MONITORING WORKSHOP FOR THE REVISED CCMP FOR THE DELAWARE ESTUARY

NOVEMBER 2018

This report provides a summary of the notes compiled from the October 30, 2018 Monitoring Workshop and recommends follow-up actions. This document was created by RK&K to inform the Monitoring Assessment process being led by the Partnership for the Delaware Estuary.

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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.

THE DRAFT MONITORING INVENTORY

On September 17, 2018, RK&K invited nearly 300 scientists and experts to provide information about their organization's past and present monitoring efforts for a draft monitoring inventory. Experts were invited via email and were asked to fill out a worksheet attached to the email. The email explained that the information collected from the worksheets would be reviewed at an upcoming monitoring workshop, in service of creating a Monitoring Assessment Report. Email text can be found in **Appendix A**.

The worksheet consisted of three tabs. The first tab, labeled "Instructions," provided information about how to use the worksheet, as well as more information the Monitoring Framework process and the geographic area of interest. The second tab, labeled "Definitions," provided color-coded definitions for each of the fields requested in the worksheet.

The third tab, labeled "Program Entries," invited experts to add information about their monitoring programs. The "Program Entries" tab included six topical areas: general information, temporal data, spatial data, project/sampling notes, data availability/access, and additional information. Within the General Project Information section, participants were asked to enter the parameter being monitored by their program, and to select a "characteristic group" for that parameter from a drop-down menu. The intent of adding a prescriptive field was to be able to more reliably sort monitoring programs if filtering by parameter did not prove useful for categorization purposes. Experts were provided with four example entries for reference.

By the time of the workshop, over 30 organizations and partnerships had contributed information on over 400 monitoring programs for the inventory. At time of writing, the draft inventory contained 533 monitoring programs provided by 33 organizations and partnerships. The draft inventory can be found in **Appendix B**.

THE MONITORING WORKSHOP

PDE worked with RK&K to hold a monitoring workshop at the John Heinz National Wildlife Refuge at Tinicum on Tuesday, October 30th from 9:00 to 3:00 pm. The workshop objectives were to review the draft inventory of monitoring programs, identify gaps in data collection, and gather input to help prioritize future monitoring efforts. One week prior to the workshop, participants were provided with the workshop agenda and the full draft monitoring inventory. At the workshop, participants were provided with agendas, feedback forms, and copies of the draft inventory broken into four thematic pieces. The agenda can be found in **Appendix C**, and full notes from the day can be found in **Appendix D**.

FRAMING THE DAY: WORKSHOP GOALS AND BIG QUESTIONS

Jim Eisenhardt from RK&K began the day by welcoming participants and introducing Dr. Danielle Kreeger. Dr. Kreeger thanked participants and provided an overview of the monitoring framework and how the workshop fit into a larger process. Dr. Kreeger also provided additional information about the study area for the inventory, which includes the full extent of the Delaware River Basin (which is the Delaware Estuary's watershed). The revised CCMP also has an Estuary Focus Area, which includes the Delaware Bay and the tidal Delaware River up to the falls at Trenton and up to the headwaters of the Schuylkill River. The monitoring inventory will center on the Estuary Focus area but is open to including projects in the Delaware River Basin as well. Jim Eisenhardt then led the group in a discussion regarding the most important resources, parameters, and trend data to collect over the next ten years.

Question 1: What will be among the most important resources and/or parameters to monitor over the next ten years?

Participants identified four main categories of resources to be monitored over the next ten years: water quality, habitat, species, and human-related parameters. First, participants identified water quality monitoring for basic parameters (dissolved oxygen, temperature, electrical conductivity/salinity, pH, and turbidity) and toxics and chemicals including PCBs, PFAS, chlorinated pesticides, mercury, microplastics, and emerging contaminants. With respect to water quality monitoring, participants also discussed toxicity of mixtures, and biological endpoints for parameters such as ammonia. Second, participants identified a need for habitat monitoring, specifically related to land use/land cover change, ecosystem services of habitat, and sea level rise. Third, participants identified a need for monitoring collective species richness, as well as monitoring the health and populations of sturgeon and mussels. Fourth, participants identified the need for monitoring human-related parameters, including behavioral changes, number of environmental events, funding, and trash/litter/dumping grounds.

