field will also evaluate your proposal (see Application Review Process section below).
   - Quality Assurance Project Plan (QAPP) will be developed for the project.

IV. Methods – Data Analysis: Describe your data analysis methodology, including identification of statistical tests to be used. Data analysis will be included in the QAPP for the project. Note that statisticians are included on the review panel.

Work Products: Conclude with a section describing the products of the work, at a minimum to include:
   - Annual presentation(s) to the regulatory community at the annual June Pooled Monitoring Initiative's Restoration Research Forum (if invited) and additional regulatory training events for the duration of the study period, as appropriate;
   - A talk at a restoration conference for the practitioner audience;
   - A final report and fact sheet; and
   - At least one scientific paper in the peer-reviewed scientific literature.

Reviewers will carefully consider how clearly the hypothesis, methods, and analysis approaches were crafted.

## Application Review Process

Each proposal is reviewed and scored by technical expert peer reviewers based on the criteria below. Peer review scores are discussed by a Review Panel composed of both technical and management/regulatory experts who will consider the input of the technical expert reviewers as well as the value of the work to the management, regulatory, and practitioner communities. The review panel then recommends a suite of applications to the Trust's Board of Trustees.

Because both technical and non-technical reviewers will consider your proposal during this two-phased review process, your proposal must be both robust enough scientifically to be attractive to the technical reviewers and well-explained enough to be clear to non-experts in your field.

We anticipate applications will be disseminated for peer review between February 3 and February 22, 2027. On or around February 24, 2027, applicants may be provided with a set of questions from the first round of proposal review. Applicants must make a representative available to answer reviewer questions for one hour on a date to be determined between April 8 to April 12, 2027. These dates and times are subject to change with any updates provided by email to applicants and/or posted to the Pooled Monitoring program's website.

The Trust and funding partners reserve the right to fund projects and budget items that advance its mission and meet its specific funding priorities and criteria.

To allow applicants to set expectations prior to investing time in application, the Trust provides historical application approval rates for the same or similar programs. The average approval rate from the last twelve rounds in this award program is 34%, including both fully and partially funded applications.

## Evaluation Criteria

The following criteria will be used to evaluate applications:

- **Robust Methods and Statistics** (Scale of 1 to 20): Use of scientifically robust methods, including sampling regimes and parameters, and statistical analysis appropriate to address the proposed hypothesis. Your tabular or visual depiction of the experimental design will be evaluated for clarity and efficacy. For projects that require site availability or data availability, evidence that such availability exists will be considered in this criterion. Sites that are well-vetted, appropriate for the experimental design, and articulated in the application are preferred.
- **Qualifications** (Scale of 1 to 10): Organization, lead staff, and contractors (if used) qualifications.
- **Usefulness of the Anticipated Result to the Target Audience** (Scale of 1 to 10): Transferability of the results to key audiences, such as regulators, restoration implementers (e.g., local governments), and restoration practitioners.
- **Cost Effectiveness/Budget** (Scale of 1 to 15): Budget line items and associated costs per line item must: a) support the scope of work that will answer the research question(s) and b) be appropriate and cost-effective. Reviewers will evaluate whether procurement guidelines are appropriate for the funding source(s), e.g., contractual work should be secured by attaining at least three estimates or by using a competitive bid process. Cash and in-kind match are not required, but leveraging funds to make a research plan more robust can result in higher scores.

## Requirements of Awardees

By submitting an application to this program, applicants acknowledge that if selected for an award, they:

