# Restoration Research Award Program

Application Package

**www.chesapeakebaytrust.org / 410-974-2941**

## AT A GLANCE

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

Information Session: January 11 from 11 am to 12 pm, webinar details in the "Information Session" section

Applicant Q&A with Review Panel: April 17, 2019 (11:30 am to 12:30 pm)

**Deadline:** 4:00 pm, February 21, 2019

***Submit Your Application by following instructions at:***
www.cbtrust.org/restorationresearch

## Background and Goal of the Program

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 most optimal sites. However, differences of opinion sometimes exist, and questions about the performance and function of some of these practices persist.

The goal of this award program is to answer several 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 proposed restoration project outcomes, clarification of the optimal site conditions in which to apply particular restoration techniques, information useful to regulatory agencies in project permitting, and information that will help guide monitoring programs.

This program is funded by Chesapeake Bay Trust (the Trust), the Maryland Department of Natural Resources, the Maryland Department of Transportation State Highway Administration (MDOT SHA), Montgomery County Department of Environmental Protection, and the National Fish and Wildlife Foundation through the Environmental Protection Agency's Chesapeake Bay Program Office. This program supports the Pooled Monitoring Initiative that is designed to connect key stormwater and stream restoration questions posed by the regulatory and practitioner communities with researchers in the scientific community.

*Information Session*

A workshop at which the program will be described and questions from potential applicants will be answered will be held January 11, 2019, from 11 am to 12 pm. Interested parties may attend via webinar at https://cbtrust.webex.com/cbtrust/j.php?MTID=mf079965b8bfa5085b742df0de40b8213

with audio connection: 240-454-0887 and access code: 733 985 089.

## Types of Activities that May be Supported

Members of the regulatory and restoration communities have worked together to identify several key restoration questions that are presenting challenges to advancing watershed restoration work in the Chesapeake (below; next 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.

## Key Restoration Questions

The following ten research questions are organized into four themes:

A. Effectiveness of stormwater and stream restoration programs at the watershed/catchment scale
B. Effectiveness of stream restoration practices at the project scale
C. Impact of construction activities on natural resources
D. Trade-offs in resource improvements incurred by restoration practices and the resulting net ecological change as measured by a common "currency"

### A. Effectiveness of stormwater and stream restoration programs at the watershed/catchment scale

1. Watershed restoration assessment: What are the cumulative effects of watershed restoration activities within a watershed? Of interest in the restoration community is whether, given the high temporal and spatial variability of nutrient concentrations and flows, a signal from the restoration activities even in a highly targeted, small watershed can be measured relative to a control site (before vs. after restoration activities). A related question: What percentage of the impervious surface in a watershed must be treated with best management practices (BMPs) before a difference can be measured at the outfall? Does BMP type (e.g., stream restoration, environmental site design (ESD) practices, and stormwater wetlands) influence that percentage? We recognize that this question is extensive and reviewers will accept proposals that address just one component of this research question.

   Possible Elements of the Experimental Design: Select multiple watersheds (to allow for replication) of similar characteristics in which 0 to a significant percentage (e.g., 20%) of the impervious area can be treated. Some hypothesize that due to variability driven by spatial forces (e.g., watershed characteristics) or temporal forces (e.g., rainfall) at least 20% of the watershed

must be treated to enable seeing a signal of restoration in the watershed. In choosing watersheds, ensure that watershed characteristics remain as consistent as possible, including factors of size, land use, and type and scale of BMPs to be used to treat impervious cover. Regress load reductions in total nitrogen (TN), total phosphorus (TP), total suspended solids (TSS), and other pollutants of interest (loads measured after vs. loads measured before restoration at a point where the watershed drains into the stream) against % of impervious surface treated in the watershed, considering the untreated watershed(s) as a control.

2. Stormwater management assessment: What is the effectiveness of stormwater management practices (implemented, for example, at a level required under the latest stormwater management regulations) on stream channel protection? What percentage of a catchment needs to be treated with ESD practices to reduce water flow enough to protect stream channels? Does the location of ESD practices within the catchment make a difference in protecting the stream banks?