Question 2: What type of trend data will be most important to have ten years from now?

Generally, the group responded with four categories of trend data: habitat, water quality, climate change, and human behavior/actions. Trends in habitat that were of interest to the group included rate of change in acreage of wetlands (especially coastal wetlands), forest cover, and SAV. The group was also interested in benthic indicators including freshwater and saltwater shellfish and changes in bathymetry. Water quality trends of interest included TMDLs, DO, nutrients, light attenuation, turbidity, Cyanobacterial HABs, and beach/shellfish closures. Climate change-related trends of interest included salinity change, shoreline change, and ocean acidification. Mostly, however, the group dwelled on trends in human behaviors, actions, and practices. Trend data of interest included fish consumption/aquaculture consumption trends, intakes for water dischargers, entrapment and impingement, sustainability practices/green infrastructure employed or installed (including green roofs), economic activity, effect of legislation and regulation on point sources and nonpoint sources, and general trends in human population.

Mapping the draft inventory?

Following the directed group discussion, participants opened a new dialogue regarding next steps for the inventory. There was energy and interest around the draft inventory, though it was clear from discussion that many participants had not reviewed the full inventory provided in advance of the workshop, due to recommendations that organizers include information about program latitude and longitude, HUCs, and

data access. (These fields are included in the full inventory, but due to space limitations, were not included in the thematic inventory printouts provided at the workshop.) Beyond recommendations for collecting additional data, participants also vocalized a strong interest in seeing the monitoring programs represented geographically in some type of application. Participants recommended that, once mapped, geographic gaps in information would become more apparent. If latitude/longitude and/or HUCs are already included in the data being gathered, mapping programs would provide a clear picture of what is or what is not occurring in a given watershed. The topic of mapping the inventory was revisited throughout the workshop.

GROUP DISCUSSIONS

Following the introductory talks and group discussion, the group was provided with an orientation to the draft monitoring inventory and how, for the purpose of the workshop, it had been broken into four thematic groups for easier discussion. For each thematic section of the inventory, the group was asked to respond to four questions:

1. Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?
2. Are there critical parameters not being collected?
3. Are there obvious geographic gaps in the data?
4. What new efforts should be prioritized for the future?

DISCUSSION 1: NON-PLANT LIVING RESOURCES

The first thematic inventory provided for the group to explore was non-plant living resources. The group was provided with information about the characteristic groups that were selected to comprise this thematic portion of the inventory, and then were engaged in a group discussion.

> *Question 1: Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?*

Participants identified long-term monitoring programs with and without the organizations that they believed were undertaking them.

<u>Datasets Associated with Named Organizations</u>

- Stroud Water Research Center
- PA DEP's benthic macroinvertebrate data through the Instream Comprehensive Evaluation (ICE) program
- PA Fish and Boat Commission has a number of resources, including a reptile/amphibian survey and long-term striped bass monitoring program
- DNREC Fish & Wildlife tracks migratory shorebirds
- DRBC biomonitoring
- University of Delaware tracks marsh bird habitat
- University of Delaware monitors zooplankton
- Wetlands Institute for turtles
- PA iMap for invasive species
- NOAA spatial portal, NOAA mammal information in relation to spills (DNREC involved, speak with Ben Anderson)
  - Cornell citizen science birding program
  - Western PA Conservancy
  - PWD shad monitoring program
  - USACE and Rutgers monitoring the effects of dredging on sturgeon and oysters
  - Delaware State University and Academy of Natural Sciences of Drexel University (ANSD) have eel data
  - Rutgers Haskin Shellfish Research Laboratory has shellfish monitoring information

- State Agricultural Departments monitor pollinators
- Delaware River Watershed Initiative
- EPA Coastal Assessments macroinvertebrate information
- US Fish & Wildlife
- Fishery Cooperatives

<u>Datasets that Exist (no named organization supplied)</u>

- Horseshoe crabs
- Shad (tidal and nontidal)
- Sharks
- Invasive species
- Amphibians
- Reptiles
- Regional climate change
- Bacterial monitoring
- Nest watch program
- Oysters
- Young of year
- Fish ladder information

Question 2: Are there critical parameters not being collected?

