

MONITORING SURVEY RESULTS

FOR THE REVISED CCMP FOR THE DELAWARE ESTUARY

JANUARY 2019

This document provides a summary of the results compiled from an online survey administered between November 29, 2018 and December 14, 2018. The survey was created to help vet and prioritize information gathered at the October 30, 2018 Monitoring Workshop. This document was created by RK&K to inform the Monitoring Assessment process being led by the Partnership for the Delaware Estuary.

INTRODUCTION

As part of the revised Comprehensive Conservation and Management Plan (CCMP) for the Delaware Estuary, a Monitoring Approach was created to help track strategy implementation and progress on CCMP goals. The vision established by the Monitoring Approach involves convening a monitoring workshop every five years to assess critical monitoring projects in the region. The Monitoring Assessment would provide a baseline for regional monitoring programs and data infrastructure, help to link related monitoring efforts, and provide the opportunity to explore new connections among ecosystem features.

In the fall of 2018, PDE worked with RK&K to undertake two efforts. First, to compile an inventory of monitoring activities being undertaken in the Delaware Estuary region. Second, to hold a monitoring workshop at the John Heinz National Wildlife Refuge at Tinicum on Tuesday, October 30th, with the objectives of reviewing the draft inventory of monitoring programs, identifying gaps in data collection, and gathering input to help prioritize future monitoring efforts. Information gathered at the workshop was summarized and distilled to create questions for a follow-up survey.

THE MONITORING SURVEY

The purpose of the survey was to vet results from the workshop, aid in prioritizing and ranking results from the workshop, and gather additional information. RK&K sent a request to participate in the survey to PDE's list of nearly 300 experts (including those who took part in the monitoring workshop). The survey was structured to reflect the same thematic discussions that took place at the workshop, wherein the monitoring inventory was broken into four sets of parameters: non-plant living resources, plants and habitat, water quality in the Delaware River and Bay, and water quality in the tributaries. For each of these four main sections of the survey, respondents were asked to rank the importance of various parameters in a list; indicate high, medium, or low priority of that same set of parameters; provide information on whether additional parameters within that category should be considered; and provide information on any geographic data gaps in data collected within that category. Aside from the four main sections of the survey, participants were also asked to provide identifying information, give information about volunteer monitoring groups whose information should be included in the monitoring inventory, and provide information about the general security of their organization's monitoring funds.

Fifty-five people from 34 organizations, companies, and universities began the survey; of that number, 39 pursued the survey to completion and 16 responded to some but not all of the questions. All information,

including summary data and answers from each respondent, are included in the attached SurveyMonkey documents.

SURVEY TEXT AND SUMMARY RESULTS

Thank you for participating in the Delaware Estuary Monitoring Survey. The goals of this survey are to vet the results from the October 30th Monitoring Workshop, to aid in prioritizing/ranking results of the workshop, and to gather additional information. Please refer to the list of all Delaware Estuary Monitoring programs (as collected during this process) here [LINK], and leave it open while completing the survey.

IDENTIFYING INFORMATION

1. Please enter your contact information. [Fifty-five people provided their information.](#)
2. Select your area(s) of expertise (please select all that apply). [Fifty-five people provided their information. Of the 21 options provided \(including "other"\), most respondents selected "water quality" \(34 respondents\), followed by "coastal ecology/function" \(22 respondents\).](#)

WORKSHOP RESULTS: NON-PLANT LIVING RESOURCES

3. Here is a list of non-plant living resources identified at the workshop as not yet being robustly monitored in the study area. From 1-4, with 1 being "most important," rank the importance of these missing or not-yet robust monitoring programs.
 - a. Freshwater bivalves ([Score: 2.89; Rank: 2](#))
 - b. Invasive species ([Score: 2.98; Rank: 1](#))
 - c. Marine mammals and sea turtles ([Score: 1.59; Rank: 4](#))
 - d. Population-level monitoring ([Score: 2.69; Rank: 3](#))
4. Here is a list of non-plant living resource parameters that were identified at the workshop as not yet being robustly monitored in the study area. For each resource, indicate whether you think monitoring it is a low priority, a moderate priority, or a high priority.
 - a. Freshwater bivalves ([Weighted Average: 2.40; 24/45 recommended high priority](#))
 - b. Invasive species ([Weighted Average: 2.51; 25/45 recommended high priority](#))
 - c. Marine mammals and sea turtles ([Weighted Average: 1.71; 7/45 recommended high priority](#))
 - d. Population-level monitoring ([Weighted Average: 2.36; 19/45 recommended high priority](#))
5. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any non-plant living resource parameters that you believe are not indicated above that should be elevated for monitoring in the future? [Twenty respondents provided information. Please see SurveyMonkey documents for information.](#)
6. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any geographies that you believe would benefit from more robust monitoring efforts in the future? [Twenty-one respondents provided information. Please see SurveyMonkey documents for information.](#)