   Possible Elements of the Experimental Design: Select multiple catchments with similar characteristics (to allow for replication) in which 0 to a significant percentage (e.g., 20%) of impervious area will be treated with ESD practices. In choosing catchments, ensure that catchment characteristics remain as consistent as possible, including factors of size, land use, and type and scale of ESD practices to be used to treat impervious cover. Regress degree of bank loss (measured with cross sections and/or other method both before and after ESD installation) and load reductions in TSS (loads measured after vs. loads measured before restoration at the outfall) against % of impervious surface in the catchment treated with ESD practices, considering the untreated catchment(s) as a control.

3. Level of monitoring effort: Monitoring can be costly and money spent on monitoring is by definition not spent on pollution reduction implementation. What degree of representative sampling is required to determine levels of pollutant discharge at a county scale? What sample size is needed to capture variability? What is the cost of such a monitoring program? Can a reduced monitoring regime, either in terms of number of sampling stations or parameters measured at a station, or a factor such as % impervious surface treated in the region be used as a proxy?

   Possible Elements of the Experimental Design: Identify a pollutant load dataset in which a high level of sampling (both spatial and temporal) exists (or collect a new dataset). Simulate less rigorous sampling regimes by excluding certain data and compare resulting estimates of pollutant load.

   To test whether % impervious cover treated can be used as a proxy for the region's pollutant load reduction, choose regions or counties with varying rates of % impervious cover treated and regress against measured pollutant load reductions at a representative sample size of outfalls in each region.

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

4. Comparisons of water quality impact among stream restoration techniques, approaches (functions sought to be restored), or site conditions. While many studies present data on a single restoration technique in a single set of conditions, few studies compare restoration effectiveness across restoration approaches, across different restoration techniques, or across a range of site

conditions. Here we ask: How does water quality impact (defined here as change in nutrient and sediment loads) compare among different restoration approaches or techniques and/or (depending on ability to replicate) across site conditions? The types of restoration approaches in which we are interested are those that aim for different function (e.g., degree of floodplain reconnection, frequency of inundation, bank stabilization, etc.). Those approaches can be accomplished with several techniques or a mixture of multiple techniques, including regenerative stormwater conveyance (RSC), natural channel design (NCD), and stream valley restoration/legacy sediment removal). The site condition factors in which we are interested include differences in land use, % impervious cover, watershed condition, soil type, valley type, and/or watershed position (headwaters vs. downstream near the receiving waters).

Possible Experimental Design Options:

a) Test technique, keeping approach and site condition constant: Compare TN, TP, and TSS load reductions among two or more different techniques that aim for the same function (e.g., RSCs, NCDs, stream valley restorations/legacy sediment removal, or a combination of those techniques that aim for the same degree of floodplain reconnection), keeping site condition constant. Be sure to include enough sites to capture variability.
b) Test approach, keeping technique and site condition constant: Compare TN, TP, and TSS load reductions at restoration projects that use the same technique (e.g., RSC) to accomplish different functions (e.g., different degree of floodplain reconnection), keeping site condition constant.
c) Test site condition, keeping approach and technique constant: Compare TN, TP, and TSS load reductions across a range of one of the site condition factors, keeping other site condition factors, restoration approach, and technique constant.

For any of the options, be sure to include enough sites to capture variability. We also encourage proposers to include evidence that a power analysis to determine replication level has been performed. If enough replication is possible, it may be possible to address multiple factors (technique, approach, AND site condition) within the same analysis, but if not, focus the analysis. The most robust analyses will be facilitated by using paired control and experimental (before and after the restoration activity) sites.

*Methodological Guidance*

- Studies that simply produce nutrient and sediment reduction values for one stream restoration technique in one set of site conditions will not be supported. We are looking for comparative studies.
- Levels of the factor(s) (either restoration technique, approach, or site condition) 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 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[1]) 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

[1] 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.

considered, if justified (i.e., no "before" data were collected, but the sites provide particularly good opportunity to test the question).

