

Minutes
March 2, 2018

Despite a nor'easter, the Wastewater Advisory Committee to the MWRA met at MAPC, 60 Temple Pl., Boston, MA

Attendees/Contributors:

WAC: Craig Allen (chair), Karen Lachmayr, Stephen Greene James Guidod (AB), Philip Ashcroft, Dan Winograd (all by phone), Karen Golmer, Martin Pillsbury, Mary Adelstein

Guests: Wendy Leo, Alison Leary (City of Newton, councilor), John Reinhardt, MyRWA

Staff: Andreae Downs

FUTURE MEETING DATES/TOPICS

NEXT: **TUESDAY**, April 24, 10:30am at the **Waterworks Museum:** MWRA Budgets and Advisory Board's approach to the budgets over the decades.

VOTES:

February 2018 minutes approved

CHAIRMAN'S REPORT: Next WAC meeting is at the Waterworks Museum with WSCAC (therefore, a Tuesday), and will include the Advisory Board giving a historical view of how their approach to the MWRA budgets (also presented) has changed.

The May meeting is a tour of Greater Lawrence Sewer District's co-digestion project. Discussion with WAC settled on May 4 for the tour, despite it being just over a week after the April meeting.

MWRA UPDATES: As the meeting started, the predictions for flooding and rain/snow meant that MWRA was anticipating possible issues with staff getting to facilities at Deer Island and Chelsea, among other spots, and preparing for higher flows, as outlined in the Executive Director's report and previous Board staff summary. Sean Navin was at the emergency operations center to coordinate communications with communities.

ADVISORY BOARD UPDATES: Reviewing MWRA budgets and budget policy. Had an Operations meeting on wastewater metering and on community I/I funding. Discussion of amount to recommend to the MWRA Board, and discussion of the number of communities not taking advantage of the program.

Reminder that the June 15 AB meeting, at BC, will be on climate change and adaptation with Gina McCarthy and Matthew Beaton, among others.

EXECUTIVE DIRECTOR'S REPORT:

See attached—highlights: Mike Baron is WSCAC chair. Primacy for wastewater permitting is still before the Legislature. MWRA is tracking changes in flow during astronomically high tides, heavy rainfall, and the combination to see where I/I may be impacting the system. Some tidal issues identified at Columbus Park. Dave Coppes is filling Mike Hornbrook's post.

WAC requested a thank-you note to Mike Hornbrook, noting that his retirement after 29 years at MWRA was a milestone. "I can't think of anyone more consequential to MWRA's success."

Members also voted to send a letter to MWRA requesting the higher, \$180 million, amount for Phases 11 and 12 of community I/I grants and loans, with incentives to ensure the funds are used.

PRESENTATIONS & DISCUSSION:

Bob Zimmerman, CRWA.

Issue on the Charles (and other rivers) of cyanobacteria blooms—caused by warmth and phosphorus.

K Lachmayr: while some are toxic, some are not—and they may be used to create alternative fuels.

Much of the contribution of phosphorus delivered to the rivers is from impervious surface—commercial, industrial, high-density residential. Not the majority of the land, but a disproportionate contribution to river pollution. Very little comes from fertilizers, because phosphorus binds to soil (not the case for nitrogen).

MPillsbury: high density residential results in less phosphorus pollution per person—because people stacked on top of each other take up less greenspace.

This is precedent—the CRWA wants to clean up the Charles, and to do so, we need to know where pollution is coming from.

Also remember that 40%, or 140mgd flowing to Deer Island on an average day is I/I. It's the largest loss of water to the Charles River. Whatever pollutants we have in the water are concentrated with the loss of water.

The current increase of 1% storms is 71%--in New England. Becoming more powerful and more intense. The chance of a catastrophic storm is very high. What are we doing to prepare for it?

