Science and Technical Advisory Committee

Partnership for the Delaware Estuary: A National Estuary Program

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Annual Joint Meeting of the Science and Technical Advisory Committee (STAC) and the Monitoring Advisory and Coordination Committee (MACC)

Meeting Minutes (Meeting No. 46)

Thursday, May 31, 2018
9:30 A.M. to 12:00 P.M.
Delaware River Basin Commission – Goddard Conference Room
25 Cosey Rd., West Trenton, NJ 08628

STAC Attendees:
David Bushek (Rutgers)
*Lance Butler (PWD)
Jeff Fischer (USGS)
*Dorina Frizzera (Getting to Resilience, LLC)
Desmond Kahn (Fishery Investigations)
Jerry Kauffman (UDel WRC)
Susan Kilham (Chairperson, Drexel)
Danielle Kreeger (Science Advisor, PDE)
*Kari St. Laurent (DNERR)
*Alison Rogerson (DNREC)
Pete Rowe (NJ Sea Grant)
Ken Strait (PSEG)
John Yagecic (DRBC)

MACC Attendees & Others:
Emily Baumbach (PDE)
Eric Bind (NJDOH)
Jake Bransky (DRBC)
*Dan Caprioli (COE)
*Scott Ensign (Stroud)
Matt Fritch (PWD)
*Jack Gibs (retired USGS)
*Don Hamilton (NPS)
Heather Heckathorn (USGS)
Andrew Homsey (UDel)
Tom Imbrigiotta (USGS)
John Kushwara (EPA)
*Mike Lookenbil (PADEP)
Leslie McGeorge (NJDEP)
Angela Padeletti (PDE)
Elaine Panuccio (DRBC)
Megan Mackey (EPAR3)
Meg McGuire (Delaware Currents)
Ken Najjar (DRBC)
*Sarah Rickard (NYDEC)
Namsoo Suk (DRBC)
Li Zheng (DRBC)

**Participated by phone and GoToMeeting*

1.) Call to Order & Introductions

- **Elaine Panuccio** called the joint STAC/MACC meeting to order at 9:46AM and welcomed meeting attendees in person and on the phone/GoToMeeting. She then invited attendees to introduce themselves.

2.) STAC Business

- **Danielle Kreeger**: There are 7 STAC members whose terms are up as of July 2018.

- We still have not received any new nominations, but will continue receiving nominations through the end of the week.
- Elections will take place in early June for a July start.
- **D. Kreeger** asked if there were any edits to the draft minutes from the previous STAC meeting. No edits were offered, and the minutes were accepted contingent on the minor edits emailed to Danielle from a few STAC members.
- **D. Kreeger** reminded attendees that the purpose of the annual joint meeting of the STAC and MACC is to share information on how monitoring programs are sustained and any new opportunities that arise within the Delaware Estuary.
- **D. Kreeger** explained how the STAC and MACC serve an important purpose for the Delaware Estuary Program to help coordinate and facilitate monitoring and research throughout the estuary study area.
- This coordination and facilitation is conducted through the annual meeting of the STAC and MACC to shed light on new data sets and programs.
- **D. Kreeger** discussed how the STAC and MACC are the lead entities helping to generate the 2017 TREB, which also provides useful information for DRBC's State of the Basin report.
    - The 2017 TREB was posted on PDE's website in January.
    - The TREB authors went above and beyond expectations and updated a full suite of indicators to create a new report, with only a few indicators not updated.
    - Using the TREB for the CCMP revision process as a guiding document to help set some strategies related to research and monitoring.
    - It will be important to keep TREB actions and needs in mind as we move from CCMP planning to CCMP implementation.