Four parameters/data trends were discussed: freshwater bivalves, invasive species, marine mammals and sea turtles, and population-level analysis. Freshwater bivalve monitoring, including a comprehensive survey and maps of populations/mussel beds was recommended as a critical need (the last comprehensive survey was 1919). Monitoring for invasive species was discussed, specifically in regard to zebra mussels moving down the C&D canal from the Susquehanna River. There was also a need voiced for invasive species DNA analysis. Marine mammals and sea turtles were recommended as a missing critical parameter. Finally, there was also a recommendation that there should be more population level analysis in order to track the health of populations over time.

Question 3: Are there obvious geographic gaps in the data?

Participants were surprised not to see more monitoring information in the Schuylkill River, but there was uncertainty about whether it wasn't being collected, or if it had not yet made it into the draft inventory.

Question 4: What new efforts should be prioritized for the future?

For this question, the group largely referred back to the four parameters/items discussed under Question 2: freshwater bivalves, invasive species, marine mammals and sea turtles, and population-level analysis.

Discussion 2: Plants and Habitat

The second thematic inventory provided for the group to explore was plants and habitat. The group was provided with information about the characteristic groups that were selected to comprise this thematic portion of the inventory, and then were engaged in a group discussion.

Question 1: Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?

Participants identified long-term monitoring programs with and without the organizations that they believed were undertaking them.

Datasets Associated with Named Organizations

- EPA has data on SAV and aquatic resources
- EPA and PDE have Delaware Estuary Benthic Inventory data
- PDE, BBP, and ANSD have MACWA data to provide
- St. Jones Reserve can provide data from the Ameriflux network (ecosystem carbon, water, and energy fluxes) and Phenocam network (ecosystem phenology)
- US Forest Service, National land cover datasets (National Vegetation Classification System) and canopy inventory through i-Tree
- Chester County pond datasets
- State forestry departments for forest information
- NJ Water Supply Coordinating Council
- US Fish & Wildlife Service collects sediment and vegetation data
- National Dam Inventory/Database for dam location and removals
- USDA South Jersey Levee Inventory
- North Atlantic Aquatic Connectivity Collaborative (NAACC)
- ANSD marsh accretion data
- International Stormwater BMP database
- Michael Kearney with the University of Maryland Dept. of Environmental Science and Technology has marsh condition data (using remote sensing)
- DNREC has phragmites community mapping
- National Atmospheric deposition program
- National Wetlands Inventory
- National Park Service
- Coast Guard publishes information for first responders
- Environmental Sensitivity Index (ESI) maps from local area committees

Datasets that Exist (no named organization supplied)

- Fish passage and hydrology
- LiDAR and DEMs
- Storm frequency and intensity
- Meteorological conditions
- Locations of restoration projects

Question 2: Are there critical parameters not being collected?

Four parameters were highlighted as not being collected: sediment stratification, transition zone data, submerged habitat information, and forest data. Stratification of sediment, including information about sediment deposition and grain size, was identified during the conversation. So too was the need to monitor transition zones between coastal wetlands and upland areas (and marsh retreat). Submerged habitat information for both freshwater and saltwater environments was identified. Finally, the group touched back on the need for forest monitoring.

Question 3: Are there obvious geographic gaps in the data?

Participants identified state and county-level geographic gaps as well as habitat-related geographic gaps. In terms of state-level gaps, gaps in NJ wetland conditions were acknowledged, as well as gaps in PA temporal information. One participant reminded the group that there are eight square miles of the estuary watershed within the state of Maryland, and that there were no monitoring programs identified there. There was also a call to include more county-specific data. In terms of habitat-related geographic gaps, there was discussion about freshwater and saltwater environments, with the concern that freshwater environments were not emphasized. Additionally, there was interest in better monitoring the

transition zones between coastal areas and upland areas to better understand shoreline condition information and landward margin and seaward edge.

