

OUTFALL MONITORING SCIENCE ADVISORY PANEL MEETING

October 3, 2019

10:00 AM to 3:00 PM

Stellwagen Bank National Marine Sanctuary



AGENDA

1. Welcome and Introduction (10:00-10:15 AM)

Matt Liebman, EPA (general welcome remarks)
Pete DeCola, Superintendent, SBNMS
Judith Pederson, Chair OMSAP (today's agenda)

2. Public Review Process (10:15-10:20 AM)

Matt Liebman, EPA

3. MWRA Update (10:20-11:20 AM)

Quick Review of April 24, 2019 report on 2017 and 2018 data, Betsy Reilley, Director MWRA, Environmental Quality Department, (slides available at:
<https://drive.google.com/open?id=12c9iJtcbjvES1x6sC6O5JouwFF5QMdRQ>)
Special MWRA Report: Current Status of Red Tide Event, Scott Libby, Battelle
Presentation on Status of Bay Eutrophication Model, Dan Codiga, MWRA

4. Background, Purpose and Overview of OMSAP Informational Science Meetings (11:20 AM-11:50 AM)

OMSAP discussions on processes and issues relating to request for revisions of Ambient Monitoring Plan, contaminants of emerging concerns, climate change, and special topics. Review of four AMP questions and MWRA responses. For each AMP area, OMSAP will review recommendations of informational discussion group and put forth a consensus opinion. Below are the four topic areas.

Legacy Contaminants in Sediments
Redox Potential Discontinuity
Precancer Disease Monitoring
Contaminant Monitoring of Flounder, Lobster and Mussels Tissues

5. Passive Sampling (Polar Organic Chemical Integrative Systems (POCIS)) (11:50 AM-12:15 PM)

Loretta Fernandez, Northeastern University and OMSAP Member

Next Steps: Judy Pederson (12:15-12:30 PM)

LUNCH 12:30-1:15 PM

6. Contaminants of Emerging Concern (1:15-2:30 PM)

What we know and what we don't know. This discussion will include a short presentation on CEC monitoring in other wastewater treatment facilities (WWTP), status of standards and regulations, and potential impacts. To date we have focused on organic chemicals such as fluorinated hydrocarbons and pharmaceuticals and personal care products and will be adding plastics to the discussion. OMSAP is requested to identify a process for moving forward in anticipation of making a recommendation on inclusion in future ambient monitoring.

7. Overview of OMSAP Informational Meeting CEC Monitoring in WWTPs:

Summary of WWTP monitoring of CEC, Todd Callaghan, Massachusetts Coastal Zone Management (1:20-1:35 PM)

Massachusetts focus on CECs, Cathy Vakalopoulos, Massachusetts Department of Environment (1:35-1:45 PM)

Update of monitoring in Mass Bay, Anna Robuck (1:45-1:55 PM)

General Discussion 1:55-2:20 PM)

Next Steps: Judy Pederson (2:20-2:30 PM)

8. Future OMSAP Informational Meetings and Topics (2:30-2:45 PM)

9. Public Comment (2:45-3:00 PM)

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Stellwagen Bank National Marine Sanctuary office

Scituate, MA

Meeting notes drafted by Cathy Vakalapoulos and Matt Liebman. We may have missed some attendees.

Welcome

Judy introduced the meeting.

Pete DeCola welcomed everyone to the SBNMS office.

We mentioned a few ground rules. Mainly, let OMSAP members speak first.

Matthew Liebman, EPA, Public Review Process

Reviewed the public review process for proposed revisions to the MWRA outfall monitoring plan. There are opportunities for public review both formally and informally. SBNMS and NMFS are also key players for review.

Matt also discussed the mailing list. The contingency plan MWRA listserv seems to be working now. If you want to be on this listserv, which primarily is used for notifications of exceedances, or meeting notices, then please contact Wintrob.paul@epa.gov.

For meeting planning purposes, we keep another mailing list. There is a lot of overlap on these lists. If you want to be on that list, contact Matt Liebman at Liebman.matt@epa.gov

Betsy Reilley, MWRA Outfall monitoring overview and update

2019 is the 28th year of outfall monitoring. Good plant performance, receiving awards, metals loadings decreasing. 2018 Outfall monitoring overview will be released November 15.

Karenia bloom in Boston Harbor. Red tide bloom extended into July and August and exceeded contingency plan threshold of 100 cells per liter through late July. Dissolved oxygen levels are normal.

