

OMSAP meeting

May 11, 2021

1 pm to 3:30 pm (to 4:00 pm for PIAC meeting)

Welcome and intros.

We asked people to put names in the chat so we can document who attended. Went over ground rules for meeting.

Monitoring revisions process and outcomes (Matt Liebman, EPA and Judy Pederson, MIT and OMSAP Chair)

Matt talked about the revisions process. (Presentation available).

There are two types of revisions, interim and annual.

During a series of ad hoc OMSAP meetings, we used a set of criteria to evaluate revisions. They included:

- Whether monitoring data show improving trends below established thresholds in the Contingency Plan;
- Whether there are other data (including effluent data) or technologies that can provide information that gives us confidence that we are addressing the monitoring question; and
- Whether other monitoring by the MWRA adequately allow us to evaluate whether water quality standards are being met.

As a result, the following revisions were made. They were approved in July 2020, and then in January 2021 as part of the annual process.

- End the monitoring, described in section 4.3 of the 2010 plan, of chemical contaminants in soft sediments in the nearfield and farfield of the outfall site scheduled for every third year, starting this August (2021);
- As of August 2020, end the annual monitoring, described in section 4.3 of the 2010 plan, of soft sediments in western Massachusetts Bay using sediment profile imaging (SPI); and
- Discontinue monitoring two reference stations (Nantasket Beach and eastern Cape Cod Bay), described in section 5.3, for histological analysis of winter flounder liver tissue. Sampling at all four sites occurred in early May 2020. Monitoring of flounder on Deer Island Flats (Boston Harbor) and near the outfall site will continue and was last sampled in April 2021.

Judy Pederson added a few more insights as to what the rationale for the changes were, from the OMSAP perspective.

Ken Keay explained that for the replacement of the SPI measurements, additional observations are made when benthic grabs are conducted. Observations of oxygenated sediment depth in August 2020 were reported in the subsequent Contingency Plan Quarterly Report and will continue.

Judy and others mentioned that the flounder tissue monitoring was removed because the levels in the farfield sites were so low for so long and that there was no added information provided by the sampling.

Bruce thanked OMSAP and the regulators for a good process and agreed with the decisions, especially keeping the flounder in Boston Harbor and near the outfall site, since it is an iconic species.

2020 results, Ken Keay, MWRA (plus short remarks by Carolyn Fiore, Deputy COO of MWRA, on Covid and Wastewater) Presentation available.

Carolyn Fiore described how MWRA is testing sewage before treatment for presence of RNA fragments of the SARS-COV virus, using a company called Biobot Analytics. Initially it was a useful measure of Covid community spread 7-10 days before you saw positive cases in the community. Since testing became more prevalent, there is no longer a lag time however, it is still a useful tool.

Discussion centered on whether SARS-CoV-2 is infectious after treatment and disinfection, and the understanding is that it is not.

MWRA will be testing through the end of calendar year 2021 and then reevaluate.

There was a request to have MWRA put out a statement regarding whether disinfected wastewater that sometimes is discharged to a beach, like in Lynn, is infectious for Covid.

People are concerned about Covid in wastewater. Based on this article apparently:

<https://www.itemlive.com/2021/03/31/concerns-of-covid-presence-in-water-at-lynn-swampscott-beach/>

MWRA committed to sending something out about that.

Ken addressed the question of why it takes so long to post results. There is analysis, QA/QC, and review and comparison to thresholds. It takes time.

Covid restrictions impacted monitoring, reducing the number of people on the boat, limiting analyses, skipping some sampling dates.

No sediment profile imaging or contaminated sediment monitoring done in 2020 because of the revisions. But no problems associated with sediment, e.g. diversity was high, good sediment oxygen penetration.

But there were some interesting observations for 2020 include a small *Alexandrium* bloom, a new alga growing at a rocky seafloor site south of the outfall, the first observations of radiolarians as a major component of zooplankton and *Karenia mikimotoi* found throughout the year.

There were questions about the density of the radiolarians and whether they are prey for larger animals. Waiting for the final reports on those. Also MWRA will be doing some more research on the extent of *Karenia* in Gulf of Maine and Mass Bay.