3.) DRBC Enhanced Monitoring Activities for Estuary Eutrophication Modeling

- **John Yagecic** provided updates on eutrophication modeling in the Delaware Estuary and reviewed some updates on other large-scale ongoing projects:
- DRBC continued development of the Delaware Estuary eutrophication model.
- DRBC established new dissolved oxygen (DO) criteria to support existing use for zone 3 and 4, in regards to use for fish passage.
    - Based on some data that was originally provided by the Delaware Riverkeeper Network, there is evidence of fish propagation taking place in the Delaware Estuary, and we will need to protect that existing use.
- DRBC has continued to conduct water quality monitoring since 1967 at 22 stations below the head of tide to the mouth of the Delaware Bay.
    - DRBC expanded to year-round monitoring starting this year collecting samples over the winter on nutrients and nutrient-related parameters.
    - We are developing some apps if anyone is interested in seeing the Delaware Estuary water quality data presented at previous meetings.
    - We've added a few new parameters, specifically CBOD 20 for the eutrophication model.
- **J. Yagecic** provided an update on the nitrate spectral analyzer development at Trenton and Chester:
- USGS plans to deploy a span spectral analyzer at the USGS station that's currently operational.
    - You can scroll down on DRBC website and see continuous real-time nitrate data.

- Over time, more data will be collected to verify the calibration.
    - This is provisional since there can be interference from TOC and turbidity, and we want to take discrete values to match up to the sensor.
    - Right now, it takes a range of concentrations in the environment, but still need to build the confidence rating (two under the same river at two bridges – one at the left bank and one at the Delaware River at Chester).
- **J. Yagecic** provided an update on light extinction data collection:
- DRB met with the expert panel to discuss data collection since light extinction is especially important in the Delaware Estuary.
- Collecting samples to conduct surface and 1-meter below the surface par (light measurement) measuring turbidity, CDOM, SEQU depth, TSS, and chlorophyll.
- From the data collected, developed statistical model that related light extinction from some of the measurements, and now trying to target a range and then repeating that in 2019 to help target higher flow conditions.
- **D. Kreeger:** Measuring at any particular tidal stage?
- **J. Yagecic:** It covers the range of the tidal cycle.
- **D. Kreeger:** We've been sampling SPR, TSS and part org and biochem in Philadelphia-Camden area over different tides, which has demonstrated tremendous variability (even higher than the seasonal variability).
- **J. Yagecic:** The expert panel requested to apply the Beer-Lambert Law, but correlations weren't great. Other work on this project that DRBC hasn't normally done is measuring CDOM and collecting center channel as well as off the center channel in order to develop tighter relationship.
- **Des Kahn**: Are you saying that the purpose of the project was to see what ammonia level is achievable? What is limiting the achievability?
- **J. Yagecic**: In part the cost is limiting, and how low point dischargers can get with ammonia and what the relative cost associated is.
- **D. Kahn**: And light limitation has an impact as well?
- **J. Yagecic**: An important component of the eutrophication model is in terms of impacts on algal growth and being able to simulate that correctly.
- **Ken Strait**: Does it also impact the chemical breakdown and water chemistry itself?
- **Namsoo Suk**: I believe it should, but focus is on DO so that chemical breakdown, ammonia and nitrogen, and consumption of oxygen is the major portion.
- **Jerry Kauffman**: I'm wondering if the nitrate analyzer could be deployed at other freshwater inputs in the Estuary other sites than Trenton (Schuylkill and Brandywine).
- **J. Yagecic**: I wish we could, but the budget for this project is extremely stressed and we are not in position to do that now. We would welcome this idea if other funding becomes available.
- **J. Kauffman**: John Sharp said water temperature is another limiting factors and how high DO can get close to 30 degrees C. Is this going to be evaluated as well? Have you examined literature by UD oceanographers on turbidity being the maximum limiting factor? There's a good database on literature on this topic.
- **J. Yagecic**: We've been working with Sharp's entire database and have used it extensively with the expert panel to help identify additional data collection that would be needed.

