



Annual Joint Meeting of
**Science and Technical Advisory Committee (STAC) &
 Monitoring Advisory and Coordination Committee (MACC)**
 (STAC No. 35)
 Tuesday, February 24th, 2015
 9:30-2:30 P.M.
 Delaware River Basin Commission – West Trenton, NJ

I. Call to Order & Introductions

- At 9:45 am, Sue Kilham (STAC Chair) called the meeting to order and asked attendees (including on phone) to introduce themselves.

Name	Organization	STAC	MACC	Others
Gregory Breese	USFWS	X		
Laura Craig	American Rivers	X		
Thomas Fikslin	DRBC	X		X
Jeff Fischer	USGS	X		
Dorina Frizzera	NJDEP	X		
Heather Jensen	USACE	X		
Susan Kilham	Drexel University	X		
Danielle Kreeger	PDE	X		
Peter Rowe	NJSGC	X		
David Wolanski	DNREC	X	X	
John Yagecic	DRBC	X		
Tom Imbrigotta	USGS		X	
Leslie McGeorge	NJDEP		X	
Darvene Adams	EPA R2			X
Kelly Anderson	PWD			X
Kurt Cheng	PDE			X
Priscilla Cole	PDE			X
Jacob Gibs	USGS - Retired			X
LeeAnn Haaf	PDE			X
Douglas Haltmeir	NJDOH			X
Bob Limbeck	DRBC			X
Ron MacGillivray	DRBC			X
Kenneth Najjar	DRBC			X
Erik Silldorff	DRBC			X
Namsoo Suk	DRBC			X
Jessica Sanchez	DRBC			X
Bob Schuster *	NJDEP			X
Margaret Novak *	NYSEC		X	
Bill Heddendorf *	NJDEP			X

Alan Hrohan *				X
Alan Ambler	NPS		X	
Jamie Myers	NPS			X

* denotes call-in

II. STAC Business

- Sue Kilham sent around draft minutes from the 12/11/14 STAC meeting for final review and editing by any STAC members present (minutes were also sent by email).
- [prior to lunch] Sue confirmed that all STAC members present had had a chance to review and offer edits, noting that only a few small edits were received. Sue asked for a STAC vote on whether to accept the minutes contingent on incorporating the edits. The STAC voted unanimously to accept the 12/11/14 minutes contingent on edits.

III. MACC Business

- John Yagecic reported that the last MACC meeting was also held in December, 2014, which had the usual updates and networking. The agenda and notes from the MACC meeting are available for review. Need candidates for vacant MACC slots. (John Y.)

IV. Orientation and Meeting Goals

- Danielle Kreeger thanked the MACC for agreeing to meet jointly with the STAC once per year. She summarized reasons for why this annual meeting serves important needs of the Delaware Estuary Program (DELEP). One key action in the Comprehensive Conservation Management Plan (CCMP) is to help coordinate monitoring, which was the original reason for the formation of the MACC.
- Over the years, the MACC has evolved to serve other needs in addition to DELEP. Every 5-10 years, it might be useful to view monitoring “top down” at the larger watershed scale to inventory monitoring needs and existing infrastructure and working jointly to fill any gaps. This was last done in 2007 via the scoping for a Delaware Estuary Watershed to Ocean Observing System (DEWOOS), which was the Delaware River and Bay Pilot for the National Water Quality Monitoring Network.
- In last year’s STAC-MACC meeting, it was decided that in the intervening years between watershed-wide assessments (like DEWOOS), monitoring coordination is best achieved by organic efforts to address emerging monitoring needs and joint efforts to sustain key existing infrastructure and programs. Gap filling tends to happen organically whereby different sectors and organizations respond to needs opportunistically.
- Hence, the goals of our meeting today are to:
 - share information regarding current monitoring efforts,
 - discuss current and future needs, prioritizing if/where needed (as per last year’s prioritization exercise),
 - identify ways to address needs, forming collaborations where appropriate.

- Questions about DEWOOS:
 - Are the gaps noted from National Water Quality Network similar to those that were identified in DEWOOS? (Leslie McGeorge)
 - They are the same thing (Danielle)
 - DEWOSS included more than just gaps, as there were also options to fill them with costs (Tom Fikslin)
 - The National Water Quality Council (I'm a member) is looking at those gaps now. Since the Delaware Basin was one of the pilots, perhaps there will be new opportunities. (Leslie)
 - That would be great, and note that some of the gaps identified in DEWOOS have already been partly filled, such as for coastal wetlands (as per the Mid-Atlantic Coastal Wetland Assessment since 2010). MACWA originated from DEWOOS where it was first articulated as a gap to be filled. (Danielle)
 - Jonathan Sharp also used DEWOOS as a call to launch the ferry monitoring. Currently, he's looking to update equipment on the ferry. He is slowly giving responsibility to someone else. (Sue)
 - There are two UDel people involved; one was named Dana (Tom F.)