2019 Nitrogen exceedance, David Wu, MWRA with discussion led by Judy Pederson

David Wu explained that the Contingency Plan set the caution level at 12,500 metric tons per year and the warning level at 14,000 metric tons per year. In 2019, the caution level was exceeded, but it was not exceeded in 2020. The levels are consistent with population projections.

Deer Island Treatment Plant performs well, and has received many national performance awards.

On average and depending on the time of year, ambient monitoring data show that there is an effluent signature of ammonia and other nitrogen forms within 7.5 to 10 km from the outfall, but not much beyond. Note – During individual surveys increased nitrogen can sometimes be detected 10 to 20 km from the outfall. And, the chlorophyll levels do not seem to be high near the outfall compared to other areas.

DITP contributes about 3 to 5 percent of the total inventory of nitrogen in Mass Bay, according to modeled estimates from many years ago.

Discussion about impacts of nutrients in Mass and Cape Cod bays. Recent observations of warming, more stringy algae on lobster pots, low dissolved oxygen/hypoxia and lobster deaths in Cape Cod bay, suggest that the increase in nutrient discharges may be having an impact and is worth exploring.

Rich Delaney said that people on the Cape are concerned about the observations of hypoxia in Cape Cod bay. Rich says that even though Cape Cod is working on ways to reduce nitrogen entering coastal waters and spending billions of dollars to do it, it is one tenth the population of metro Boston. (Editor's note: the population of the cape increases about 5-fold in summer.)

Levels of nitrogen discharged from Deer Island are about 28 mg/l, which is lower than Salem at 40 mg/l, but much higher than Scituate at 3 mg/l. (Todd checked later and South Essex Sewerage District varies from 20-44 mg/l, with an average of 33 mg/l.)

It is noted that, as required by the NPDES permit, the MWRA annually produces a report evaluating nitrogen removal technologies including the feasibility of adding tertiary treatment to reduce nitrogen concentrations in the effluent.

Here is a screen shot during the presentation by David Wu.

The screenshot shows a Zoom meeting interface. The main content is a slide titled "2019 Nitrogen Exceedance" with a table and bullet points. The table compares 2019 results against caution and warning thresholds and a 2001-2018 range. The 2019 results show a significant exceedance. Below the table, bullet points explain that the annual nitrogen load from Deer Island is a contingency plan threshold parameter, that 2019 was the first exceedance, and that prior evaluations showed no environmental degradation.

Parameter	Caution Level Threshold	Warning Level Threshold	2001-2018 Range	2019 Results
Effluent Nitrogen Annual load	12,500 metric tons (mt)	14,000 mt	10,920 – 12,448 mt	13,217 mt Caution Level Exceedance

- Annual nitrogen load from Deer Island is a Contingency Plan (CP) threshold parameter.
- It is **not** a NPDES permit effluent limit.
- 2019 represented the first nitrogen threshold exceedance.
- Exceedance was NOT repeated in 2020.
- Prior evaluations have shown no evidence effluent nitrogen has degraded the environment.

The Zoom interface also shows a grid of 12 participants: Bruce Berman, Matthew Liebman, Andreae Downs, Ken Keay, Cathy Vakalopoulos, Juliet Simpson, David Wu (MWRA), Judith Pederson, JoAnn Muramatsu, Eric Nestler, Mark Patterson, and Devon Winkler. The bottom of the screen shows the Windows taskbar with the time 2:11 PM on 5/11/2021.

Bays Eutrophication Model: a comparison of former and updated and results for 2016, Dan Codiga, MWRA

Dan Codiga presented an update on the new BEM using a model developed by Deltares. The slides are available.

They ran comparisons between the updated and the former model and the updated model performs at least as well as the former model.

MWRA's NPDES permit has a requirement that MWRA maintain a Bays Eutrophication Model and run it annually. This hindcasting model focuses on the role of nutrients on productivity and dissolved oxygen. Both the observations and the model show that elevated levels of nitrogen are localized near the outfall. The former and updated models show that even with additions of nutrients, little to no effects on productivity is observed.

The updated model treats dilution over the diffusers on the same grid used for all its parameters, there is no small-scale turbulence sub-model for the effluent-- this is the same as the former model. (The group of modeling experts who reviewed the updated model suggested a closer look at the dilution in the immediate vicinity of the outfall, which MWRA is undertaking.)