- Will hold a kickoff meeting with funders to discuss reviewer feedback, make any scope adjustments, and ensure highest likelihood of usefulness of the work to the management, regulatory, and practitioner communities;
- Will submit quarterly status through the course of the project (due by 1/15, 4/15, 7/15, and 10/15) and will submit a final report;
- Will develop a summary of the research in a fact sheet (or similar approved by the Trust) for the two target audiences of regulators (primary audience) and practitioners; the fact sheet template will be provided by the Trust;
- Will disseminate research results for the annual (June forum) presentations to the regulatory community (regulators/policy makers), if invited (i.e., one per year during the award period as well as the year immediately following the award period upon conclusion of the work);
- Will provide the Trust with any data collected as part of this award and will commit to submit one or more publications as a result of the work to a peer-reviewed scientific journal. The timeframe for data delivery and journal submission may be up to one year from the completion and may be made publicly available for use;
- Will have and maintain contractor liability insurance in full force and effect during the term of the contract usual and customary amounts of liability insurance coverage in connection with the performance or failure to perform services under the contract;
- Are and will be compliant with federal employment and non-discrimination laws; and
- Have not been debarred, convicted, charged or had a civil judgment rendered against you for fraud or related offense by any government agency (federal, state, or local) or been terminated for cause or default by any government agency (federal, state, or local).

## Deadline

Applications must be submitted in the **Chesapeake Bay Trust Online System** by **4:00 PM EST on January 28, 2027**. Late applications will not be accepted, and the online funding opportunity will close automatically and promptly at 4:00 PM EST. Applicants are strongly encouraged to submit at least a few days prior to the deadline given the potential for high website traffic on the due date. The Trust cannot guarantee the availability of technical assistance for our online system on the deadline date.

## Awards and Notifications

All applicants will receive an emailed letter stating the funding partnership's decision. An application may be declined, partially awarded, or fully awarded. The Trust and funding partners may request changes to the experimental design based on reviewer feedback and/or that applicants include additional collaboration with funding partners and/or other applicants prior to receiving the award.

Award Process: If approved, the Trust will send a contract with award conditions and due dates of status and final reports. In the contract, awardees will agree to the terms in the Requirements of Awardees section. The Trust uses an online system for the application process, and if awarded, project management. In addition, all final products will be provided to the funding partners for use and distribution at the sole discretion of the funding partners.

If awarded and the Project Leader changes organizations and is considered essential to the project work, the

award can be transferred to the new organization to continue and complete the project work.

In cases in which the awardee fails to submit a status report or final report by the due date, the Trust reserves the right to terminate the agreement. During the project term awardees will submit status reports and products/milestones outlined in the contract (e.g., deliverables). Organizations with outstanding status or final reports, or pending refunds, may be declined or if awarded funding will be required to submit all outstanding items prior to receiving additional award funds.

The FY 2027 Pooled Monitoring Initiative's Restoration Research awards will be announced in June 2027.

## Introduction to the Chesapeake Bay Trust

The Chesapeake Bay Trust (Trust) is a nonprofit, award-making organization dedicated to improving the bays, streams, rivers, forests, parks, and other natural resources of our local systems, from the Chesapeake to the Coastal Bays to the Youghiogheny River. The Trust, supported in large part by Maryland's Chesapeake and Coastal Bays License Plate, and partnerships with other regional funders, engages and empowers diverse groups to take actions that enrich natural resources and local communities of the Chesapeake Bay region. Since 1985, the Trust has awarded over $250 million in awards to municipalities, nonprofit organizations, schools, and public agencies throughout the Chesapeake Bay watershed.

The Trust has a mission to empower all people to participate in the restoration and protection of our region's natural resources through its award-making. As a result, the Trust strongly encourages applications directly from or that engage communities underrepresented in the environmental space. For more about the Trust's commitment to engage underrepresented groups, see our strategic plan at www.cbtrust.org/strategic-plan and https://cbtrust.org/diversity-inclusion/.

## Contacts

For technical assistance contact Mimi Abdu at (410) 974-2941 ext. 162, mabdu@cbtrust.org and/or Sadie Drescher at (410) 974-2941 ext. 105, sdrescher@cbtrust.org.

## Narrative Questions

Answer the project narrative questions and upload the MS Word or PDF file. The project narrative should not exceed ten (10) pages of text. We recommend that you copy and paste the questions to use as an outline in the project narrative to demonstrate that the narrative addresses all questions. You may add photos/graphs, resumes, Letter(s) of Commitment, and other materials to support your project proposal in addition to the Project Narrative questions and submitted as one file (i.e., combine the Project Narrative answers with additional materials excluding the budget for submission). There is a file attachment limit of 2 GB for the entire application.