V. NEP/EIC Updates

Update on PDE Plan for Revising the CCMP

- The DELEP CCMP is almost 20 years old. EPA is requiring a full revision of CCMP's for estuary programs where the plans are more than 10 years old, including for DELEP. The STAC has been working with the EIC to identify which sections and actions have been completed, which are still in progress, and which are obsolete. (Priscilla Cole)
- Revising the CCMP is expected to require significant time and resources. We have until September 2018. Currently, folks are working to lay out the plan and process for the revision, and the process plan is expected by September of 2015. Since there are no new resources available, we need to find a way to revise the CCMP by reallocating existing resources. (Priscilla)
- Hence, we may need to push back the timeline for the next State of the Estuary Report. Another emerging idea is to somehow do an update to the State of the Estuary Report as part of the CCMP revision, perhaps by simply updating TREB for only those indicators where we have new data since 2012. (Danielle)
- Complicating matters a bit, PDE and partners also recently completed our first ever set of Measurable Goals, and we're now moving forward with steps to track implementation of goals. It is uncertain whether and how PDE and our DELEP partners can tackle these goals along with the CCMP revision and possibly SOE/TREB. (Danielle)
- There is some discussion about possibly hiring a contractor to assist with the CCMP revision. (Priscilla)
- There is also some discussion about linking and separating the timing major DELEP products (CCMP, SOE, Goals) in the future, such as revising the CCMP every 10 years, updating the CCMP every 5 years, and tackling SOE reports and Goals checkups in intervening time slots. (Priscilla)
- Question: How does the Strategic Plan fit in? The Strategic Plan is for PDE only, which is used to prioritize what PDE does for DELEP and for other grants and programs. PDE is responsible for operating DELEP, but DELEP itself includes many partner entities, the states. The PDE Strategic Plan

is also updated every 5 years and the STAC is invited to help us chart our entity's goals. But the CCMP, SOE/TREB, and DELEP Measurable Goals are of broader interest to groups like the MACC. (Danielle)

- We already had one CCMP planning meeting . We will be meeting monthly. Although the format of the new CCMP has not been decided, there is some interest in replacing the current format with a simplified format that directly aligns with the Measurable Goals categories: healthy waters, healthy communities and healthy habitats. The goals have short and long term actions. There is emerging consensus that the new CCMP does not need to be fully comprehensive of all environmental actions, and it can be focused on promoting the short-term Measurable Goals. Since the CCMP will at least be updated every 5 years, the actions in the CCMP can be revised to match changes in Measurable Goals as they evolve.

Goals > Actions > Monitoring > Indicators of Progress,... revise Goals, repeat.

So although revising the CCMP sounds daunting, we already have the groundwork to start from. We already had a lot of thought involved. (Priscilla)

- Many think old CCMP is too long. It's over 300 pages, which is not very approachable and is hard to track. The general feeling of the EIC is that the new CCMP should be kept under 100 pages. (Priscilla)
- We reviewed how 3 other NEPs revised their CCMPs. There are different models for contractors. Do we edit line by line? Do we do a state of the estuary style? (Priscilla)
- The next CCMP planning call is set for March 12th. EPA Region 2 is hosting an Adobe connect (similar to webinar). Everyone is invited to participate. We'll be going through existing documents for other CCMPs to see where similarities are and where areas are missing that we might want. We're trying to build an outline for the new CCMP. (Priscilla)
- So if there is no new funding, will hiring a contractor mean that money needs to be taken out of another pocket? (Sue)
 - (Priscilla) Yes, there is talk of moving money away from some of the work that PDE does to promote regional restoration, such as operating the Restoration Workgroup and the Alliance for Comprehensive Ecosystem Solutions. There is also talk about pushing back the timing of the next SOE report, or maybe just doing a smaller SOE update. We're also planning to ask the Steering Committee members if they can provide additional resources, or ask contractors that may be on staff with partners.
 - And there is a possibility of marshalling some funding for climate change via specific grants. (Tom F.)
- Please let us know if anyone has any other ideas for funding the CCMP revision. (Priscilla)
- We have Measureable Goals (about 21 short term), 77 CCMP actions, and about 50 indicators in TREB. This is an opportunity to align goals, actions and indicators. But it will mean that some important pieces might not be included if they don't align perfectly, especially since the Goals are more limited/specific. But by syncing up categories, we will increase efficiency and everything gets at least updated every 4-5 years. There is never enough resources to do everything anyway, so this will help focus our shared priorities. (Danielle)
- For the CCMP updating, the STAC will be a pivotal contributor. We are also inviting anyone from the MACC if you have time and are interested. This is your opportunity to have a direct say in the next DELEP plan document. (Danielle)
- I'd recommend at least one face-to-face meeting for CCMP update meetings. (Ken N.)