Question 4: What new efforts should be prioritized for the future?

When the group circled back to which efforts should be prioritized for the future, the concept of monitoring cumulative impacts to habitat was discussed. The concern is that while some losses are being catalogued, no one is considering the larger picture of "death by a thousand slices." This includes considering a cumulative assessment of spills. Other concepts that came up were dredging monitoring work and buffer monitoring/tracking.

Discussion 3: Water Monitoring - Delaware River and Bay

For the next two topics, participants were broken into five groups to discuss the questions among themselves. Results were reported out to the larger group. Raw information and full results can be found in **Appendix D (**Workshop Notes), and **Appendix E** (Group notes from workshop activity).

Question 1: Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?

Groups were asked not to spend time brainstorming which groups' data had not been included, and instead to focus on analyzing the information already in the database.

Question 2: Are there critical parameters not being collected?

Roughly 30 parameters were identified. Six of these parameters were echoed by more than one group: pharmaceuticals, microplastics, endocrine disrupters/EDCs, Harmful Algal Bloom toxins (phytotoxins, cyanotoxins), fish tissue analysis for bioaccumulating compounds, and PCBs.

Question 3: Are there obvious geographic gaps in the data?

Groups advised that there was data missing for the upper reaches of the Delaware, there seemed to be less monitoring for toxins in the nontidal portion of the river, and there should be more buoys (and more spatial density of monitoring stations in general). Two groups agreed that, while DRBC takes measurements of the center channel, there should also be measurements/samples taken along the banks. There was also discussion of taking measurements at different depths.

Question 4: What new efforts should be prioritized for the future?

Groups recommended that there should be modeling to support multi-scale monitoring, more monitoring for bacteria associated with CSOs in water quality, more spatial/temporal monitoring of the top five parameters, and more real time and continuous monitoring overall. Multiple groups agreed that endocrine disrupters, microplastics, and nuisance algal blooms/cyanotoxins should be prioritized for monitoring in the future.

Discussion 4: Water Monitoring – Tributaries

As stated previously, participants were broken into five groups to discuss the questions among themselves. Results were reported out to the larger group. One of the five groups participating opted to use their full time to review only the Delaware River and Bay monitoring programs and did not provide information regarding tributary programs.

Question 1: Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?

Groups were asked not to spend time brainstorming which groups' data had not been included, and instead to focus on analyzing the information already in the database. However, one group recommended that there should be more citizen science information added to the database to help cover efforts in the tributaries. Two groups recommended that data from STORET and state water quality data be added.

Question 2: Are there critical parameters not being collected?

Groups stated that PCBs, wet weather sampling for bacteria, flow measurements from gages other than those managed by USGS, pharmaceuticals, fish tissue, cyanotoxins, and temperatures at shorter intervals seemed to be missing from the monitoring programs listed for the tributaries. Two groups indicated that they believed groundwater monitoring was critical and missing.

Question 3: Are there obvious geographic gaps in the data?

Groups recommended that there seems to be a need for more discharge stations where the mainstem meets the tributaries. In Pennsylvania, participants noted that the Lehigh, Neshaminy, and Brandywine Valley seemed to be missing. In Delaware, participants called out Red Clay Creek and Red Lion data as missing. In New Jersey, participants were concerned about a lack of information, especially for the Maurice and Cohansey Rivers.

Question 4: What new efforts should be prioritized for the future?

Participants recommended not only monitoring efforts, but also analysis and modeling efforts for the future. Monitoring efforts discussed included monitoring for microplastics, nuisance algal blooms, and wastewater effluent for EDCs. Analysis recommendations included comparing stream miles impaired to contribution in flow and linking water quality monitoring with safe drinking water standards. Modeling recommendations were for sediments and nutrients.

During this conversation, participants also recommended edits to the monitoring inventory database for the future. First, they recommended that a column for "program objective" be added. This field would provide important information that would allow those reviewing the inventory to better draw conclusions regarding the type of monitoring being undertaken. Second, they recommended that a column for "Quality Assurance Project Plan (QAPP)" or similar be added. While a methodology field currently exists, this addition would allow for a clearer understanding of the type of effort being undertaken.