- Sample size to be used must be justified. As discussed above, applicants are encouraged to perform 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[2]) for water quality sampling methods, associated error, and optimal sampling to reduce error.

5. Climate impacts to restoration practice: Climate change models predict that frequency and intensity of rain events will increase, that growing season will lengthen, and that other processes related to the Chesapeake community's approved set of BMPs will change. As a result, some suggest that standards for stormwater practices, stream restoration, and other BMPs should change (e.g., plan to treat a two-inch rain event versus a one-inch rain event; design stream restoration practices for more frequent storms).

   Funders are looking for investigators to compare the modeled or measured outcomes (pounds of nitrogen treated, sediment reduced, acres treated, etc.) of current stormwater BMPs to those of a new set of stormwater BMP standards (e.g., larger practices, different siting of the same practices (moving them upstream or downstream), different design elements such as vegetation species). The ultimate use of this information would be to revise design criteria of these BMPs.

   In addition, for stream restoration practices funders are looking for investigators to compare modeled or measured outcomes (e.g., criteria for site selection, design approach for stability, design approach for habitat, or construction technique) of stream restoration practices under current conditions vs a new set of conditions (e.g., design element(s) to improve stability and/or improve habitat) to reduce the impacts of future climate change such as changing intensity duration frequency curves, frequency of storms, and/or periods of drought. Finally, a literature review that provides a synthesis of stream restoration siting criteria, design conditions, construction techniques/sequences, and/or other factors to manage for future climate impacts will be considered. The findings will support current stream restoration maintenance/upgrades and future stream restoration siting, designs, and/or construction practices.

   Example possible study: To address the stormwater BMP aspect of this question, review ESD designs permitted within the last five years and calculate the modeled loads reduced (TN, TP, TSS) for the one inch storm event. Use current and future (e.g., 20 years) rainfall data and the associated intensity duration frequency curves to compare outcomes/response variables (e.g., nitrogen load reduction) across various rainfall scenarios. Model a design change (e.g., deeper stormwater practices) and repeat the exercise. Sample size must be high enough to capture the variability and the experimental design must control for important factors expected to impact the results (e.g., impervious cover, soil type, land use, drainage area).

[2] 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.

6. Emerging Pollutants: Temperature and salt 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 restoration community to date. Questions within this area are:
    a. Thermal – What best management practice design and siting methods will reduce thermal impacts to streams in Maryland's Use III and IV watersheds (see the Maryland Stormwater Design Manual Section 4.1)?

       Possible elements of the experiment design: Compare thermal response in streams from stormwater management best management practices (e.g., wet pond retrofits) or restored with different stream restoration techniques. Follow the guidance in question #4 above.

    b. Salt – Which techniques of salt application to roadways will result in less loading to streams? Which BMPs can be used to reduce salt loading to streams?

       Possible elements of the experimental design: Identify two or more methods of road salt application, apply them in real-world settings (remember to include replication, and keep as many factors constant as possible or build an experimental design robust enough to account for levels of a second factor; see advice in question #4 above), and measure salt concentrations and loads at nearby stream outfalls.

7. Invasive species: The act of restoration, in ecological terms, can be considered a disturbance. Colonization by invasive species following any disturbance is common, and restoration practices are no different. In addition, managing invasives can be a costly component of post-project maintenance regimes. As a result, many in the practitioner community are looking for ways to implement restoration projects that result in less colonization by invasive species and if an "acceptable" threshold for invasive species could be quantified and used as a management tool. Specifically, funders are looking for research comparing the value of different techniques in reducing invasive colonization in stream restoration and tree planting projects.