Project Narrative – Answer the following questions in your proposal:

1. Key Restoration Question(s): Articulate the key restoration question(s) your project will address. Reference the research question number(s) listed in the RFP.

2. Introduction and Literature Review: Begin with a short review of the literature to support the research direction and methodology chosen. Discuss the background of the hypothesis you will be testing, including other relevant studies (peer-reviewed and gray literature) and their findings. How does your work build on previous activities? How does your proposed project advance the knowledge to the next level?

3. Hypothesis Section: Clearly identify the specific hypothesis to be tested. Hypotheses proposed must be directly linked to one or more of the RFP research question(s). Because both technical and non-technical reviewers will be evaluating your proposal, we recommend you present your hypotheses in graphical/schematic form (i.e., illustrate the hypothesized result you expect to see from your work).

4. Methods – Data Collection and Summary of Finding(s): Provide **robust and scientifically defensible methods section**, including:
    a) A narrative describing the experimental design and justification of sample size to be used given existing spatial/temporal variability (power analysis highly encouraged for relevant studies). Identify sampling sites (if applicable), sampling regime (if applicable), and parameters measured. Your methods must be clear and justified to answer the research question(s).
    b) A tabular or visual depiction of the experimental design. Remember again that two types of reviewers will be evaluating your proposal, and an illustration can be an effective and efficient way to ensure that all reviewers clearly understand your project goals.

5. Methods – Data Analysis: Describe your data analysis methodology, including identification of statistical tests to be used. Note that statisticians are included on the review panel.

6. Quality Assurance Project Plan (QAPP): Do you anticipate your project requiring a Quality Assurance Project Plan (Yes/No)? If Yes, add this to the scope, deliverables, and budget. If No, justify this response.
    a) General guidance on QAPP's can be found on the EPA QAPP website: https://www.epa.gov/osa/elements-quality-assurance-project-plan-qapp-collecting-identifying-and-evaluating-existing.
    b) If your award in response to questions six (Q6) and/or seven (Q7) is supported with federal funds, the QAPP will be approved by EPA.

7. Work Products: List the products of the work with a short description of each product, at a minimum to include:
    a) A final report and fact sheet;
        i. Describe the anticipated outcomes and broader impacts/use for the findings to the audience(s) who asked the question(s) from the two target audiences of regulators (primary audience) and practitioners.
    b) Annual (June forum) presentations to the regulatory community, if invited, for the duration of the study period;
    c) A talk at a restoration conference for the practitioner audience; and
    d) At least one scientific paper in the peer-reviewed scientific literature (submission may be up to one year from project completion).

    Also, provide a statement that data collected as part of this award will be provided to the Trust as described earlier.

8. Deliverables: Provide the deliverables schedule using the table format below and include details for the deliverable format (e.g., excel spreadsheet). A template is provided for the first deliverable. Add rows for additional deliverables. Awards will be managed as firm-fixed-price contracts and this table will be used to develop the contract deliverables schedule.

| Table X. Project deliverables and timeline. | | | |
|---|---|---|---|
| **Report # and Reporting Period** | **Project Deliverables** | **Date of Delivery** | **Amount** |
| Report #1: X/X/20XX to X/X/20XX | The deliverables are:<br>• (add deliverables here) | X/X/20XX | $ |

9. Requesting Organization and Qualifications: Briefly describe your organization. Describe the experience of your organization, the staff selected in your organization to perform this work, and the contractors selected to perform this work. Resumes may be added to the application package and will not be considered in this proposal narrative's ten-page limit.

10. Contractual Work:
    a) Will contractors be used in this project (Y/N)?

    b) If yes and contractual work is ≥$15k, describe how you will or have met the below criteria for contractual work as described in the list below (i through v, whichever is appropriate for your project).