WORKSHOP RESULTS: PLANTS AND HABITAT

7. Here is a list of plant and habitat parameters identified at the workshop as not yet being robustly monitored in the study area. From 1-7, with 1 being “most important,” rank the importance of these missing or not-yet robust monitoring programs.
 - a. Buffer data (Score: 3.42; Rank: 6)
 - b. Cumulative impacts (Score: 5.47; Rank: 1)
 - c. Dredging data (Score: 4.03; Rank: 3)
 - d. Forest health (Score: 3.83; Rank: 5)
 - e. Sediment stratification (Score: 3.00; Rank 7)
 - f. Submerged habitat (Score: 4.57; Rank: 2)
 - g. Transition zone monitoring (Score: 4.00; Rank: 4)

8. Here is a list of plant and habitat parameters that were identified at the workshop as not yet being robustly monitored in the study area. For each parameter, indicate whether you think it is a low priority, a moderate priority, or a high priority.
 - a. Buffer data (Weighted Average: 2.00; 11/37 recommended high priority)
 - b. Cumulative impacts (Weighted Average: 2.69; 29/39 recommended high priority)
 - c. Dredging data (Weighted Average: 2.08; 13/39 recommended high priority)
 - d. Forest health (Weighted Average: 2.13; 11/38 recommended high priority)
 - e. Sediment stratification (Weighted Average: 1.81; 6/36 recommended high priority)
 - f. Submerged habitat (Weighted Average: 2.38; 18/39 recommended high priority)
 - g. Transition zone monitoring (Weighted Average: 2.19; 14/37 recommended high priority)

9. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any plant and habitat parameters that you believe are not indicated above that should be elevated for monitoring in the future? [Seventeen respondents provided information. Please see SurveyMonkey documents for more information.](#)

10. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any geographies that you believe would benefit from more robust monitoring efforts in the future? [Sixteen respondents provided information. Please see SurveyMonkey documents for more information.](#)

WORKSHOP RESULTS: WATER MONITORING – DELAWARE RIVER AND BAY

11. Here is a list of Delaware River and Bay water monitoring parameters that were identified at the workshop as not yet being robustly monitored in the study area. From 1-7, with 1 being “most important,” rank the importance of these missing parameters or not-yet robust monitoring parameters.
 - a. Endocrine Disruptors (Score: 4.51; Rank: 2)
 - b. Fish tissue analysis for bioaccumulating compounds (Score: 4.89; Rank: 1)
 - c. Microplastics (Score: 4.08; Rank: 4/5)
 - d. Monitoring conducted on the center channel replicated for the banks and at additional depths (Score: 3.05; Rank: 7)
 - e. PCBs (Score: 3.51; Rank: 6)
 - f. Pharmaceuticals (Score: 4.36; Rank: 3)
 - g. Phytotoxins, Cyanotoxins, Harmful Algal Bloom Toxins (Score: 4.08; Rank: 4/5)

12. Here is a list of Delaware River and Bay water monitoring parameters that were identified at the workshop as not yet being robustly monitored in the study area. For each parameter, indicate whether you think it is a low priority, a moderate priority, or a high priority.