- I'm glad to hear that the goals, actions and state of estuary reporting are being aligned. The strengths and areas of focus will change over the years, so this will allow for changes. (Pete R.)
- Although 2018 sounds like it is far away, the CCMP revision will need to be a fast, front-end loaded effort due to what is sure to be a lengthy review and approval process. It took 2 years just to update the current CCMP by noting the Regional Sediment Management Plan. (Danielle)
 - It might be a good idea to integrate SOE to CCMP. (Dave W.)
 - In 1996, there were 5 focus areas. At least have a consistent target which can be incorporated into CCMP. (Tom F.)
- I support the idea of alignment. There are a lot of good reasons to align goals, actions, etc. It is the right way to go for efficiency. Is there a requirement to produce the SOE? (Leslie)
 - An NEP of our size needs one every 5 years. There is a little flexibility since the CCMP revision was not foreseen, and EPA recognizes this. (Danielle)

Discussion on PDE's Measurable Goals

- The goals are meant to be drivers and are framed for the public. Categories are healthy waters, healthy communities and healthy habitats. (Danielle)
- For each goal there are short and long term goals. If we are on track for short term goals, then we will be on track for long term goals. Some goals may already be addressed by existing programs, whereas others may need new programs or funding. (Danielle)
- We tried to identify groups, leaders, and volunteers to be in charge of different goals. If anyone on the MACC can assist or serve as a point of contact, please let us know. Some of these goals are proving to be difficult to track/measure, such as urban brownfields. EPA doesn't inventory brownfields, and the states don't either. So that's an example of one that we need help with. (Danielle)
- For those unfamiliar with the CCMP, the action items in the CCMP are addressed in the goals. We have a good idea of what we have to address. (Sue).
- So are the goals a suitable framework for the CCMP? (Laura)
 - Hasn't been decided but that's the predominant idea (Priscilla)
 - Developing measurable goals was happening before we knew about updating the CCMP. But now we want to align for the future. But we don't have all of the expertise needed. (Danielle)
- The STAC always wants to know about gaps. If there are things we aren't doing or not seeing, we want to know. (Sue)
- How do the "actions and needs" listed in the State of the Estuary report match up with the goals? (Peter)
 - Similar to the Measurable Goals, TREB actions were developed prior to learning about the need to revise the CCMP. They are also focused mainly on things needed to strengthen our indicators monitoring abilities. They are just another piece of information that warrants checking as we revise the CCMP and implement goals. (Danielle, Sue)
 - Another issue is that TREB only included indicators for which we have data, but it misses some potential good indicators for which we don't have data. (Danielle)

Recap of Science and Environmental Summit

- Thank you to everyone who attended, moderated, funded and helped out. We had a record amount of presentations (about 140) with 3 concurrent sessions. Dr. Kilham received the Jonathan Sharp lifetime achievement award. We're looking for feedback for future meetings. (Danielle)
- All presentations are up on PDE's website based on author permission. All posters are online. Proceedings should be completed and up by next week. (Priscilla)
- There were a lot of good discussion sessions and panel sessions. Hopefully the proceedings will capture some of the main messages because they can be useful to guide action items. (Peter)
- We had some heat from over-scheduling in the past. So this time we allowed more time for unstructured networking and interaction. The looser schedule seemed to encourage more interactions among attendees. (Danielle)
- The continued growth is encouraging, especially because many large conferences are seeing declines. To see the growth and high quality of the talks is great for the region. (Sue)
- It was an impressive event, and many folks really look forward to it. (John Y.)

VI. State of the Estuary and Basin Report Planning

- Both the STACC and MACC have been deeply involved in previous State of Estuary/Basin Reports, most recently drafting the TREB in 2012. Priscilla coordinated that effort using various subgroups per chapter, which met as needed and by conference call. Different chapters also had different lead authors and peer-review processes. (Danielle)
- TREB served as the technical foundation, from which PDE did a public version SOE and DRBC did a Basin report. As per the usual 5-year cycle for SOE reports, the next report should be completed in 2017. Since it usually takes 2 years, this means we would want to start in 2015. But at present, there are no resources to support a new TREB, whereas in 2010-2012 we had some funds for contractual. We currently don't have a plan, but as mentioned earlier one possible solution would be to simply do an update to the 2012 TREB. Is there even enough fresh data to warrant a new TREB? (Danielle)
- To do a full SOE/TREB would require a lot of resources. (Tom F.)
- We put a lot of effort into the last TREB, getting it finally into a scientific format. Much of the effort was figuring out the format and process. So perhaps an update rather than a whole new report is the best action and might not require as much funding. (Sue)
- Certain chapters could be updated and certain chapters could be completely redone. (Tom F.)
- I agree with the concept of carrying forward the same format and chapter structure rather than creating new ones. It reduces the value if it keeps changing; stay consistent to see changes over time. (Greg B.)
- Definitely there is a need to update some chapters where there are lots of new data (e.g. wetlands). But others like macroinvertebrates may not be ready yet for an update. (Danielle)
- Keep TREB format and update what is necessary. Since we're going to have to look at these data anyway to update CCMP, we might as well do it. Updating the SOE will also help prioritize for the CCMP. If trying to pare down the CCMP, then maybe some of the reinvestment strategy could be allocated to support the SOE update. Also, don't discount the usefulness of the SOE for the states. (Dorina)