If contractors are expected to be retained for the proposed project, the process to select contractors for the project must be or must have been used as follows:

i. For work ≥$15k and ≤$350k you must i) get three estimates or ii) put the work out for competitive bid (e.g., in an RFP) or iii) provide sole source justification.
ii. For work >$350k you must put the work out for competitive bid.
iii. If the contractor/consultant has already been identified, describe the process used and reason(s) for selection of the winning contractor.
iv. If the contractor/consultant has not already been identified, describe the competitive process to be used, including a description of the selection process/criteria used to select the winning bidder (e.g., low bidder, qualifications, criteria, etc.), and reason(s) for selection of the winning contractor.
v. If the contractor/consultant has already been identified because the contractor was already on retainer, describe the competitive process used to place the contractor on retainer.

This funding opportunity includes federal funding for Questions 6 and 7. Therefore, to be eligible for the federal funds if responding to these questions, your project must follow procurement requirements in Title 2 Code of Federal Regulations (CFR) 200. An organization proposed to receive funds other than the applicant organization is a contractor. See our FAQs When Applying for and Managing Chesapeake Bay Trust Awards that include Federal Funding for more information.

11. Transferability: Explain how you plan to disseminate the information (above and beyond the required participation in regulatory/policy-maker workshops described earlier).

12. Regulatory Support & Permissions: If your project requires implementation of restoration work for data collection, working in waterways, or similar activities: a) what permits are needed as well as the status of those permits and b) describe the process to attain permissions (e.g., landowner) to do the work.

13. Conflict of Interest: Projects in which there is independence between the lead investigator(s) and other phases of the project (e.g., design, build, monitor, maintain, etc.) will be ranked highest. Independence is defined as lack of involvement of the investigator(s) proposed here and the design or construction of the project(s) to be used to answer the questions in this study. Describe any connections your project team has with the design, construction, and/or funding of the restoration project(s) that could impact *or be perceived to impact* the results and their use.

## Online Application Submission Instructions

We have a new online award management system, hosted by SmartSimple. This is the **Chesapeake Bay Trust's Online System** for the application process, and if awarded, project management. **Please login to SmartSimple to access your awards and applications.** You can access SmartSimple in two ways:

1. Through our website: https://cbtrust.org/login and clicking the link "Log In to the Bay Trust Awards Portal" or
2. From the Chesapeake Bay Trust's SmartSimple page: https://chesapeakebaytrust.us-1.smartsimple.com/s_Login.jsp.

If you have applied to the Trust in the past, your profile and award data has been migrated to our new system. You can access the new system by entering the same email you used in our former system (Blackbaud), click 'forgot password,' and follow the prompts to create a new password. If you are a new applicant, click the blue "Register" button on the landing page and follow the instructions.

**See https://cbtrust.org/login for help setting up your account and finding funding opportunities.**

Applicants must submit applications in the **Chesapeake Bay Trust Online System** by **4:00 pm (EST) on January 28, 2027.** Late applications will not be accepted. The online funding opportunity will close promptly at 4:00 PM (EST).

The Trust has adopted a Data Privacy Policy to protect the privacy of individuals by establishing requirements governing the disclosure, use, sale, and redisclosure of personal information and geolocation data maintained, collected, or provided by the Chesapeake Bay Trust (Trust). This Policy is intended to comply with Maryland State Government Article §10-1702. Applicants, awardees, and other interested parties can review the Policy here: https://cbtrust.org/wp-content/uploads/IT-001-001-Data-Privacy-Policy-Procedures-Final-July-2026.pdf

## Online Application Form

**Online Application Form**: You will be asked to provide the following information in the online application form. Some items are required in order to submit your application. Refer to the online application for details.

- Eligibility Quiz
    - This three-question quiz is meant to assist you in determining if your project meets the requirements of this award program and that your staff/organizational structure best supports a successful application.

- Applicant Information Tab
    - Provide the organization's name, mailing address, phone number, organization type, mission, Employer Identification Number (EIN) number, and SAM Unique Entity Identifier (UEI) number. If

a MBE/WBE add certification number and state(s). Provide the Executive Officer and Project Leader's name, title, address, phone, and email address.