- **D. Kreeger**: It's fascinating how in some area that have a poor benthic environmental and then healthy SAV and mussel beds that are very turbid and then clear. For light data, it would be interesting to compare vibrant benthic to areas that do not have benthic communities.
- **J. Yagecic**: This currently is not being evaluated by the expert panel. The focus is on primary producers and water quality primary producers.
- **N**. **Suk:** If the model cannot calibrate the data, we will need to add more components like SAV and bottom feeders into the model.
- **J. Yagecic**: Even if we are able to answer the DO questions, we will have the chance to build on other questions as well since we have a long list to put to use (not only for the eutrophication model).
    - We're also looking at other exhibiting overnight models for the hydrodynamic portion each night which is linked to any occurring spill events.
    - We want to update to a multidimensional model and know how the Estuary amplifies tidal signal (6-foot tidal range get translated to tidal part of Estuary).
- **Pete Rowe**: Is this bounded by current water flow events and rain events followed by longer periods of drought and is the model flexible and taking this into consideration?
- **J. Yagecic**: Yes, the model is calibrated to take that into consideration and look at climate change and changing flow patterns.
- **Dave Bushek**: Do you take salinity measurements further down as well?
- **J. Yagecic**: NOAA has a PORTS information system and added salinity to existing stations (lower Delaware, C&D Canal).
    - The reason we selected those stations are for the tidal boundaries for the model
- **E. Panuccio** provided updates on Eutrophication Model Development starting with nutrient monitoring in the Delaware River at Trenton and Schuylkill:
- This area accounts for the largest freshwater inflows to the Delaware Estuary.
- We're currently monitoring twice per month at the Calhoun Street Bridge in Trenton, NY and Falls Bridge in Philadelphia, PA.
- Started at the Calhoun Street Bridge twice per month in January 2017 and added the Schuylkill River for intensive monitoring period (2018-2019).
- Composite samples are collected and analyzed for a number of nutrient species and conventional pollutants.
- CBOD at 30 degrees C is an amended method used as a surrogate to the ultimate BOD test (90 days).
- The parameter list was refined with the help of the expert panel.
- Results from 2017 monitoring at the Delaware River at Calhoun Street Bridge are available in STORET. Results from 2018 monitoring also including Schuylkill River at Falls Bridge is starting to come in.
- **E. Panuccio** provided updates on 2018 Tributary Nutrient Monitoring:
- Monitoring occurs once per month for 8 months (April through November) at 25 sites.
- We preliminarily monitored 10 tributary sites 4 times both in 2016 and 2017 (8 monitoring events total). Tributaries in Zone 6 were monitored during this time period.
- DRBC selected 10 tributaries with the greatest drainage areas upstream of the monitoring points to monitor for CBOD-20 at 30 degrees C and Particulate Inorganic Phosphorous (PIP).
- **Sue Kilham**: Why not measuring silica and sulfate in tributary nutrient monitoring?