- Since both PDE and DRBC are the decision makers regarding SOE reporting, what does DRBC think about when and how to update TREB? (Greg B.)
 - And how does the MACC feel about it? Would a TREB update serve the MACC and DRBC, or should we look for a full re-do, possibly later? (Danielle)
 - DRBC would rather stay on schedule, in sync with PDE. Since we also have limited resources and flexibility, a full revision makes no sense. (Ken N.)
- Action. Priscilla and I can poll previous TREB authors, asking if enough new data exist per indicator to warrant an update, assuming we would finish by perhaps mid-2017. We can also ask them if resources would be needed. We'll look into a survey format, such as via survey monkey. (Danielle)
- On indicators, how do you track performance, the level of resolution, or time frame for detecting change? We do it for water quality. (Jacob G.)
 - We rely on authors for that, since different approaches are needed for disparate types of indicators. These things are discussed in the text of the report and are qualities of the indicator. (Danielle)
- You want to define your data quality objectives per indicator. (Bob L.)
 - We rely on the authors to use their expert judgment, and there is a QAPP guiding the overall SOE effort. (Danielle)
- We also rely on the broader scientific community (e.g. STAC, MACC) for peer review and feedback once chapter/indicator drafts are prepared. (Sue)
- Having options for the TREB would be helpful to present to the EIC. (Danielle)
 - If we present separate packages (CCMP, SOE), then the EIC will think about them differently. (Tom F.)
- Recommendation to EIC. It sounds like there is consensus that we should recommend doing a TREB/SOE update concurrently with the CCMP revision, and pulling from TREB to help guide the CCMP revision; highly coordinated. (Sue)
- Did last TREB have an emerging issue section?
 - Some authors touched on it, others didn't. (Priscilla)
 - Climate change section did. (Danielle)
 - Could augment whole report by a supplemental section focusing on emerging issues or extra stressors.
 - In climate section, we went from about 2-10 issues. There were a lot of new ones. (Danielle)
- Absolutely want new information on things like climate change (Sue)

VII. STAC-MACC Monitoring Coordination

- The Delaware Estuary Pilot Study (DEWOOS Report) was opened and projected to facilitate the roundtable discussion of current and needed monitoring.
- Water Quantity, Water Quality, and Living Resources/Habitats were sequentially discussed/

A) Monitoring Roundtable – Water Quantity and Physical Conditions

Flow Monitoring Discussion

- There have been a lot of discussions about increasing reservoir capacity, for more storage for many reasons. There are different models. USACE also looking at reservoirs. Others can talk about 3D modeling. (Ken N.)
- For monitoring, we're interested in salinity. Considering future scenarios for run-off and sea level rise (SLR), how will the volume change lead to salinity shifts? What are the potential additive effects of SLR, deepening of channels, and shoreline retreat with regard to system volume? It seems as if no model captures all possible volume changes, which will affect tidal range as well as salinity. (Danielle)
 - Change in precipitation cycle also will heavily affect flow and salinity. Intensity and frequency changes. (Sue)
 - Subtle changes in salinity will have large effects on some key biota, such as oysters. Salinity control is one of our 21 Measureable Goals. (Danielle)
- Our target right now is to maintain the salt line. It's difficult to predict what reservoir volume would be needed. (Ken N.)
- We're looking to do basin-wide models. We have an existing model that's being finalized now. The basin wide model can later be refined to tacking on the lower portion of the estuary, but that's far in the future. (Heather J.)
- DRBC currently has a 1D model, which was linked with the Oasis model. To have better resolution, it would be good to compare outputs with the USACE 3D model. We use each model for different purposes, but we should look at whether the different models will respond to similar changes in model inputs. The next step is also to compare model results to real conditions. We need more data and continuous monitoring though. We don't have continuous salinity data near the mouth of Delaware Bay, and we need data from throughout the estuary, not just mouth, to calibrate model. (Namsoo S.)
 - The ferry monitoring is helpful, but since the ferries move, the data aren't at one point of continuous analysis. (Tom F.)
- The volume issue doesn't seem to be well studied, and we're also interested in coastal inundation at high tide for areas where the tidal range might increase. As I understand it, past channel deepening events led to more volume and a larger difference between low and high tide in the upper estuary. So, if the volume is still increasing, how will storm surge scenarios change, focusing on events that co-occur with high tide (i.e., mean higher high water). What are implications for human health and safety? (Danielle)
- Models are used to determine how to meet a benchmark. We can therefore use the model if we know what the ecological benchmark is. (Tom F.)
 - We already know the benchmarks for oysters, generally prevailing salinities >15 ppt.(Danielle)
- Perhaps we should prepare a white paper or STAC Brief that summarizes some of the ecological benchmarks for salinity. Another factor is what will happen in the future for droughts? (Tom F.)
 - I think a STAC white paper on the ecological benchmarks related to the salt line would be useful and doable. Freshwater mussels, freshwater tidal marshes, and oysters both come to mind, maybe sturgeon. There are key living resources that salinity is important for. (Danielle)
- How important is C&D canal data and who is responsible for it? (Sue)