- Provide the Executive Officer and Project Leader's name, title, address, phone, and email address.
  - Both an Executive Officer and a Project Leader, two separate individuals, must be identified for all applications.
  - The Executive Officer and Project Leader must both be able to make decisions on behalf of the organization either as a board member, an employee, or other approved position recognized by the organization but not a contractor of the application.
  - **The Executive Officer** is the individual that oversees the organization (e.g., Executive Director, Chief Executive Officer, Mayor, President or Vice President, Principal (for schools), etc.) and has the authority to sign/execute award agreements on behalf of the organization. The Executive Officer information is tied directly to all the organization's applications and should not vary from application to application. If the Executive Officer could be listed as the Project Leader in a future proposal, we recommend listing a Board Member or other higher-ranking position of the organization as the Executive Officer in order to reduce the variation in the Executive Officer across applications.
  - **The Project Leader** will be responsible for all project coordination and correspondence with the Trust for the duration of the project. The email address entered here MUST be the same as the email address you used to log in to the online system. The Project Leader is the primary point of contact for the application, and the email address used to submit the application via the online system must be that of the Project Leader. Applications in which the email address associated with the Project Leader in the applicant information tab of the online opportunity does not match the email address used to submit the application will not be considered for funding. The Trust cannot conduct any official correspondence with contractors or other project partners.
  - If at any time the Project Leader cannot continue in the position, the organization must contact the Trust and assign a new qualified Project Leader. If awarded and the Project Leader changes organizations and is considered essential to the project work, the award can be transferred to that organization to continue and complete the project work.

- Project Information Tab
  - Provide a project title; project abstract (include the research question(s) to be addressed, hypothesis to be tested, and a summary of the project); the watershed, county, and legislative district in which the project is located; and the latitude and longitude coordinates of the project location.

- Timeline Tab
  - Add the project start and end date. Provide a project timeline that includes major tasks and their associated start and end dates.

- Deliverables Tab
  - Provide estimated metrics for your proposed project. Disregard deliverables that do not apply to your project.

- Project Partnerships

- Provide a list of project partner organizations or contractors, individuals, their areas of expertise, and their role(s) in your project. An organization proposed to receive funds other than the applicant organization is a contractor.
- Applicants are encouraged to upload a Letter of Commitment for the project from each partner describing in detail the partner's role or contribution to the project. Applications including strong Letter(s) of Commitment often receive higher scores. If not submitted with the application, Letter(s) of Commitment essential to your project's success will be required prior to the release of any awarded funding. To better understand the Trust's definition of and policy on Letter(s) of Commitment, visit our Forms and Policies webpage: www.cbtrust.org/forms.

- Narrative & Supporting Documents Tab
  - Upload a Microsoft Word or PDF file that contains your answers to the Narrative Questions section of this RFP. Upload additional supporting documents, if needed/required.

- Budget Tab
  - **Application Budget** - You will be asked to enter items into the various budget categories. Totals will be automatically calculated on the page. Additional guidance on the budget can be found at https://cbtrust.org/login.
  - **Additional Budget Justification -** This online application component will ask you to provide a descriptive budget narrative to justify and explain costs. The body of work described in your proposal should be able to be accomplished with the resources requested in your budget. If the success of the work is contingent upon award of other funds, make this clear in your budget justification section.
  - If you have any questions about the budget, including how best to meet the cost effectiveness/budget evaluation criteria, reach out to the Trust's point(s) of contact for this RFP.

  - **Note**: **This program will use federal funding to support questions 6 and/or 7**. After submission, for responses to these two questions the Trust will review budgets for Federal compliance. Your budget request may be funded using Federal funds and will need to meet Federal requirements, including 2 CFR Part 200 Subpart E Cost Principles and applicable indirect cost rates, see 2 CFR 200.414. If you have a Negotiated Indirect Cost Rate Agreement (NICRA), it must be uploaded with the application. The Trust has prepared an Indirect and Fringe Cost Policy and FAQ for Federal Funding document to assist applicants: Additional Applicant & Awardee Resources - Chesapeake Bay Trust.

- Terms and Conditions Tab
  - Agree to the specified terms and conditions for the program for which you are applying. Note that federal funding through this program will support questions 6 and/or 7.

- Demographics Tab and Survey Tab (optional): Provide voluntary demographic information. Provide voluntary feedback on the application process.