- **J. Yagecic**: Long-term monitoring of silica in the Estuary is already being done (70% of freshwater inflow between Delaware and Schuylkill together)
- **S. Kilham**: When first moved in 1991 and measured silica, no silica was found at the Ben Franklin Bridge. There's light in that range for diatoms to take out the silica and it's a wonderful story that no one has really dug into.
- **K. Strait**: Is silica one of the items elevated based on fracking?
- **S. Kilham**: Yes, I think so.
- **E. Panuccio** provided updates on additional point discharge effluent nutrient monitoring:
- Round 1 of Point-Discharge Monitoring started in 2011-2015 in order to later categorize dischargers into tiers.
- The goal is to estimate loadings of nutrients from individual facilities during model calibration period of 2018-2019. 12 tier 1 facilities as weekly monitoring, 20 tier 2 facilities as monthly monitoring, and the remaining 39 facilities in are tier 3 with no additional monitoring required (using existing dataset).
- **J. Yagecic**: Had two different versions of CBOD-20 standard method and then amended the method and added an inhibitor for nitrogenous oxygen demand.
- We've been collecting data for a long time and tends to be bimobile (can exhaust prior to the end of the 20 days and can produce different results).
- Continually monitoring DO and attempting to address deficiencies in the standard method. Once we collect a large amount of data, we can then conduct a side-by-side analysis (address a test that has a long history of being suboptimal).
- USGS data is being used for flow measurements.
- We're currently developing webpages to consolidate all the data in one place and then provide a link to the canned query to download the data to the hard drive. Once you create a query, it will continually update which is a wonderful feature of the product.
- **Jake Bransky** provided updates on the Upper Estuary Primary Productivity Sampling Project:
- The expert panel requested initiation of primary productivity measurements in the Delaware Estuary.
- DRBC collected primary productivity samples from the lower estuary in 2014 (RM 10-55).
- The expert panel suggested collecting additional samples in the upper portion of the Estuary.
- Two sampling events targeting most productive times of year (May and July) in 2018
    - Five transects ranging from RM 71-131
    - Six samples per transect at three locations per transect with a surface and bottom sample at each location
- The sampling process includes grab samples and sent to Tom Fisher at UMCES for ex-situ incubations to calculate productivity and respiration and also nutrients and chlorophyll a.
- Additional parameters include water temperature, DO, conductivity, and light transmission (PAR).
- May sampling has been completed with next sampling taking place in early July. DRBC may collect primary productivity samples in 2019 as well.
- **J. Yagecic**: The report is on the DRBC website if you want to see primary productivity measurements in the Bay based on the 2014 work conducted.
- The goal is not to define primary productivity, but looking at how to specify that model (we're not redoing the lower Estuary, but conducting more of an extension).

- The focus has somewhat shifted from the data collection from the upper to the more urbanized part of the Estuary.
- Sharp's data shows that productivity and turbidity are inverse.
- **D. Kreeger**: Since the start of sampling in early 2000, have seen a decline each year in chlorophyll and particulate organics and biochemical. There's some anecdotal evidence that there may have been a rebound in that.
- **S. Kilham**: Has temperature in the river increased?
- **J. Yagecic**: We will need to check in on that.
- **S. Kilham**: Primary productivity increases, but respiration increases almost twice as fast.
- **D. Kreeger**: We also see how uncharacterized particular organics is going up and chlorophyll is going down. We're seeing about 50% of the materials that don't separate when you should be getting about 5% nucleic acids. We are also seeing geopolymers that are changing the composition of the particles in the Delaware Bay and a high quantity of uncharacterizable organics.
- **S. Kilham**: Any chance there are microplastic particles?
- **J. Yagecic**: We looked at long-term continuous monitoring data going back to the 60s and 70s. It looks like at Ben Franklin, residuals may be slightly declining, but Reidy island is increasing.
- **Jake Bransky** provided updates on the Ichthyoplankton Augmentation:
- PSEG is conducting ichthyoplankton samples from the Delaware Estuary twice monthly (April through July) in 2018.
- 90 samples will be collected during each event using a towed plankton net.
- DRBC identified an area of interest that was under sampled – C&D Canal to PA/DE line.
    - DRBC provided funds to collect 3 additional samples per event in this area
- 2018 sampling is underway with one sample collected in April due to unsafe conditions and two samples collected in May.
- A huge sampling effort is looking at DO threshold and what DO levels do the species need.
- **K. Strait**: From 2002 to 2004 as part of population modeling, the DEP administered a requirement for ichthyoplankton sampling.
- $450,000/year for the program with millions of small fish to sort through
- **J. Yagecic**: The Academy of Natural Sciences is conducting a literature survey on DO needs based on the species in the Delaware Estuary.
- Developed a methodology working with WQAC targeted for June 1st and will be shared once the report comes out.
- **Pete Rowe**: Copepods and other plankton lower on the food chain will be significantly more important to establishing DO levels.
- **D**. **Kahn:** One of the most sensitive species is the Atlantic Sturgeon and the knowledge of them is very unknown with little lab work and lots of gaps in terms of temperature effects.
- **K. Strait**: Ichthyoplankton does not sample Atlantic Sturgeon since the sampling is conducted from April through July and the sturgeon only spawn early in the year.
- **D. Kahn**: We know that sturgeon are spawning and where they are going, but we don't know the exact locations.
- **D**. **Bushek**: If one compartment of the model is in small tidal creeks then they can overwhelm the nitrogen budget and nekton contribution (via menhaden and shad).
- **K. Strait**: What's the overall schedule for the eutrophication model?