2017 and 2018 sediment monitoring show no exceedances, among lowest measured. No Contingency Plan thresholds exceeded. Fish tissue monitoring showed low levels, and liver lesions in flounder lower than baseline in Boston harbor.

Overall, results show no adverse effects to Mass Bay.

Scott Libby, Battelle, *Alexandrium* Bloom

Rapid response kicks in when cells exceed 100 per liter. Cysts were low, so a small bloom was forecast for 2019. But the bloom was comparable to large blooms in 2005 and 2008 and carried over into July, when there were over 24,000 cells per liter. And, it was detectable in Plymouth and Scituate, which is downstream from the outfall. By August, the bloom ended.

The “outfall effects hypothesis” is that cell numbers should be higher south of the outfall than in the north of the outfall. This year there were higher numbers in the nearfield, but the data do not suggest that the outfall enriched the bloom southward. Based on looking at some physical drivers, there was a high Merrimack River plume, which caused a more “slippery” layer. And, there was some wind forcing in May that caused the bloom to enter Mass Bay. Due to the warmer than average temperatures, and high rainfall, there was a lower salinity plume entering Mass Bay, and it was more stratified than usual throughout.

There are elevated nutrient concentrations at the pycnocline, and dinoflagellates are known to move up and down the water column seeking nutrients. Using a modeling approach, NOAA is evaluating the hypothesis that the river discharge brought more nutrients into the bay. MWRA providing data for this modeling effort. And, MWRA collected sediment samples to be analyzed for cysts.

Carlton Hunt described the issue of dissolved organic carbon providing a complexing agent. Specifically, a study from the west coast looking at humic and fulvic acids showed that they bind with copper reducing copper toxicity. He suggested that perhaps the dissolved organic matter discharged from rivers may reduce the effects of copper toxicity on *Alexandrium* blooms thus increasing the likelihood of a bloom. Here is the paper mentioned by Carlton):

<https://www.sciencedirect.com/science/article/pii/S0025326X14003361?via%3Dihub>

Dan Codiga, Bays Eutrophication Model

The NPDES permit requires that MWRA run the Bays Eutrophication Model annually, which is usually done in hindcast mode. It’s a hydrodynamic and water quality model. It usually confirms monthly observations. It has been helpful in documenting influence of nutrient impacts to the bay.

The new model contract is with Deltares USA for 3 years. It is commercially available, and the tailored Mass Bay model will be owned by MWRA. Currently running it through its paces, by comparing to previous years runs.

Judy Pederson, OMSAP discussion on Informational Science meetings (aka ad hoc subcommittee to address revisions to the outfall monitoring plan.)

Sediment contaminants

We relied on information provided by MWRA in response to a set of criteria that Matt Liebman devised.

The committee felt that eliminating legacy (i.e. metals, PAHs, PCBs, pesticides) contaminants in sediment was ok because levels are much lower than thresholds. These chemicals are also measured in the effluent. The MWRA also does additional effluent monitoring as part of the Ambient Monitoring Plan.

Apparent Redox Potential Discontinuity (RPD)

The committee felt that we could eliminate this as well because oxygen levels are very high, much higher than thresholds, and is trending toward improving. Also, the MWRA can evaluate oxygen levels in a semi-quantitative way when doing benthic community assessments.

Contaminants in fish and shellfish and liver disease in fish

There was no consensus on removing monitoring for contaminants from fish and shellfish or monitoring liver disease in flounder. The reasoning is that this turns out to be more complicated than thought before. The discussion seemed to revolve around whether the question of: “Is it safe to eat the fish and shellfish” using the legacy contaminants alone helps us answer the question. And, are we monitoring the right fish and shellfish? Should we be monitoring other contaminants? In terms of effects on fish, the contaminants are decreasing, but do they still have some effects?

Ken Keay said that we still have 16 to 18 months to figure this out, because the next time they would gear up for sampling would be in 2021. MWRA also stated that flounder is an iconic species and the public would be interested in these results so there would be no push to remove this from the monitoring program. But they might propose to eliminate stations in Eastern Cape Cod Bay and Nantasket Beach because the levels there have stabilized and are very low and likely not impacted by the outfall.

So, OMSAP does not recommend that this monitoring component be modified at this time.