## C. Impact of construction activities on natural resources

8. Minimizing Short- and Long-term Impacts of Stream Restoration Construction: Some in the community are concerned that the act of project construction can have negative consequences on the resource(s). For example, construction equipment can compact soils, reducing infiltration and therefore water quality benefit. Certain alternative construction mechanisms may be available, or adding a step of countering the soil compaction may help. Researchers choosing to address this question will be responsible for identifying or proposing alternative methods, then either modeling their effect on TN, TP, and TSS load reduction and/or habitat characteristics, or testing them empirically. In the alternative construction methods used to address this question, consider how the construction methods impact the construction time, restoration materials used, and cost.

   Possible Elements of the Experimental Design: An example of an alternative method that may reduce construction disturbance is to limit clearing for access around the stream channel. To evaluate whether limiting clearing improves total infiltration rate, ultimate pollutant load reduction, and final stream health and recovery, representative sites (with similar characteristics such as soil type) would be randomly assigned to treatments (e.g., measured by % of trees

removed or # of feet cleared around the stream channel). Restoration construction would ensue, then restoration success (as measured by soil infiltration rate, pollutant reduction, quantity of input leaf and brush detritus for organisms, stream temperature, or other defined metric) would be measured at representative samples within each site before and after restoration construction. In addition, resulting construction time and costs of the methods would be reported.

Additional examples of construction techniques that impact soil compaction include different treatments for construction access paths (including different depths of wood chip mulch, timber wetland matting, mulch plus matting combinations, temporary gravel roads, decompaction with tiller/spader, etc.). To evaluate the impact of different construction access path treatments, representative sites (with similar characteristics) would be selected for each treatment, and total infiltration rate, soil compaction, and tree mortality (both short and long term) would be measured both before and after construction.

9. Work in the wet vs work in the dry for stream restoration: When permitting stream restoration, most regulatory agencies require practitioners to divert water around the stream section to be restored. Such diversion can be costly and can prolong the projects and therefore construction disturbance, leaving some to hypothesize that the net sediment impact of diverting is no "better" than that of a quicker project done with the stream flowing.

   Funders seek to ask: What is the difference in effects on water quality (turbidity) and total sediment load delivered downstream between stream restoration work "in the wet" (construction without diverting the stream) vs. work "in the dry" (construction accomplished through diversion of the water flow) for streams that are larger than 1st order (e.g., streams that will use at least a 6 inch pump, estimated for base flow of 5.1 $ft^3$ per second)? All aspects of work in the wet vs work in the dry that affect sediment input must be considered, including:
   a) Installation of a diversion when working in the dry, which may release sediment for some period of time at some high concentration (e.g., greater than the water quality standard of 150 NTU) during the installation;
   b) Removal of the diversion, which may also release sediment; and
   c) Duration of construction (hypothesized to be shorter for work in the wet).

   This work will build on a previous study of this question in smaller-scale streams funded through this program. Preliminary results can be found here. The management and regulatory communities have reason to hypothesize that larger streams may present different scenarios than smaller streams.

   You will be required to articulate potential covariates, such as restoration type, restoration size, project duration, sediment type, substrate type, slope, stream size, stream flow, land use, drainage area, area disturbed, and other factors. Your experimental design must include the replication needed for scientifically defensible results, and you must justify the number of replicates chosen. You are encouraged to perform a power analysis to ensure that your sample size is large enough to detect the hypothesized difference. Reviewers will be sensitive to the degree of replication proposed.

   Possible Elements of the Experimental Design: Compare the sediment load before and during stream restoration using "work in the wet" construction techniques to "work in the dry" construction techniques. Make sure to keep any factors that could confound the results constant,

such as the restoration type, restoration size, project duration, sediment type, substrate type, slope, stream size, stream flow, land use, drainage area, and area disturbed. The project will be conducted in larger stream systems (e.g., where a 6 inch pump would be used) because they are typical throughout the state for stream restoration where "work in the wet" vs "work in the dry" is questioned during the design and permitting stage).