- There's a tide gage, which operates on and off sometimes. Need to add specific conductivity. These are very important data to have. (Namsoo S.)
- USACE's model incorporates upper Chesapeake Bay to see if any river flow could change C&D canal flow. (Tom F.)
- What agencies are responsible for gathering these data? (Sue)
 - A number of companies pay for things, USGS funds some monitoring, DRBC funds some monitoring. We just shifted from Pt. Pleasant to the Delaware River, at Frenchtown, NJ. We shifted priority. (Tom F.)
 - NOAA could add it. They have the infrastructure. Is that the right location? (John Y.)
- Who are you working with Tom? (Heather) UDel doing the ferry monitoring, now that J. Sharp has retired. (Tom F.)
- PWD is studying the impacts of quantity and quality of drinking water intakes. Water quality models are being developed for CSO programs. In a few years, we will have better data to share. We fund specific conductance gages. We have buoys picking up water quality data. Not sure on timeline. (Kelly)
- Regarding a white paper, marine and shellfish folks would be interested in reviewing. (Leslie)
 - Bruce Friedman or Bob Schuster are contacts that may be willing to help input (Leslie)
 - We may look at a few new STAC briefs but want a consensus from STAC. The STAC is a volunteer group, so we will ask them if they would lead this. Action: Danielle will poll the STAC regarding interest in a Salinity Benchmarks brief.
- NOAA PORTS data are used for many for non-navigational needs. The states found some funding to prevent a full shutdown. We need to identify opportunities to keep data from NOAA PORTS going. (John Y.)
- Another water quantity issue to think about is how to identify/define "extreme events". We didn't come up with anything specific in TREB. This idea of benchmarks may be a useful way to say something is 'extreme' if it passes some benchmark. (Sue)
- USGS looked at some parameters with Sandy. There are some meteorological types of assessments for extreme events. (Tom F.)
- We tried a lot of different things on the TREB. I tried to identify low pressure anomalies as surpassing various thresholds, but never found a statistical correlation over time, and it wasn't really telling. Ray Najjar reports various "anomalies" and found a decrease in average wind speed but also with more anomalies. So yes, this is a route to explore more. (Danielle)
- How do you pick your benchmarks, a 5 or 10 year benchmark? Do we decide ourselves or look nationally. (Peter)
- Monitoring of water level changes and volume changes are important for living resources too. For example, plants have optimal growth ranges within the tidal prism. Changes in inundation will adjust plant assemblage and location. Having more water level loggers would be useful. Continuous monitoring would be useful. Not just higher highs, but lower lows. These are drivers of change in coastal habitats. (Danielle)
 - These are the types of questions we would love the STAC to frame for us. Once we have the questions, we can build computer programs to mine NOAA PORTS type data. (John Y.)
- Another issue is that we've been defaulting to NAD88. The best record in NJ is the 1977 baseline of mean high water at the time. Since then, we've had SLR and tremendous erosion, and so we need new data on shoreline positions, and a new vertical datum for NJ. We have models like

the coastal vulnerability index and these are helpful but we still need consistent shoreline and a vertical datum. (Dorina)

- As important as gage stations are, water quality monitoring is needed too. (Leslie)
- We do a good job of monitoring along the upstream-downstream backbone of the estuary, but another gap is the flanks. When you go laterally to the coastal wetlands, river mouths, our monitoring stations disappear, but that is where a lot of the change is occurring. (Danielle)
- It's helpful to look at a map of the PORTS system and see where infrastructure is and is not. (Leslie)
- To maximize data utility per dollar invested, we also need to consider the temporal resolution. Each PORTS gage has 6 min interval water level data. What resolution is useful, 10 minutes, 2 day average, or 4 day average? (John Y.)
 - This depends on the study question, but 10 minute, maybe even hourly intervals would suffice for biology. But daily means or multi-day averages would miss the important extremes (peak heat, peak height, lowest DO) that drive biology. (Danielle)

Turbidity Monitoring Discussion

- In recent years, we've been very focused on sediment budgets for many reasons, and turbidity tracking is important. For example, many coastal marshes depend on trapping suspended sediments to help keep pace with sea level rise. Is there anything new? (Danielle)
 - Reedy Island is scheduled to come out. To me, it's difficult to have turbidity measurements. We have secchi depth and direct measured turbidity to help look for shifts in the Estuary Turbidity Maximum. (John Y.)
- Is there satellite imagery on ETM or some proxy for it? (Pete)
 - Chris Sommerfield did a bit of ETM work in the 2000s. Bigger volume = bigger velocities which will change sediment dynamics. Depending on question, can use existing data to infer. (Tom F.)