Loretta Fernandez, Northeastern University and OMSAP member, via conference line

Passive Samplers: Methods for measuring trace-level time-averaged dissolved concentrations

Some of these notes are based on the presentation material. I don't mention any equations here. Bulk concentrations in sediment are not as predictive as porewater concentrations for toxicity to crustaceans living in the sediment. Semi permeable membrane devices are potentially good for hydrophobic organic compounds, those with log Kow > than 4. These are lay-flat polyethylene tubes with triolein inside, which can sample water column but not sediments. Performance reference compounds (PRCs) are added to triolein to evaluate sampling rate, which is like calibrating the systems. There are also polymer film passive samplers, which can be used for less hydrophobic compounds, i.e. those with log Kow < 3. As before, it is helpful to have performance reference compounds. There are also samplers called Polar Organic Chemical Integrative Samplers, or POCIS. These can sample compounds with log Kow <3.

Passive samplers are integrative, they won't necessarily show spikes in contaminant levels. Also, passive samplers appear to roughly correlate with organism tissue levels, based on a review published in 2016.

Overview of OMSAP Informational Meeting CEC Monitoring in WWTPs

Todd Callaghan, MA CZM

Reported on a study performed by the Silent Spring Institute on Cape Cod. PFAS appears to be associated with septic system effluent, and perhaps can be traced with nitrogen. But there are sometimes commercial or industrial discharges as well.

Some evidence to suggest that PFCs (polyfluoroalkyl compounds), such as PFAS, are toxic to human health. State of Michigan has put out advisories to not eat fish in some rivers due to contamination, perhaps in some cases downstream from wastewater effluent.

Southern California Coastal Water Resources Program (SCCWRP) has proposed a screening and initial monitoring approach to determine which CECs to target.

Most microplastics found in water are fibers, many from our fleece jackets. They can act as passive samplers to absorb contaminants and enter the food chain.

Cathy Vakalopoulos, MA DEP

Reported on ongoing work on characterizing PFAS and CECs, contaminants of emerging concern. MassDEP established a guideline for drinking water of 70 PP trillion (i.e. .07 µg/l) for the sum of five PFAS compounds – PFOA, PFOS, PFNA, PFHxS, and PFHpA – for sensitive populations. MassDEP intends to develop a drinking water standard for a group of PFAS chemicals. MassDEP has proposed a groundwater cleanup standard of 20 ppt for the sum of six PFAS chemicals proposed for drinking water. Eventually MassDEP plans to develop human health and aquatic life PFAS criteria for surface waters. MassDEP is also planning to look at the other top 10 ECs, or emerging contaminants, such as perchlorate, PBDEs and possibly PCB byproducts and microplastics.

Anna Robuck, EPA Narragansett and URI

Provided an update on the survey. They sampled September 9 and 10, at 17 sites across two days, microplastic tows at 8 sites in transit. Boston University students conducted the tows, and preliminary results show that they captured microplastics in most of the tows.

Collected water for PFAS and APIs, i.e. active pharmaceutical ingredients. Currently doing the QC and processing the samples. One of the goals of the study is to determine source apportionment. She thanked MWRA for assistance in collecting samples and providing effluent.

Next steps

Need to continue discussions about:

- contaminants in fish and shellfish

- microplastics, and
- passive samplers. For example, can we do some kind of experiment, or ask MWRA to do an experiment, using passive samplers?

Attendance

SBNMS

Pete Decola (Host)

OMSAP

Judy Pederson, MIT Sea Grant

Peter Burn, Suffolk University

Bob Kenney, URI

Jeff Rosen, Corona Environmental Consulting

Bob Beardsley, WHOI

Loretta Fernandez, Northeastern via phone

IAAC

Cathy Vakalopoulos, MA DEP

Matt Liebman, EPA

Steve Wolf, Army Corps of Engineers

Todd Callaghan, MA CZM

PIAC

Bruce Berman, SHSB

Sebastian, intern at SHSB

Another intern at SHSB

Tim Pasakarnis, Cape Cod Commission

Heather McElroy, Cape Cod Commission

Andreae Downs, Wastewater Advisory Committee

MWRA

Ken Keay, MWRA

Betsy Reilley, MWRA

Dave Taylor, MWRA

Denise Ellis-Hibbett, MWRA

Meagan Riley, MWRA

David Gotshall, MWRA

Yong Lao, MWRA

Jianjun Wang, MWRA

Lucner Charlestra, MWRA

Doug Hersh, MWRA
Steve Rhode, MWRA
Dan Codiga, MWRA
Wendy Leo, MWRA

Consultants

Eric Nestler, Normandeau
Deborah Rutecki, Normandeau
Ellen Baptiste-Carpenter, Battelle

Others

Carlton Hunt, citizen
Frank Singleton, Weymouth
Eileen Snedeker, Boston Water and Sewer Commission
Bill Kiley, BWSC
Peter Fifield, Boston Harbor Ecosystem Network