## D. Trade-offs in resource improvements incurred by restoration practices and the resulting net ecological change as measured by a common "currency"

10. Resource trade-offs in different types of restoration projects. The decision to install a restoration project at any given site by definition implies that an existing condition at that site will be modified, replaced, and/or improved. The hypothesis of the restoration practitioner is that the net condition will be *improved.* However, a value judgment is placed on the existing condition, (e.g., deeming the existing condition to be inferior to the desired "restored" condition) that is often not based on quantification. In addition, there is an accompanying value judgment on the proposed resulting condition that may not take into account reductions of certain functions (e.g.,, removing trees to create a wetland). One difficulty is that the units of the resource negatively affected is often not the same as the units measured to report the restoration work (often pounds of nitrogen reduced).

    The goal of this question is to encourage quantification, in some comparable metric, of the resources present prior to the activity compared to the resources available after restoration project installation, calculating net ecological impact after evaluation of individual functional components. Your project should explore the "positive" and "negative" impact for at least two resources using common metric(s) (e.g., vegetation biomass, pounds of pollutant reduced, a habitat metric) to determine the net change.

    Research Question: With certain kinds of restoration projects or practices, do the net benefits (nutrients, sediment, habitat, hydrology, biological resources) outweigh the net impacts (persistent and excessive iron floc mats, tree loss and resulting habitat loss, etc.)?

    Include at least two resources for consideration, such as, but not limited to the following:

    - Wetland trade-offs in stream restoration projects: Certain stream restoration practices can impact type and function of existing wetlands. Impacts can include changes to the wetland's hydrology and plant community extent and distribution.
        - What are the changes to the wetland community and does this result in a loss of wetland function compared to the benefit of the other elements of the restoration practice?
    - Tree trade-offs in stream restoration projects: Certain stream restoration practices by necessity can result in removal of trees: 1) trees may need to be removed on a short-term basis for construction site access; 2) trees may be removed for various methods of stream restoration in nontidal forested wetlands; 3) trees may be removed to accomplish legacy sediment removal in which the stream banks are forested; and 4) trees, even when remaining after restoration, may experience mortality due to changes in hydrology leading to higher water levels/inundation.
        - What is the water quality and habitat cost of tree removal of certain practices compared to the benefit of the other elements of the restoration practice?

- Iron presence in stream restoration projects: Iron can occur naturally in the soil and the groundwater. Some hypothesize that stream restoration practices can lead to precipitation of iron compounds. Iron can precipitate in the presence of oxygen which can be introduced when a stream restoration practice is installed where hydrology reconnection is accomplished. Ironstone, carbon, and other materials could be used in stream restoration projects and could add iron to the system and/or change the form of iron leading to impacts in the system. Iron flocculate or mats can reduce macroinvertebrates. Iron in streams could also have additional negative impacts such as impacts to percolation, heavy metal, aesthetics, etc.
    - What stream restoration techniques are associated with increases in iron concentration in the surface water, groundwater, and/or sediment and what are the impacts of this increased iron?

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.

## Resources to Support Proposal Development

*Existing Scientific Literature*
A list, though not exhaustive, of relevant literature is presented at: www.cbtrust.org/restorationresearch.

*Current Research*
Eighteen projects focusing on these and related research questions have been funded over the past four years. To become acquainted with the scope of ongoing work, forge partnerships, and avoid duplication of effort, visit www.cbtrust.org/restorationresearch and see the "Awarded Projects and Final Products" section.

*Restoration Project List*
Given budget constraints, investigators are encouraged to couple efforts with planned or completed restoration projects where appropriate. The Trust and collaborators will work to provide project list(s) of relevant restoration projects as they become available in the "Additional Resources" tab at the bottom of the program's webpage (www.cbtrust.org/restorationresearch).

## Proposal Narrative Format

All proposals must 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).
- IV. 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.
- V. Work Products: Conclude with a section describing the products of the work, at a minimum to include:
    - A talk at a restoration conference for the practitioner audience;
    - Annual presentations to the regulatory community at regulatory training events for the duration of the study period; 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, it is imperative that your proposal 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.

Applications will be disseminated for peer review between February 22 and March15, 2019. By March 18, 2019, 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 on April 17, 2019, (11:30 am to 12:30 pm) either in person at the Chesapeake Bay Trust office or by phone. The date and time are subject to change.