- **J. Yagecic**: Data collection will take place through 2019 and part of 2020. The schedule right now is all resource dependent and DRBC will provide further details later on.

4) DELEP Updates

Delaware Estuary CCMP

- **Emily Baumbach** provided updates on the revised CCMP for the Delaware Estuary:
- The most recent outreach effort in the revision process included a series of open houses that took place late summer through early fall 2017 (there were 8 open houses with 95 attendees).
- The goal of these meetings was to provide presentations to stakeholder groups in the Estuary and incorporate their feedback into the working draft CCMP.
- Following the open houses, the EIC participated in a series of several conference calls and a working session to walk through the draft revised CCMP.
- A revised version of the draft was then provided to the Steering Committee, where the Steering Committee had several weeks to review the draft and then discuss their feedback and concerns during a daylong meeting in April.
    - This meeting resulted in Steering Committee approval for the document to be ready for the upcoming public comment period
- In early May, the draft underwent a round of technical editing by RK&K.
- Another round of technical editing will take place during the public comment period.
- A 60-day public comment period started on Monday, May 21st and will run through July 20th.
    - A copy of the draft Revised CCMP is posted online and PDE is accepting comments through email, and online form, and via postal mail.
    - A CCMP Public Comment period webinar will take place in mid-June
- Following the public comment period, a Final Draft Review will take place (~August-September 2018)
- In addition to the EIC and other interagency reviewers at this time, members of the STAC and MACC are welcome to provide comments on the draft during this round of review.
- Next steps in the revision process include final approval by the Steering Committee with a meeting/call to take place in November 2018
- The draft will then move into final production to then be rolled out at the Science and Environmental Summit in January 2019.
- Another item discussed during the last STAC meeting included a 2017 TREB action and revised CCMP strategy comparison document to see where there is a nexus between TREB actions/needs and CCMP strategies. This discussion also looked at the need to identify areas where there are no corresponding CCMP strategies for TREB needs.
    - PDE is conducting this comparison exercise internally now and will provide results to the STAC at a later date.

Monitoring Inventory Workshop

- **D. Kreeger** provided updates on the upcoming Delaware Estuary Monitoring Inventory and Workshop:
- CCMP is the guiding document for DELEP to be updated every 10 years with a strategic plan assessment related to monitoring to take place every 5 years.

- The draft CCMP outlines a Monitoring Approach that the MACC helped live edit during the last MACC meeting.
- This approach includes the "Collection and compilation of datasets from these and other monitoring programs is a collaborative effort for which PDE's STAC works closely with the DRBC's MACC".
- The Monitoring Approach includes three major activities: Annual STAC/MACC meeting, State of the Estuary reporting every 4-5 years, and a Monitoring Workshop every 4-5 years to look more comprehensively at monitoring needs and data gaps.
- There's money available in the current budget to help create a monitoring inventory and review current and future monitoring programs to look at core monitoring programs and capture some of the research and ad hoc monitoring that hasn't been conducted in a while.
- The goal of this project is to inventory critical monitoring in the region.
- PDE thought it would be helpful to also conduct an inventory of monitoring needs through a Gap Analysis.
- PDE and DELEP will need to fulfill this strategy in the Revised CCMP and set up a baseline to complete a needs assessment every 5 years.
- This approach will fulfill requirements for EPA while also focusing on William Penn cluster work since other groups are also interested in participating in this monitoring approach beyond just a simple inventory.
- The workshop will take place fall of 2018.