B. Monitoring Roundtable – Water Quality

- USGS Update
 - We have a new water quality meter at Frenchtown, NJ. (John Y.)
 - Though it's funded for 5 years (Jack G.)
 - Frenchtown does have turbidity. (Jack G.)
- DRBC updates:
 - reallocated some funding to add conductivity to the Callicoon, NY meter. This was in response to concern about fracking and aqueous waste.
 - We're looking to stand down HOBO stations that we do maintenance on. Last year, explored top and down DO loggers. Looking to deploy DO loggers in spring and summer this year.
 - Bob Limbeck looking more careful at WQ at data in the lower non-tidal river. May be able to demonstrate impact of SPW program and its success. (John Y.)
 - How did you select the sites for the top and bottom DO loggers? (Dave W.)
 - It was just a demonstration, but this spring and summer we want to look at more locations targeting areas of interest. (John Y.)

- How does ice on the river affect DO? (Sue)
 - In non-tidal areas, DO is usually at or close to saturation. (John Y.)
 - Actually, we sometimes have super-saturation due to pH around 8.5-9. Some diatom production as well under ice super saturating water. (Erik S.)

Discussion on Ammonia

- It seems that ammonia/ammonium is a growing concern for benthic organisms. For example, in some areas we see heavy shell erosion of freshwater mussels, usually on areas of the animals that are below the sediment surface. Could high alkalinity or other conditions encourage ammonia over ammonium, as per David Strayer's research, possibly contributing to shell erosion, especially in juveniles? (Danielle)
 - Most is (ammonium) NH_4 naturally. NH_3 concentration is low and that is the toxic form. (Namsoo)
 - Is it just acid rain? (Dave W.) No, doesn't seem to be a problem with water column pH, just sediments. Possibly microbial N processing? (Danielle)
 - That's a good point that there may be another biogeochemical pathway. (Erik)
 - Sewage treatment has been better and so ammonia and ammonium have gone down. Shouldn't be more these days than in the past. Nitrate goes up but not ammonia. But the estuary is different. Non-tidal tributaries should be regulating ammonia heavily. (Jeff)
 - In River, excess ammonia may need to be reconsidered. Oxygen demand will be affected by low flow and ammonia. Perhaps facilities/plants would be regulated to not release ammonia in the summer. I see that in the future. (Sue)
- We need a model before we can act on ammonia toxicity. DO has recovered enough from where we set our goals in 1967. (Erik)
 - The problem is just barely above the DO level. (Sue)
 - Striped bass are doing good, shad, white perch okay, Atlantic sturgeon aren't doing great. Tom Fikslin is working with others on studies with sturgeon and DO tests. (Erik)

Discussion of General Nutrient Loadings

- When you get into the estuary, coastal marshes are thought of as nutrient sinks. As we lose our wetlands, does this that implications for nutrient management? Are nutrient models capturing changes in nutrient sinks as a result of climate change? (Danielle)
- DO and nutrients in coastal marshes aren't as simple as we thought; e.g. Murderkill study. (Dave W.)
- True, there seems to be increasing spatial variability in many ecosystem services. Since marshes hold lots of buried nutrients (and C) and since we're losing an acre per day with associated peat, what would naturally be a sink could turn into a source under disequilibrium conditions. This could have important implications for water quality along with fish production, coastal flood protection, C capture, etc. (Danielle)

NJ Update

- We have the 2015 National Coastal Condition Assessment this year. There are tentative stations picked. (Bob Schuster)