## Appendix A: Past project's latest reports.

Applicants should be aware of relevant past projects funded through this program. While several previous projects relate to Questions 1 and 2 (not included here), the list below provides supporting information for Questions 3 through 8 (Q3–Q8), including direct links to the most recent reports and resources. Please note that this list is not exhaustive. Applicants are encouraged to visit the Pooled Monitoring website for the full suite of past project materials at: https://cbtrust.org/grants/pooled-monitoring-initiatives-restoration-research-award-program-additional-information/.

- Cross-cutting resources: We have launched the Pooled Monitoring Science Synthesis Products, which bring together findings from research supported through the program. Visit the Pooled Monitoring website to explore resources on stream restoration, stormwater BMP effectiveness, pollutants of emerging concern, restoration trade-offs and cross-functional benefits, and monitoring and data optimization. These resources complement the project-specific reports below and may inform proposals addressing any of the research questions.
- Q3 supporting information:
  - "Meta-Analysis of Biological Monitoring Data to Determine the Limits on Biological Uplift from Stream Restoration Imposed by the Proximity of Source Populations" with final report at: https://cbtrust.org/wp-content/uploads/Southerland-et-al_Meta-analysis-of-Biological-Monitoring-Data.pdf
  - "Using eDNA methods to extend biological sampling and identify candidate restorations for species reintroductions" with final report at: https://cbtrust.org/wp-content/uploads/Hilderbrand-and-Richardson-Pooled-Monitoring-Final-Report.pdf
  - "Assessing the feasibility of assisted macroinvertebrate colonization in achieving ecological uplift in restored streams" June 2025 forum presentation at: https://cbtrust.org/wp-content/uploads/3_CBT_MEETING.pdf
  - "Quantifying the ecological uplift and effectiveness of differing stream restoration approaches in Maryland" with final report at: https://cbtrust.org/wp-content/uploads/Hilderbrand-et-al_Quantifying-the-Ecological-Uplift.pdf
  - "Determining realistic expectations for ecological uplift in urban stream restorations" with final report at: https://cbtrust.org/wp-content/uploads/Hilderbrand-realistic-restoration-expectations-final-report.pdf
- Q4 supporting information:
  - "Climate Change Impacts to Restoration Practices" funded in 2021 final report at: https://cbtrust.org/wp-content/uploads/Deliverable9_19278_FinalReport_final_092623.pdf
  - "Climate Impacts to Restoration Practices" funded in 2019 final report at: https://cbtrust.org/wp-content/uploads/Grant16928-Deliverable11-FinalProjectReport_120820.pdf
  - "Reliability of Two-Dimensional Hydrodynamic Models for Assessing Susceptibility of Stream Restorations to Flood Damage and Potential Effects of Climate Change" with final report at: https://cbtrust.org/wp-content/uploads/CBT_Final_Report_ULRF_Award17985_FinalSubmission_2025-08-25.pdf
  - "Comparative analysis of Maryland highway mini-catchments to assess the effectiveness of bioretention in addressing stormwater impacts" with final report at: https://cbtrust.org/wp-content/uploads/CBT-swales-FINAL-REPORT_2025.pdf
  - "Stream Floodplain Restoration to Counter Increased Peak Flows from Climate Change at Watershed Scales" awarded in 2025
  - "Impacts of Urban Soil Compaction on Stormwater Runoff Volumes and BMP Sizing" with final report at: https://cbtrust.org/wp-content/uploads/22064-Final-Report.pdf

- "The Long-Term Effects of BMP Implementation on Stream Channel Stability in Urban Watersheds." June 2026 forum presentation at: https://cbtrust.org/wp-content/uploads/2_Fraley-McNeal_Caraco_Khan_BMPs_StreamStability_2026PMI.pdf