The domain is larger in the new model, including the Gulf of Maine. There are other differences and similarities between the models.

The modelers calibrated the updated model using 2012 to 2016 conditions and made a detailed comparison of the updated and former models using the 2016 simulations, showing the updated model results were similar to the former model.

The model is configured for hindcasting only, not suitable for forecasting.

Discussion ensued about whether the model can capture periods when the plume may extend above the pycnocline for short periods in the summer, for example during heavy rainfall events. The model includes weather variations and the general nature of this plume variability but doesn't really capture the details on timescales as short as a day.

Question: Does the model capture denitrification from sediments? This is something to look into, but the model connection to sediments is simpler than the former model.

Todd Callaghan: What would an effect look like if it was detected by the model?

We see effects of the outfall on nutrients, but not on chlorophyll (Ken Keay commented on these notes and said the same can be said for oxygen, which is also monitored and tracked by the model). Is this a problem? Or put another way, how high does a nutrient load need to become before we would see increases in phytoplankton? We would have to double the nitrogen load apparently based on previous simulations.

Jeff Rosen said that a power analysis can be done with the data to determine what can be detected by the model.

Ginny wondered how the model treats denitrification, which is an important process in some estuaries, like Waquoit Bay. Dan said he would follow up on that.

We aren't making a decision on the approval of the model. But we note that the Model Evaluation Group advised that the model is good and made suggestions on the plume dilution near the diffusers and MWRA will be following up with that.

Contaminants of Emerging Concern (CEC) status and update of the white papers, Judy Pederson

The white papers focused on whether the MWRA is likely to contribute PPCPs and PFAS to Mass Bay, and what the potential impacts are. They show that they are likely to contribute, and that there are probably minimal impacts from PPCPs, but not necessarily from PFAS.

Took a source transport fate and effects approach.

There is a lot we don't know, and the regulatory community has not established standards or methodologies. We are now beginning to get an idea of what is discharged by MWRA.

We are beginning to figure out what plants or animals to look at in terms of exposure.

We should also do our best to reduce the use of these chemicals.

Want to thank co-authors, e.g. Todd Callaghan, Peter Burn, Anna Robuck, Mark Cantwell, and Michaela Cashman (EPA).

Will circulate the final papers by end of June and a full meeting in the Fall.

Bruce Berman thanked the authors of the papers also. Looking forward to reading them.

Additional public input

Further discussion on the low DO in Cape Cod Bay, as a major concern.

Next steps, should we discuss more about the model or the hypoxia in Cape Cod bay?

Todd suggests that we wait and see what the model produces for the last four years, and perhaps follow up from that.

Rich Delaney reiterated that the Cape has concerns about the low dissolved oxygen in Cape Cod Bay.

CCS is working on this issue and we should look at the Bays as a whole. Cape Cod communities are in the process of reducing nitrogen loads, due to the Cape 208 plan and treating sewage.

Thank you to Julie for hosting from MIT Sea Grant.

PIAC meeting

No notes on this meeting. But I noted here are the members of PIAC who attended this meeting:

Bruce Berman, Jo Ann Muramoto, Andreae Downs, Vi Patek, Chris Mancini, Beth Neal, Rich Delaney.

Links and Resources

Links shared in the chat:

Hypoxia in Cape Cod Bay:

<https://www.mass.gov/news/southern-cape-cod-bay-experiences-lobster-mortalities-related-to-low-oxygen>

Global ocean temperatures:

https://resources.marine.copernicus.eu/?option=com_csw&task=results

The google drive for many documents and recent meetings is here: [MWRA OMSAP documents](#)

Attached to this invite is the Executive Summary of the Outfall Monitoring Overview. A link to MWRA monitoring reports is here: <https://www.mwra.com/harbor/enquad/trlist.html>

Attached to this updated invite is an Executive Summary of a comparison of the updated Bays Eutrophication Model to the former BEM. The MWRA contracted with Deltares to update the BEM for its annual hindcast, as required by the permit. This exercise was needed to compare the former model to this one. Here is a link to the whole report: <http://www.mwra.state.ma.us/harbor/enquad/pdf/2021-02.pdf>

MWRA is updating the Ambient Monitoring Plan with the approved 2020 revisions.

Here is the attendance.

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