- Final site selection will happen soon, and May 12-14 is set for training. We're doing the fish trawls ourselves.
- Continuing *Vibrio* monitoring in oyster tissue, related to shellfish sanitation monitoring. Also looking at effect of ice storage and handling processes.
 - We also have 10 HOBOS to deploy throughout the estuary to monitor temperature, and its relationship to *Vibrio*.
 - We're monitoring TSS and chlorophyll as well. We did DO, pH, and salinity at the surface and bottom. We're going to focus on different oyster beds and their salinity and temperature. We're hoping to have May through August data. (Bob S.)
- We will continue baseline sampling for nutrients; fewer sites but more frequency. (Bob S.)
 - Do you measure Silica? (Sue)
 - Yes (Bob S.)
 - Diatoms are the food for many organisms and so this is important. (Sue)
 - We stopped doing dissolved fraction of silica one year ago. Only in Barnegat do we do the dissolved fraction. (Bob S.)
 - Of course, diatoms require silica. The first year I was here, I measured silica and found no silica between Ben Franklin bridge and Trenton. Found out diatoms in fringing marshes stripped all silica from the water, a tremendous amount of silica. This meant that there were no planktonic diatoms in the river itself. Bioturbation releases some silica lower in the bay. If there is silica, diatoms can out-compete harmful algae blooms. Can follow Si:N:P to see what phytoplankton you will get. (Sue)
 - Benthic diatoms are really fundamentally important. "Secret Garden". They support infaunal organisms that fish can feed on. (Danielle)

Seston Monitoring

- As part of an oyster monitoring study funded by the USACE, the Academy of Natural Sciences of Drexel has been I've been analyzing quantity, quality and biochemistry of microparticulates (seston) sampled from surface water above oyster beds in DE and NJ, since 2000. Also, chlorophyll. This is to help model food conditions, needed for models of oyster production. Each year, 8-18 stations are assessed, including some stations without oysters to parameterize the models and to assess grazing impacts. (Danielle)
- Striking trends are emerging that suggest a decline in seston quality over the 14 year time span. The bioavailable fraction (protein, labile carbohydrates, chlorophyll) has dropped year over year, and the refractory component has increased. We now suspect that this could help explain a 6 year prolonged failure in oyster recruitment. (Danielle)
 - The quantity of particles seems to be similar among years, but the quality has declined. Oyster fitness generally declines with higher turbidity and increases with higher organics.
 - More than half of the organic fraction of seston is now comprised of non-bioavailable refractory material. Protein has dropped more than other components.
 - The environment may have been different in early years, but nothing comes to mind that could explain this. (Jeff)

National Monitoring Network

- Regarding DEWOOS and the National Network, there hasn't really been a lot of activity since the Delaware Pilot report was issued in 2008. But Dan Sullivan from USGS Wisconsin is now taking a fresh look at gaps in the national network, particularly with regard to nutrients. If there are sites in this estuary that are a high priority for adding nutrient monitoring, and we can get agreement, then perhaps we can see if this gap can be addressed. (Leslie)
- There is also the potential to move sites or highlight critical habitats/sites in the estuary for nutrient monitoring. (Leslie)
 - STAC generally defers to DRBC for nutrient monitoring. (Danielle)
 - Reedy Island had a limited period of funding for turbidity and we didn't push to keep it. We do multiple species of nitrogen and phosphorous. (John Y.)
- We have also added monitoring to where priorities were identified e.g. natural gas. DRBC is not able to respond to fill gaps in national network, but instead we need to focus on local priorities. (John Y.)
- I thought the national monitoring network was coastal? (Jeff)
 - The real name is the National Monitoring Network for U.S. Coastal Waters and Tributaries. (Leslie)
- Action. I can talk to Dan Sullivan and then give the STAC an update on the status of the National Network. (Jeff)

Discussion of Monitoring Cuts

- Any potential losses of monitoring infrastructure for 2015? (Tom F.)
 - There is a lot we still don't know, but for those unfamiliar there was a NJ ballot referendum to change how funding from the corporate business tax gets allocated within NJDEP. To date, this has been one of the few funding sources that has supported water monitoring in the state. As a result of the referendum passing, \$10 million of the \$15 million has been reallocated to open space purchases. There's currently sufficient funding to sustain water quality monitoring for one year. But afterwards, we're not sure how this monitoring will be sustained. (Leslie)

Emerging Contaminants

- In the last SOE, we had an action to improve studies and monitoring for emerging contaminants. Anything new to report? (Sue)
 - Some work on PFC work underway in Mantua Creek as a result of the train car derailment and spill. Some funding from CDC for the work. (Tom F.)
- Emerging pollutants are not able to be assessed in state labs, since our work responds to the regulatory environment. (Jack G.)
- We jumped through considerable hoops to find a lab to process some pollutant samples. (Dorina)
- We have an RFP out for sediment, fish, mercury, methyl mercury, etc. We sent out to 4 labs already. (Tom F.)