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 four rounds in this award program is 40%, including both fully and partially funded applications. The average approval rate of all applications to the Trust is 33%.

## Criteria

The following criteria will be used to evaluate applications:

- Robust Methods and Statistics (Scale of 1-20): Use of scientifically robust methods, including sampling regimes and parameters, and statistical analysis appropriate to address the proposed hypothesis. For projects that require site availability or data availability, evidence that such availability exists will be considered in this criterion.
- Qualifications (Scale of 1-10): Organization, lead staff, and contractors (if used) qualifications.
- Usefulness of the Anticipated Result to the Target Audience (Scale of 1-10): Transferability of the results to key audiences, such as regulators, restoration implementers (e.g., local governments), and restoration practitioners.
- Cost Effectiveness/Budget (Scale of 1-15): 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. Funders will evaluate whether procurement guidelines (described below -contractual work must be secured by attaining at least three estimates or by using a competitive bid process). Cash and in-kind match is not required, but leveraging funds to make a research plan more robust can result in higher scores.

## 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.

## Funding Available and Timeline

Funding partners have allocated approximately nearly $1,000,000 for this research program. Project timeframe for research projects should correspond with the goals of the project.

## Ineligible Budget Items

The following cannot be funded:

- 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

## 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 disseminate research results in annual training sessions for regulators/policy makers (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. The timeframe for data delivery may be up to one year from the completion of the work and may be made publically available for use;
- Will commit to submit one or more publications as a result of the work to a peer reviewed scientific journal;
- Will submit status and final reports through the course of the project;
- 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 them 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).

## Application Deadlines and Dates

Application Process: Applicants must submit proposals in the **Chesapeake Bay Trust Online Grant System**, found at http://www.cbtrust.org/restorationresearch by **4:00 pm on February 21, 2019**. Late applications will not be accepted and the **online funding opportunity closes promptly at 4:00 pm**. **Applicants are strongly encouraged to submit at least a few days prior to the deadline** given potential for high website traffic on the deadline date. The Trust cannot guarantee availability of technical assistance for your online application on the deadline date.

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 other applicants prior to receiving the award.

Award Process: If approved, the Trust will send an award agreement with award conditions and due dates of status and final reports. In the agreement, awardees will agree to the terms in the Requirements of Awardees section above.

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 and require a refund of funds already transferred to the awardee. During the project term awardees will submit status reports including invoices, receipts, and documentation of personnel time (timesheets or time and effort reporting for universities). All financial back-up documentation will be grouped and numbered to correspond to the budget line item reported as spent in the Expenses Worksheet of the Financial Management Spreadsheet. When the project is complete, awardees are required to complete final reports, including submission of all invoices, receipts, and documentation of time. Organizations with outstanding status or final reports will not receive additional awards. In addition, all final product(s) and data will be provided to the funding partners for use and distribution at the sole discretion of the funding partners.

Awards will be announced in May 2019.

# Contact

For technical assistance with projects, please contact: Sadie Drescher at 410-974-2941 ext. 105 or sdrescher@cbtrust.org

# Online Application Instructions

To apply for an award, follow instructions at http://www.cbtrust.org/restorationresearch. Click on "New Applicant" and follow the on-screen instructions if you have not yet registered to use the system.

When completing the online application, you will be asked for the following information:

**Project Title:** List the title of your project

**Organization Information:** Organization name, address, city, state, zip code, phone number, mission of the organization, organization type, Employer Identification Number (EIN) which is also known as a Federal Tax Identification Number, and DUNs number

An Executive Officer and Project Lead must be identified for all proposals and must be different individuals. Both individuals must be staff or board members of the applicant organization.
**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 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 section 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, consultants, 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.