- a. Endocrine Disruptors (Weighted Average: 2.48; 20/40 recommended high priority)
- b. Fish tissue analysis for bioaccumulating compounds (Weighted Average: 2.62; 26/39 recommended high priority)
- c. Microplastics (Weighted Average: 2.27; 19/40 recommended high priority)
- d. Monitoring conducted on the center channel replicated for the banks and at additional depths (Weighted Average: 2.10; 15/39 recommended high priority)
- e. PCBs (Weighted Average: 2.21; 13/39 recommended high priority)
- f. Pharmaceuticals (Weighted Average: 2.56; 23/39 recommended high priority)
- g. Phytotoxins, Cyanotoxins, Harmful Algal Bloom Toxins (Weighted Average: 2.42; 21/40 recommended high priority)

13. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any Delaware River and Bay monitoring parameters that you believe are not indicated above that should be elevated for monitoring in the future? [Fourteen respondents provided information. Please see SurveyMonkey documents for more information.](#)

14. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any geographies that you believe would benefit from more robust monitoring efforts in the future? [Fourteen respondents provided information. Please see SurveyMonkey documents for more information.](#)

WORKSHOP RESULTS: WATER MONITORING – TRIBUTARIES

15. Here is a list of tributary monitoring parameters that were identified at the workshop as not yet being robustly monitored in the study area. From 1-8, with 1 being “most important,” rank the importance of these missing or not-yet robust monitoring programs.

- a. Endocrine disruptors (Score: 4.51; Rank 5)
- b. Fish tissue analysis (Score: 5.29; Rank 3)
- c. Flow measurements (Score: 5.36; Rank 2)
- d. Groundwater (Score: 5.03; Rank 4)
- e. Nuisance algal blooms (Score: 3.56; Rank 7)
- f. Pharmaceuticals (Score: 4.08; Rank 6)
- g. Temperatures at short intervals (Score: 3.14; Rank 8)
- h. Wet weather (storm flow) monitoring (Score: 5.51; Rank 1)

16. Here is a list of tributary monitoring parameters that were identified at the workshop as not yet being robustly monitored in the study area. For each parameter, indicate whether you think it is a low priority, a moderate priority, or a high priority.

- a. Endocrine disruptors (Weighted Average: 2.25; 17/36 recommended high priority)
- b. Fish tissue analysis (Weighted Average: 2.47; 19/36 recommended high priority)
- c. Flow measurements (Weighted Average: 2.50; 19/36 recommended high priority)
- d. Groundwater (Weighted Average: 2.46; 20/35 recommended high priority)

- e. Nuisance algal blooms (Weighted Average: 2.11; 12/36 recommended high priority)
 - f. Pharmaceuticals (Weighted Average: 2.20; 14/35 recommended high priority)
 - g. Temperatures at short intervals (Weighted Average: 1.86; 22/36 recommended high priority)
 - h. Wet weather (storm flow) monitoring (Weighted Average: 2.61; 22/36 recommended high priority)
17. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any tributary monitoring parameters that you believe are not indicated above that should be elevated for monitoring in the future? [Eleven respondents provided information. Please see SurveyMonkey documents for more information.](#)
18. Based on a review of the draft monitoring inventory and your knowledge of other existing programs, are there any geographies that you believe would benefit from more robust monitoring efforts in the future? [Eleven respondents provided information. Please see SurveyMonkey documents for more information.](#)

ADDITIONAL MONITORING PROGRAMS AND FUNDING

19. Are you aware of volunteer organizations that could be included in the Delaware Estuary monitoring assessment?
- a. Yes (10)
 - b. No (27)
20. If you answered “yes” for Question 19, what is/are the name(s) of the volunteer organization(s)? [Nine respondents provided information. Please see the SurveyMonkey documents for more information.](#)
21. Does your organization anticipate having sufficient funding over the next ten years to carry out existing monitoring programs and activities within the Delaware Estuary?
- a. Yes (9)
 - b. No (8)
 - c. Uncertain (21)
22. If you answered “no” for Question 21, what level of funding is needed for which program? [Nine respondents provided information. Please see the SurveyMonkey documents for more information.](#)

If you have not yet contributed a list of your past or current monitoring programs to the inventory, it's not too late! Please email Sari Rothrock at SRothrock@rkk.com to request a worksheet for submission.

Thank you for your time.

APPENDIX A

SURVEYMONKEY SUMMARY OF ALL SURVEY RESPONSES

APPENDIX B

SURVEYMONKEY COMPILATION OF ALL SURVEY RESPONSES