C. Monitoring Roundtable – Living Resources & Habitats

Biological Endpoints

- Most water quality monitoring programs focus heavily on assessing dissolved forms of pollutants, such as nutrients. Sometimes total and dissolved. But since the biological community often sponges dissolved nutrients up quickly, where do we stand on developing biological endpoints, such as nutrients bound up in algae (seston) or epiphytes? (Danielle)
 - There is lab capability to do it. (John Y.)
 - Fates and effects of nutrients are unknown and important. Need to develop a way to understand. What biological group of organisms could be used? It's a conversation that needs to happen, but we're not ready right now. (Erik)
- In DELEP, we often get frustrated by characterizations of this system as being free of nutrient issues, despite high loadings. New studies suggest that the ability of coastal marshes to keep pace with sea level rise partly hinges on their production of root systems adapted to scavenge for nutrients, but nutrient loadings lead to less belowground production and compromised elevation over time. Hypothetically, this could be an important piece of the puzzle explaining our high rates of wetland loss. (Danielle)
 - Besides the paradigm, there are some technology limitations to consider. (Dave W.)
- Another concern is stoichiometric ratios of nutrients. Shifts in ratios (e.g., N:P) may be ecologically important. For states and USGS, do you look at ratios of nutrients? (Danielle)
 - I think in water quality standards world, that's really tough. (Erik)
 - Ratio of nutrients is what links nutrient monitoring to the living world, even more than the absolute loadings. (Sue)
 - If this group can tee up questions in a meaningful way, we can start to get answers. We can provide the results available and see if it's sufficient, and go from there. (John Y.)
 - Nutrient ratios are important, and I know the Academy of Natural Sciences is working with diatoms as a result of ratios in freshwater systems. (Leslie)
- There have been attempts to link nutrient impacts to biological endpoints for a long while but no one has found a smoking gun. (Dave W.)
- It's axiomatic that marshes are seen as nutrient sinks, so studies tend not to look at effect of nutrients on marshes. (Dave W.)

Shellfish

- Oysters. Haskin lab reported that oyster populations have not fully recovered after significant storms reducing salinity. (Danielle)
 - Dermo disease pressure was low this past year and recruitment remained low. (Kurt Cheng)
 - USACE shell planting is not quite dead. Just FYI, more of a policy issue. (Heather)
- Freshwater Mussels. Danielle summarized recent mussel survey data and reintroductions, led by PDE.
 - How are you going to map freshwater mussels? (Tom F.)
 - Looking at side scan sonar. PWD may have some capabilities. (Danielle)
 - NJ had equipment to do some sonar in the shallows. (Dorina)
 - Any relationship between abundance and sediment chemistry? (Tom F.)
 - PWD did a lot of sediment chemistry. (Danielle)
 - Grain size was most interesting metric (Priscilla)

- If 309 assessment strategy takes first 3 years to plan and last 3 years to change existing management program, your study area would be to correlate findings e.g. mussels and habitats. Could ask coastal programs. You would be identifying areas of particular concern. (Dorina)

VIII. Workgroup Updates

- Wetlands. There was an annual meeting of the Mid-Atlantic Wetland Work Group earlier in February. Attended by multiple state and academic partners. This year, PDE will be performing rapid monitoring assessments in Appoquinimink, DE, and we'll be sustaining monitoring at our 11 fixed stations in Bernegat and Delaware Bays. (LeeAnn)
- Sediments. A Regional Sediment Management Workgroup meeting was just held. (Danielle)
 - Planning a sediment survey mainly for PCBs. But it will add to 2008 DEBI and 2010. (Tom F.)
 - Rick Greene wanted to take out PCBs in Mirror lake. Put sediment in there instead of excavation and got almost a 95% reduction in available PCBs in the sediment. Amount \$1mil for 20-40 acres. Worked with multiple state agencies and DNREC. (Dave W.)
 - This was presented at the PDE Summit and it's on the website for viewing. (Priscilla)
- Living Shorelines. The Delaware Living Shoreline Committee met and there is also now an ad hoc NJ Living Shoreline Committee forming. We're trying to standardize monitoring within and between the states. (Danielle)
 - Monitoring of NFWF Post-Sandy projects is a current topic of high interest, and there is some interest in applying PDE-led wetland protocols and LS monitoring framework. We want the monitoring to be scientifically defensible.

11) Upcoming Events and Notices

- NJ Sea Grant. Thanks to all who contributed to the new RFP. We should be able to support more proposals moving forward. (Peter)

12) STAC Business

- Regarding possible future STAC Briefs, several ideas have been proposed to address various emerging information needs:
 - Salt Line. Monitoring changes in salinity and the location of the Estuary Turbidity Maximum are fundamentally important for tracking changes in ecological conditions. What do we know and not know?
 - Nutrient impacts on shellfish and wetlands. One of the new Measureable Goals is to examine and address any nutrient impacts to key resources, focusing on emerging information regarding ammonia toxicity to mussels, and effects of nutrients on peat accumulation in marshes. What do we know and not know?
 - Several other topics have been proposed, but we'll need to poll STAC members regarding interest in a future meeting.
- Discussion on dates and timing of future meetings. Regarding the annual joint meeting of the STAC and EIC, Jen Adkins indicated that it might need to be in August this year, earlier than in the past. We need to have a regular STAC meeting before then.

- Tentative STAC meeting: Wednesday 20th May 2015 at PDE office.

2:55pm Meeting Adjourned