- **D. Kreeger** walked through the current timeline for the Monitoring Inventory and Workshop:
- PDE will use the TREB and DEWOOS to prepopulate the draft monitoring inventory as well as some other datasets for a draft excel database.
- PDE will share the draft inventory to STAC, MACC, and others to see what we are missing.
- Draft 2 of the inventory will be sent out in advance of the monitoring workshop for experts to begin refining the inventory.
- After compiling workshop input, PDE will create a draft analysis of gaps and needs and refine the inventory (conducting the gaps and needs assessment is optional).
- We would then send out a second survey to catch anything else that was not captured in the inventory and during the workshop and share compiled results with EPA and William Penn (draft monitoring assessment report).
- PDE would then share the draft Monitoring Assessment Report in January at the Science Summit with a special session.
- Following the Science Summit, PDE would compile input and then revise the report based on findings and have a final report complete in February 2019 with the inventory as well as a 'Top Ten' list to help provide direction on future monitoring needs and priorities.
- There might be some monitoring gaps we want to get ahead of and need to get more direction than there currently is available. This assessment can help to relay that message (from PDE's standpoint, looking at colossal loss of wetlands and living resources ahead).
- RK&K will be assisting with the monitoring workshop and drafting of the inventory.
- **K. Najjar:** The key is to capture core long-term monitoring programs and relate them to the CCMP and the TREB. It's hard to capture long-term monitoring if this covers projects that are only conducted once and if there is no long-term funding associated. This also makes it difficult to track long-term changes.
- **D. Kahn**: The CCMP doesn't really get into monitoring.
- **Leslie McGeorge**: This is an excellent approach, but it should also incorporate how it relates to other requirements for the states as well as the commission.

- EPA has mandated the states and encourages DRBC to develop long-term monitoring.
- You need to find a way to tie the long-term monitoring strategies states conduct on tributaries into the gap analysis.
- **J. Yagecic**: A majority of funding from EPA comes through 106 grants, with the monitoring initiative funding application submitted to EPA Region 3 with proposed projects to be consistent with goals.
- Nearly everything in the 2018 application was oriented towards routine modeling and then EPA comes back with comments and request additional details.
- DRBC hasn't provided a long-term monitoring plan in last 5 years since so much is already changing.
- It's a lot of work to define baseline conditions with natural gas development, and DRBC is on a different track right now in response to conditions on the ground and how we want to manage the current work being done.
- **L. McGeorge**: There should be a connection between long-term monitoring strategies by the states and by the commission in general to take the work that's being done into account in this CCMP process since we are all working together for some similar goals.
- **D. Kreeger**: PDE isn't really plugged into state monitoring development and isn't aware of those timelines. It would be helpful to know those goals from partners and include this in the inventory and assessment.
- **L. McGeorge**: Each state has a different timeline based on their strategy, but these should all be connected somehow. EPA has a requirement for long-term monitoring strategies tied into funding from congress to identify gaps to monitor waterways and we have a strategy that focuses on statewide water quality.
- **D. Kreeger**: It would be very helpful for New Jersey representatives to attend this workshop and provide their information in the inventory. Hoping that representatives with EPA and other members of STAC can also help with this process and attend the workshop.
- PDE initially took on to conduct work on non-tidal wetlands based on the results of the 2006 White Paper on the Status and Needs of Science in the Delaware Estuary
- **Megan Mackey**: We can provide our monitoring timeline and the key EPA representatives on the monitoring side.
- **D. Kreeger**: The CCMP and the TREB are focused on main-stem water quality.
- **L**. **McGeorge:** You can also include monitoring from the states on particular tributaries in this analysis.
- **K. Najjar**: It would be difficult to compare tributary monitoring versus main-stem strategies.
- **D**. **Kreeger**: If anyone on the STAC or MACC wants to provide guidance or suggestions for this process, please share with PDE in the next two weeks. Please also share any items that you think your organizations could get out of this exercise.
- **Dorina Frizzera**: Since the CCMP includes more than just the main-stem, this inventory will help show priorities and gaps.