- Q5 supporting information:
  - Q5a for Bacteria (i) and Chloride (ii):
    - "Use of molecular sewage indicator methods to reduce uncertainty in watershed remediation efforts and water contact recreation" June 2025 forum presentation at: https://cbtrust.org/wp-content/uploads/2_Schott.pdf
    - "Combining incubations, sensors, and molecular approaches to understand E. coli sources and wastewater contamination across the Anacostia River Watershed" that was awarded in 2024
    - "Assessing the effectiveness of green stormwater infrastructure for addressing stormwater management goals at the watershed scale: application of the BACI design" (addressing the pollutants of emerging concern in urbanizing watersheds, specifically thermal pollution, chloride, and coliform bacteria) with final report at: https://cbtrust.org/wp-content/uploads/22063-Final-Report.pdf
    - "Literature Review on Techniques to Reduce Salt Loading to Streams" with final report at: https://cbtrust.org/wp-content/uploads/Salt-Survey-Report_Final-8_19_20-1.pdf
    - "Impacts of salt loading on nutrient and metal processing in stormwater bioretention" with final report at: https://cbtrust.org/wp-content/uploads/20231001_CBTfinalreport_McPhillips.pdf
    - "Evaluating impacts of freshwater salinization on mobilization of nutrients and metals from stormwater best management practices" with final report at: https://cbtrust.org/wp-content/uploads/CBT-Road-Salt-FINAL-REPORT.pdf
    - "Combining Incubations, Sensors, and Molecular Approaches to Understand *E. coli* Sources and Wastewater Contamination Across the Anacostia River Watershed." June 2026 forum presentation at: https://cbtrust.org/wp-content/uploads/6_Hale_EColiSources_WastewaterContamination_2026PMI.pdf
  - Q5b for Temperature:
    - "Evaluation of watershed-scale impacts of stormwater management facilities on thermal loads to a Maryland Class IV stream using a high-frequency sensor network" with final report at: https://cbtrust.org/wp-content/uploads/19275-final-report.pdf
    - "Stormwater Thermal Reduction through Stormwater Filtration Media Layers" awarded in 2024. June 2026 forum presentation at: https://cbtrust.org/wp-content/uploads/4_Davis_ThermalReduction_BioretentionMedia_2026PMI.pdf
  - Q5c for PCB:
    - "Influence of historic and current land use practices on PCB contamination of soils and stormwater sediments in the Chesapeake Bay watershed" June 2025 forum presentation at: https://cbtrust.org/wp-content/uploads/1_CB-TRust_Kjellerup.pdf
    - "Development of a simplified approach of PCB loading estimation using a combination of passive sampling and sediment trapping" awarded in 2024. June 2026 forum presentation at: https://cbtrust.org/wp-content/uploads/5_Lombard_PCBLoading_PassiveSampling_SedimentTrapping_2026PMI.pdf
- Q6 and Q7 supporting information:
  - "Co-creating solutions for environmental stewardship in communities" and
  - "Urban Forests for All: Advancing Urban Tree Adoption and Maintenance in Pennsylvania Communities"
  - "Growing Trees by Growing Communities: Can Community-Based Social Marketing Foster the Adoption of Volunteer Tree Stewardship"
- Q8 supporting information:
  - Q8a:
    - "Tree Trade-Offs in Stream Restoration Projects: Impact on Riparian Groundwater Quality" with final report at: https://cbtrust.org/wp-content/uploads/Tree-Trade-off_University-of-Maryland-College-Park_Kaushal_final_report_032921.pdf

- "Evaluating Stream Restoration Tradeoffs in Water Quality across Watershed Scales" June 2025 forum presentation at: https://cbtrust.org/wp-content/uploads/8_2025-CBT-Symposium-1.pdf and latest publication at: https://cbtrust.org/wp-content/uploads/Kaushal-et-al.-2026-Watershed-Continuum-Monitoring-Approach-Ecological-Engineering.pdf

- Q8b:
  - "Long-term impacts of living shorelines to Sub Aquatic Vegetation (SAV) habitats in the Chesapeake Bay" (available at: https://cbtrust.org/wp-content/uploads/Long-term-impacts-of-living-shorelines-to-SAV-habitats-in-Chesapeake-Bay_UMCES_March-2022.pdf)
  - "Trade-offs in ecosystem services between living shorelines and unrestored shallow water habitats" awarded in 2025