

Restoration Research Award Program



Final Report Narrative Questions

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Complete the final report narrative questions below. After completing your narrative questions, save this document on your computer and then submit the document via your Chesapeake Bay Trust Online System account. You can access your account using this link https://www.GrantRequest.com/SID_1520.

1. Awardee Information

Organization Name: University of Maryland Center for Environmental Science (UMCES)

Project Leader: V. Lyubchich

Award Number: 13973

Date: July 1, 2016 (Beginning date)

2. Project Summary

- a. Describe the project results achieved. Provide a before and after photo of the project, if applicable.
The general conclusion is that even with the data of high quality as produced at SERC (aggregated weekly information, maximum 52-53 samples per year), there is a chance of missing an important storm even that is responsible for large loads. As a remedy against that, the calculations suggest large sample sizes (measuring throughout the most of the year) to obtain estimates of the total loads with desired confidence and precision.

3. Restoration Research Award Program Narrative Questions

- a. What was/were your key restoration research question(s)?
The key question was on statistically supported assessing of the effectiveness of restoration efforts (storm water best management practices) by analyzing water samples taken before and after implementation of such efforts.
- b. What are the results for your research question(s)?
The results include statistical power analysis at different water monitoring sites and calculations of the recommended sample size to detect a desired change in the water quality characteristics, with desired confidence (i.e., probability).
- c. List and describe the regulatory presentations and trainings provided.
Preliminary results from Baltimore LTER were presented at the bi-annual conference of CERF in Rhode Island, November 2017, in a session focused on Efficacies of Urban and Agricultural BMPs for Reducing Pollutant Loads led by Drs. Williams and Filoso. Updated results using the Carriage Hills data were presented in a session focused on monitoring urban streams at the annual meeting of Maryland Water Monitoring Council in North Linthicum, MD, December 2017. Participants of the session included water monitoring professionals, researchers, consultants, and managers.
- d. How can the findings be used for the regulatory community, for practitioners, for researchers, and others?
Based on our findings, restoration effectiveness cannot be assessed based on scarce sampling, such as one water quality sample before and after the stream restoration.
- e. What future research is needed?

Future research of comparing the effectiveness of restoration activities for different order streams and land use types considering the costs of such restoration and ecosystem disturbance, such as closing fish migration paths.

- f. How and when did you provide the data for this project to the Chesapeake Bay Trust?
The project findings were provided in quarterly status reports and attached to the current final report.
- g. Provide the citation for the scientific paper in the peer-reviewed literature that was submitted.
See drafts (not submitted yet) attached.

4. Project Evaluation and Lessons Learned

- a. Discuss the project's goal(s) and evaluation(s). Include how the project measured success to meet the goal(s) and to report the outcome(s).
The project goal was a statistical study (essentially, a power analysis of sampling estimators) that was carried out to recommend sample sizes for various scenarios (different streams, sampling method, etc.).
- b. Discuss the greatest successes.
For the areas where data were available, we were able to identify recommended sample sizes for various scenarios. The results were presented and received recognition at the professional and academic meetings.
- c. Discuss the greatest challenges, including the lessons learned, and potential roadblocks to future progress.
Unfortunately, the greatest challenges we encountered were related to data and meta-data availability for the fine-grained (non-aggregated or raw) measurements we needed to run the power analyses. It relates both to model data and sample data. Some other issues relate to the fact that a chunk of data was discovered to be almost unusable for analysis, due to tidal influence at the sampling sites.
- d. Based on the results of the project, how would you refine and improve your project or approach in the future?
We would focus on a specific area and type of nutrients before starting a similar project.
- e. What advice would you give someone considering a similar project?
One should understand the complexity of underlying data as well as scarcity of data for powerful statistical comparison of pre- and post-restored streams as well as for comparing different BMPs.

5. Final Project Deliverables

- a. Provide all final products (e.g., final report, data, scientific paper, fact sheets, presentation, etc.) and any additional deliverables required per the approved award.
Please, see the presentations and draft manuscripts (to be submitted to a scientific journal) attached. We have also prepared a function in the statistical software R to be publicly available through the Comprehensive R Archive Network (CRAN) for those who would like to run similar analysis and sample size calculations using the Beale's type estimator of total loads.

For questions about your final report, contact the Trust program manager at 410-974-2941.

Directions to submit your final report online:

1. Sign into your account using this link https://www.GrantRequest.com/SID_1520 and the same username and password as when you applied.
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6. Once complete, click Submit & Review and make sure you have uploaded and entered all of the necessary information.
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Photos: Upload any photos, digital images, newsletter articles, or press clippings to supplement your written description. These supplemental files can be uploaded into your final report’s narrative section under “additional attachments,” located on your Chesapeake Bay Trust Online System account.

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