2019 Science & Environmental Summit Update

- **Angela Padeletti** provided updates on the upcoming Science Summit:
- The next Science & Environmental Summit is January 27th to 30th and the Summit theme is *Estuary 2029: Saving our System Through Collaboration.*

- Some of the topics for this summit include critical habitats, emerging energy issues, blue carbon, citizen science, monitoring needs, and the DRWI cluster work.
- **D. Kreeger:** We usually have a science plenary and a guest speaker focusing on outreach.
- The call for abstracts will go out in June and will be due in August.
- Right now, we're asking the STAC and MACC to provide any special session requests for the Summit.

5) Roundtable - Monitoring Updates & Discussion

- **Matt Fritch**: PWD suspended monthly boat runs since duplicative of DRBC work. We're now conducting a boat run on the tidal Schuylkill River since this seemed to be a better use of resources where people come into contact with water located at Bartram's Garden downstream of the dam south of Grays Ferry.
- **Lance Butler**: PWD finished up sediment oxygen demand (SOD) runs at the C&D Canal up to Trenton with a total of three years of data (seasonal) encompassing a robust data set with ~50-70 sites.
- **J. Yagecic**: Will data be made available to the wider group?
- **L. Butler**: Yes, and the results will be used to measure benthic and spatial data too.
- **J. Yagecic**: LimnoTech indicated that DRBC should collect some additional data, and it would be helpful to be able to access this PWD data. PWD has always been great with sharing data in the past and DRBC really appreciates this.
- **D. Kahn**: Were you collecting biological data or just chemical data?
- **L. Butler**: This was purely chemical data collection.
- **D. Kreeger**: Wetland monitoring programs are limping along in terms of funding, but we have funding to conduct core monitoring at all of our monitoring stations right now.
- PDE is conducting a survey for tidewater muckets working with the Academy of Natural Sciences. Muckets have adapted to tidal freshwater systems and looking at if they are propagating in the river.
- **D. Bushek**: Conducting oyster monitoring program and looking at nutrient information on water quality with the data from last year now available.
- **D. Kreeger**: There will be a big ARRC (Aquatic Research and Restoration Center) event coming up in Philadelphia to look at freshwater mussel and shad propagation.
- We're still working on resolving an agreement with the state of Pennsylvania.
- This will be the first hatchery in the world to propagate freshwater mussels for clean water goals.
- All freshwater mussel hatcheries right now focus on rare species while this one will focus on common species for ecosystem services.
- PDE is looking to hire a Mussel Hatchery Construction Project Manager to manage flow dynamics and building construction.
- The long-term plan for the hatchery is to have a central hatchery with satellite facilities in all three states in the Estuary.
- We currently have freshwater mussels at Longwood Gardens and Winterthur and are conducting some living resource monitoring.
- We will be looking at water quality benefits and the carrying capacity for mussels in streams.
- **S. Kilham**: There has always been a gap in the monitoring of living resources.
- **N. Suk**: Freshwater mussels can provide a great benefit to water quality, but DRBC is working on setting new targets for point source discharges and new controls.

- Freshwater mussels may not be able to achieve DO levels alone and need to be combined with the cleanup process and more regulatory point source and non-point source targets.
- The mussels can help keep it clean, but not clean the waterways completely.
- This can be misleading to the public that bivalves can clean up waterways when it starts with targets set for stormwater and point sources.