**Executive Officer of Requesting Organization:** Name, Title, Address, Phone, and E-mail

**Project Lead:** Name, Title, Address, Phone, and E-mail. REMEMBER: THIS EMAIL ADDRESS MUST BE THE ONE YOU USED TO LOG IN TO SUBMIT THIS APPLICATION

**Award Information:**
1) Amount of funding requested
2) Award Period: enter project start and end dates
3) In which stream, river or watershed will the project be located?

4) In which county will the project be located?
5) Select the legislative district of the project
6) Enter the latitude and longitude (in decimal degrees) representative of project site(s)

**Project Abstract**
In a text box, you will be asked to provide a brief (3 to 4 sentences) summary of the project, including details such as type of project and main objectives, including hypothesis to be tested.

**Project Timeline**
You will be asked to complete a table listing major project tasks, with start and end dates.

**Project Deliverables**
You will be asked to fill in estimated deliverables for a variety of metrics. Disregard any deliverables that do not apply to your project.

**Project Partnerships and Qualifications**
You will be asked to complete a table listing all project partner organizations, individuals, their areas of expertise, and their role in your project. 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. Letters may be added to the Project Narrative File or uploaded in the Narrative section as additional file attachments.

**Project Narrative Upload**
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, letters of commitment, and other materials to support your project proposal as additional file attachments. There is a file attachment limit of 1 gig for the entire application.

Project Narrative - Organize your proposal as follows:

1. Key Restoration Question(s): Articulate the key restoration question(s) your project will address. Reference the research question number 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 a very 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. Work Products: Conclude with a section describing the products of the work, at a minimum to include:
   a) At least one scientific paper in the peer-reviewed scientific literature;
   b) A talk at a restoration conference for the practitioner audience; and
   c) Annual presentations to the regulatory community at regulatory training events for the duration of the study period.

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

7. 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.

8. Contractual Work:
   - Will contractors be used in this project? Yes or No

   - If yes, describe how you will or have met the below criteria for contractual work as described in "c," "d," or "e" (whichever is appropriate for your project).

   If contractors are expected to be retained for the proposed project, a competitive bid process must be or must have been used and described as below:

   a. For work <$150k you must either a) get three estimates and show good faith efforts to reach MBE/WBE/DBE firms or b) put the work out for competitive bid (e.g., in a RFP) and make sure you did and can document you did good faith efforts.
   b. For work >$150k you must put the work out for competitive bid and during that process make sure you did and can document you did good faith efforts to reach MBE/WBE/DBE firms.
   c. If the contractor/consultant has already been identified through a competitive bid process, describe the bid process used to obtain bids, including length of time the bid was open for responses, 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 (lowest qualified bid, etc.).
   d. 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 and how this process met the good faith efforts to reach MBE/WBE/DBE firms.

e. If the contractor/consultant has not already been identified, describe the competitive bid process to be used to procure consultants (including length of time the bid was open for responses, 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 (lowest qualified bid, etc.).

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

10. Regulatory Support: If your project requires implementation of restoration work for data collection, describe the status of any permits.

11. 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.

**Budget Upload**

You will be asked to upload your budget using the "Application Budget" worksheet of the Chesapeake Bay Trust's Financial Management Spreadsheet, an excel file template. The template is available in the online application and can be found by visiting www.cbtrust.org/forms.

- Please be as detailed as possible.
- For any staff cost requests, list the percentage of overall time devoted to the project by each staff member in the budget item column. It is expected that all personnel included in budgets will be directly involved in the research conducted under this program. Requests that do not include full justification for personnel involved may not be fully funded.
- Matching/leveraged resources are encouraged. Indicate whether each match entry is applied for, pledged, or in-hand. Indicate in the narrative whether your organization has requested financial support from any other sources for the project not listed as match in the budget submitted.

**Budget Category Information**

This final online award program component will ask applicants to enter budget category totals. These totals will be automatically calculated in the Application Budget. Finally, check that the project's total requested amount you entered earlier in the application is correct.

Use the "Additional Budget Justification" section in the online application to justify and explain costs. Budgets that are detailed, justified, and itemized are ideal.

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, please make this clear in your budget justification section.