ACTIVITY: MONITORING PROGRAMS AND THE CCMP

Participants were asked to review posters situated around the room which contained the goal statements and strategies listed for Clean Waters, Healthy Habitats, and Strong Communities within the CCMP. They were then instructed to consider monitoring programs undertaken by their organization that could help to monitor progress on any of the goals or strategies. Once participants had one or two of their programs in mind, they were asked to write them on a blue sticky note and add them to the appropriate goal or strategy on the appropriate poster. Next, participants were instructed to conceive of an entirely new monitoring program that they believed could help to monitor progress on any of the goals or strategies. Participants were asked to write these new programs on a yellow sticky note and add them to the appropriate goal or strategy on the appropriate poster.

The purpose of the activity was to begin to link the Monitoring Assessment work with the CCMP, to help participants see how their monitoring activities could fit into the larger effort, and to see if any of the goals or strategies might generate more interest or excitement in the monitoring community as represented at the workshop. Detailed results of the activity are included in **Appendix D**. Summarized results follow. Please note that some workshop participants listed projects, activities, or tracking exercises rather than monitoring programs as both existing and new programs.

Participants added the greatest number of sticky notes to the Clean Waters poster. Almost every goal and strategy had an existing program listed next to it. The exceptions were "Conduct and coordinate (where appropriate) education, research, monitoring, and communication about fish and shellfish consumption to protect human health," and "improve, sustain, and enhance spill communication response with Delaware Estuary partners." Both of these topics had been discussed by workshop participants earlier in the day. Presumably, there were no existing or future programs associated with them because the organizations or staff members focused on these topics were not present at the workshop; alternatively, the participants that discussed the topics earlier were focusing on other monitoring programs at that time. The strategy that collected the most existing programs was "Coordinate and promote research and monitoring efforts (chemical, physical, biological) associated with the causes of water quality impacts throughout the Delaware Estuary." The strategies that collected the most number of new programs (with three each) were "Promote land use planning by local municipalities that prevents, reduces, and/or more efficiently manages stormwater runoff to prevent pollution," and "Conduct research and monitoring on nutrient impacts in the Estuary for biological and ecological endpoints."

The Strong Communities poster attracted the second greatest number of sticky notes. However, it also attracted the greatest number of sticky notes related to projects, activities, or tracking exercises rather than monitoring programs. The strategy with the greatest number of existing programs was "Publish and share outreach materials and scientific results," and the strategy with the greatest number of new programs was "Connect people to natural areas and waterfronts in the Delaware Estuary."

Healthy Habitats, with the fewest number of sticky notes, had at least one existing monitoring program identified for each strategy or goal, with the exception of "Promote stewardship practices by local partners for the health and sustainability of forests for water quality," and "Protect and restore horseshoe crabs and their environment." As was the case with certain strategies under the Clean Water poster, these gaps likely point to people missing in the room/in the process rather than lack of monitoring in these areas. A similar conclusion could be drawn from the fact that there were very few new programs proposed for Healthy Habitats in general.

REVIEW AND NEXT STEPS

Following the poster activity, the facilitator reviewed next steps in the Monitoring Assessment timeline, and asked participants for additional questions and thoughts. Participants reiterated interest in seeing the programs in the inventory displayed in interactive map form. Participants also reiterated that PDE should reach out again to groups like Stroud Water Resources Center that would likely be able to contribute a number of programs to the inventory.

SUMMARY AND NEXT STEPS

Based on the information gleaned from this workshop, PDE should consider undertaking the following actions:

- *While not within the scope of this undertaking, PDE should internally evaluate the level of effort required to map programs in the inventory*. Participants raised the prospect of a geographical representation at several points during the workshop (and on feedback forms afterward) and underscored the value of such a tool by indicating its ability to help researchers see obvious gaps in efforts.