6) Other Business

- **D. Kreeger** reminded meeting participants that the next STAC meeting will be the annual joint meeting with the EIC in October.
- The annual Experience the Estuary Celebration will take place on September 27th at the Waterfall in Claymont, DE (same location as last year).
- **J. Yagecic** provided the schedule and next steps for the overall DO project for revised nutrient criteria plan (dependent on resources available):
- The model development is to be complete by end of 2018.
- Working with the state co-regulators on early action to achieve estuary DO and sending a letter to DO point discharger facilities.
- DO for sensitive species this year from June – July with a report is expected.
- Intensive data collection will take place through June 2020 with point discharge data collected during the same period.
- The model and calibration will take place through 2020 with a technical cost evaluation being conducted through 2020 as well.
- We will also be determining waste load and load allocation and determination of higher DO and protection of aquatic species in 2021.
- Public comment, new aquatic life use, and DO criteria will take place through June 2023.
- The determination of TN and TP will be conducted by December 2023.
- Publication and public comment on new Estuary TN and TP criteria will be done by December 2024.
- **Dan Caprioli**: Related to Bartram's Garden, we've been negotiating on a small restoration site to get William Penn funds to match dollars and are looking at and agreement with them this August for restoration.
- **D. Kreeger**: PDE proposed two living shoreline designs for the Bartram's site and also has funding to have a float lab. We're currently working on the design with the Schuylkill Trail ending at the location of the site.
- **Heather Heckathorn (USGS):** Participating in a collaborative effort with the U.S. National Parks Service for a microplastics study in parts of the Delaware River
- Looking at 4 to 5 categories of microplastics as a one-time sampling.
- The collaborative is part of a national study, but is geared towards the northeast and is sampling the water column with a mesh net.
- We're conducting a separate landscapes study of 30-50 sites for microplastics in different flow conditions.
- **D. Kreeger**: There are all different levels of microplastics that can get through filter feeders (2-50 microns). If you're sampling above that range, you're missing that vector into the food web.
- **S. Kilham**: It would be nice to see a special session on microplastics at the Science Summit.

- **D. Kahn:** Delaware Fish & Wildlife initiated a sampling program to sample the Brandywine and Christina river for anadromous fish (shad, herring) using seine surveys.
- The site in the lower Brandywine shows good production of American Shad.
- Didn't know how much spawning was occurring, but the surveys are showing quite a bit of production and planning to continue the program.
- Waiting to hear about what is going on with the dam on the Christina.
- White Clay breached one dam, and now fish can pass through to the next one.
- The streambed below the dam that was breached filled in with sediment to point where fish could no longer swim through it.
- The lowest dam on the Brandywine came off and American Shad can get over it during high tides.
- There are 11 total dams on the Brandywine, but they need to bury sewage pipes.
- **D. Bushek:** Conservation groups have reported 34,000 Red Knots moving through this year, which is the highest level in 20 years. The horseshoe crabs are showing really strong spawning, with egg counts very high on the beaches this year.
- **L. McGeorge**: New Jersey initiated a harmful blooms strategy last year and will continue this strategy.
- This strategy informs people around New Jersey waters that see blooms how they can avoid it and report it.
- There's a hot line set up and links on the NJDEP website on how to report HABs.
- The program is primarily focused on drinking water and recreational waters along beaches, but also looks at monitoring and response.
- This is a topic of increasing concern and are looking at how to respond in an appropriate manner. Many other states are conducting similar programs right now.
- **S. Kilham**: We would expect very few blooms in the tidal Delaware River based on the high nitrogen content. Diatoms dominate the Delaware Bay and can outcompete the cyanobacteria, so good to have things that can inhibit the cyanobacteria.
- **L. McGeorge**: There are also concerns over pet deaths (dogs) and impact of cows, so there really is more than just recreational and water supply concerns.
- **S**. **Kilham**: So you include dinoflagellates in this study?
- **L. McGeorge**: No, just cyanobacteria that produce toxins.
- Just contact with them can cause dermatological impacts.
- EPA also has an excellent website on cyanobacteria.

Adjourn at 12:43PM