- *Reach out to the organizations identified by participants in response to Question 1* ("Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?"*)* and find the correct contacts for the parameters with unnamed collecting organizations in order to request that they participate in the inventory. The more complete the inventory, the better the analysis that can result from it.

- *Ensure that there are sufficient habitat and wildlife representatives involved in or contributing to the process*, and that the lack of representation at the workshop was not the result of these representatives missing from the larger list of experts. Based on recommendations by workshop participants, consider prioritizing outreach to forestry experts and scientists involved with oysters, horseshoe crabs, freshwater mussels, amphibians, and reptiles.

- *Update the inventory database to include two additional columns for "QAPP" and "Objective."*

- *For future efforts and in future reports, provide a statement distinguishing between tracking and monitoring*, especially regarding topics like behavior change. Similarly, distinguish between first-hand monitoring (i.e., water testing that a Delaware Estuary Watershed group is undertaking) and secondary (downloading Census data).

Information from this summary will be used to develop questions for a follow-up survey to further vet findings from the workshop. The follow-up survey will be sent to the CCMP expert list, and the results of the survey will inform the Monitoring Assessment Report.

APPENDIX A: TEXT OF EMAILS SENT TO EXPERTS

TEXT OF EMAIL SENT TO EXPERTS, 9/17/2018

Dear Experts,

Thank you for your participation in the Comprehensive Conservation and Management Plan (CCMP) for the Delaware Estuary revision process! As part of the revised CCMP, the Partnership for the Delaware Estuary (PDE) is undertaking a monitoring assessment for the Delaware Estuary, which includes compiling a regional monitoring program inventory. Please note that the purpose of this inventory is not to be a repository for the data itself, but to direct users to sources where they can access a variety of data in the region.

Will you take action to help us keep moving forward? Here's how you can help:

- **STEP 1**: Review the draft inventory (by clicking here) to determine if your organization's information has been included.
- **STEP 2**: Add your organization's information to the attached spreadsheet.
- **STEP 3**: Email your spreadsheet to Sari Rothrock at SRothrock@rkk.com by October 1, 2018.

And please save the date for the upcoming monitoring workshop on **October 30th**! Click here to register. The goal of the workshop will be to review the inventory, identify gaps, and gather input to help prioritize future monitoring efforts. Your participation will ensure that your monitoring efforts and datasets receive greater exposure and will provide you with an opportunity to influence regional monitoring priorities.

Thank you for your ongoing support of PDE's CCMP Process!
Sari

More information about the Delaware Estuary Monitoring Inventory

As part of the revised CCMP, PDE will be including a framework for a monitoring approach that will be used to track progress on monitoring efforts across the region. This includes all monitoring programs- not only water quality, but also subjects like living resources and habitat restoration. The approach includes convening a monitoring workshop every five years to inventory critical monitoring projects in the region. A monitoring assessment report will be produced describing data needs and gaps as identified at the workshop. The report will act as a baseline for subsequent monitoring assessments, help to link monitoring programs, and provide the opportunity to explore new linkages among ecosystem features.

TEXT OF EMAIL SENT TO EXPERTS, 10/1/2018

Dear Experts,

Thanks to those of you who provided information about your programs to the Delaware Estuary Monitoring Inventory! You have helped us add almost 250 monitoring programs so far.

For those who have not yet been able to contribute, **the deadline for submissions has been extended to October 15th**. Please consider adding your monitoring programs to the Monitoring Inventory Program Worksheet. Having an inventory that shows the collective wealth of data being gathered will help to inform discussions about the future of monitoring in the region.

Will you help us by adding your programs? It's easy- just fill out the attached spreadsheet and send it back to SRothrock@rkk.com.

Thank you and have a great week!
Sari

APPENDIX B: DRAFT MONITORING INVENTORY

Please visit https://s3.amazonaws.com/delawareestuary/MASTER_DelEst_MonitoringInventory_NewProgramWorksheet_11.08.2018.xlsx to download the draft monitoring inventory as it existed at the time of the publication of this report.

APPENDIX C: WORKSHOP AGENDA

DELAWARE ESTUARY MONITORING WORKSHOP

John Heinz National Wildlife Refuge at Tinicum
Tuesday, October 30, 2018; 9:00 am – 3:00 pm

Workshop Objectives: To review the draft inventory of monitoring programs, identify gaps in data collection, and gather input to help prioritize future monitoring efforts.

9:00 am **Welcome, Introductions, and the Monitoring Framework**
Jim Eisenhardt, RK&K and Dr. Danielle Kreeger, Partnership for the Delaware Estuary

9:30 am **Framing the Day: Workshop Goals and Big Questions**
Facilitator will provide a review of the workshop agenda and goals, and will engage participants in a discussion on the following questions: *What will be among the most important resources and/or parameters to monitor over the next ten years? What type of trend data will be most important to have ten years from now?*

10:15 am **Draft Inventory: Group Discussion Overview**
Facilitator will provide an orientation to the draft monitoring inventory and introduce the goals of group discussions. For each topic, the group will explore:

- *Are there long-term monitoring programs taking place in our region not currently reflected in this draft database?*
- *Are there critical parameters not being collected?*
- *Are there obvious geographic gaps in the data?*
- *What new efforts should be prioritized for the future?*

10:45 am **Draft Inventory: Group Discussion**
Topics include: Non-Plant Living Resources; Plants, Communities, and Habitat

12:15 pm **Lunch**
Lunch will be provided for registered participants.

12:45 pm **Draft Inventory: Group Discussion Continued**
Topics include: Water Quality Monitoring by Water Body

1:45 pm **Activity: Monitoring Programs and the CCMP**
Participants will be provided with post-it notes and asked to visit the posters around the room that contain goals from the Delaware Estuary Comprehensive Conservation Management Plan (CCMP).

- *<u>Blue sticky notes</u> should be used to add existing monitoring programs that could help track progress on one of the goals or strategies.*
- *<u>Yellow sticky notes</u> should be used to add ideas for new monitoring programs that could help track progress on one of the goals or strategies.*

2:30 pm **Review and Next Steps**
Facilitator will review major outcomes of the day and next steps.

3:00 pm **Adjourn**

APPENDIX D: WORKSHOP PARTICIPANTS

First Name	Last Name	Organization/Agency
Jordan	Allison	PA Fish & Boat Commission
Drew	Budelis	Versar
Lance	Butler	Philadelphia Water Department
Lisa	Carper	US Geological Survey
Jack	Carr	Center for Aquatic Sciences
Kathryn	Christopher	Academy of Natural Sciences of Drexel University
Tom	Clark	Lower Merion Conservancy
Erin	Dorset	Delaware Department of Natural Resources and Environmental Control
Joe	Duris	USGS Pennsylvania Water Science Center
Ann	Faulds	Penn State University, PA Sea Grant
Shawn	Fisher	U.S. Geological Survey
Kathleen	Foley	USEPA - Region 2
Matthew	Fritch	Philadelphia Water Department
Michael	Griffith	Berks Nature
Simeon	Hahn	NOAA
Heather	Heckathorn	U.S. Geological Survey
Kevin	Hess	PA DEP
Danielle	Kreeger	Partnership for the Delaware Estuary
Gregory	Lech	PA Fish and Boat Commission
Kimberly	Long	Exelon Corporation
Ron	MacGillivray	Delaware River Basin Commission
Megan	Mackey	USEPA - Region 3
Kenneth	Najjar	Delaware River Basin Commission
Mark	Nardi	U.S. Geological Survey
Kirk	Raper	Academy of Natural Sciences of Drexel University
Alison	Rogerson	Delaware DNREC
Mayci	Shimon	Independence Seaport Museum
Brennan	Smith	Versar
Kaitie	Sniffen	Independence Seaport Museum
Kelly	Somers	USEPA - Region 3
Kari	St.Laurent	DNREC/DNERR
Namsoo	Suk	Delaware River Basin Commission
Mohammed	Wessan	Villanova University
David	Wolanski	Delaware DNREC
Robb	Wright	NOAA
John	Yagecic	Delaware River Basin Commission