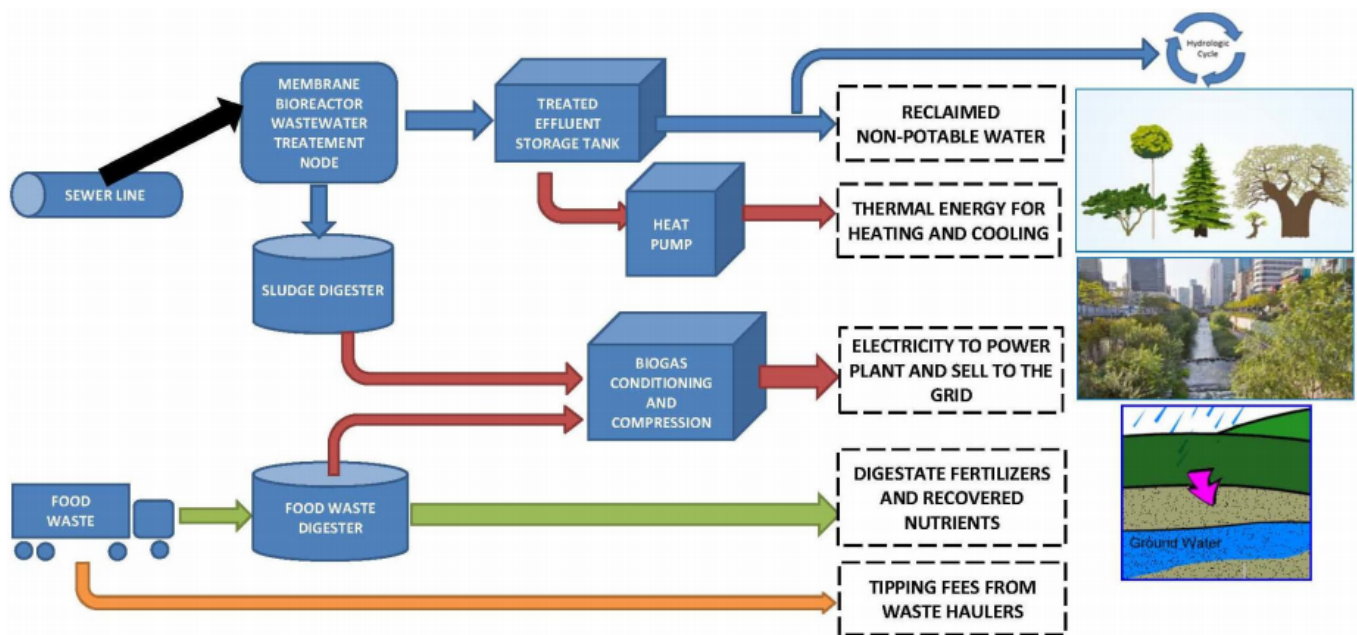
Not only getting flooding, but getting flash droughts.

Many of the impacts of the water/sewer system (I/I, CSOs, etc.) are permanent. Repair estimates for the US water/sewer system exceed what we can raise.

Yet all our planning relies on these systems continuing indefinitely.

Return to natural systems—closed circle. Tested the concept with help from MWRA and BWSC to design distributed wastewater treatment, 1-5mgd, in a CWERC, a Community Wastewater Energy Resource Center. Find 2 acres, mine wastewater pipes—pass the water through a membrane bioreactor

Maximizing Water and Energy Resources



We sought out Natural Systems Utilities to model this, because they aren't consultants. They do this for profit.

On the right is what you get: reclaimed non-potable water, thermal energy, electricity, digestate for fertilizer, ammonium nitrate for commercial applications, AND you reserve a portion of the water to restore natural hydrology.

This is what it might look like, with the restored stream:



The 2mgd plant designed for the Seaport District estimated capital cost is \$46.8 million. Before it charges a dime for treatment of wastewater, the sale of utilities generates between \$7-11m/year.

We just turned wastewater into a profit center.

In every scenario Natural Systems Utilities ran, you can pay these off in 7 years, charging 30 cents on the dollar of what it currently costs to treat wastewater.

Q: What's the market for the water?

It can be used for process water, for cooling, for irrigation. It could be located next to Gillette, which uses a tremendous amount of water.

We researched, nationwide what reclaimed water gets—it's between 0-100% of what potable water is valued at. We used 30% of what potable water gets. In some states, reclaimed water can be used for all uses, including drinking and bathing.

A: But your destination for the water would need to be lower elevation than your plant.

True. Or you locate them based on available sewage and nearby highways for the trucks of food waste. Sell the thermal energy to heat & cool buildings, sell the process water, sell the energy. In our first pass, question of where to put these things. Our initial survey of this area, we found 33 locations.

So, what if a neighborhood, like Mission Hill, which wants a supermarket, owned the CWERC? Then they could market the water, the heat, the energy to a Stop & Shop. They can speak directly to that market's bottom line with discounted energy costs, heat costs, disposal costs, etc.

It will take a culture change. One is being built in Littleton, MA. Once it is up, we can walk people around it, and they can do the "sniff test."

A: What's the effect on Deer Island?

You wouldn't abandon Deer Island—this would cost considerably less than rebuilding. But Deer Island is still valuable for catastrophic events, storage, etc. We need a pilot of one, two or three of these, and testing them out. Suspect once we get started, new innovation will mean these get smaller and cost less as we go along.

Q: If we were starting from scratch, we might not build a Deer Island. But now we are invested.

We have to continue to pay for that investment. But the key is that this is a break-even enterprise that eventually is a money maker.

Q: what about toxins from industrial and domestic uses? How does that come into the separated solids marketing?

There are membrane bioreactors all over the country. They do handle this. MWRA already does pretreatment.

Overall—there are emissions reductions, GHG reductions, less of a need for fracked gas pipelines. We also throw away less water.

Something between 20-25 culverted or bulldozed streams in downtown Boston. CRWA created a method—we call it landscape design. Figure out what happened to the streams, and then figure out how to restore them, because of the efficiency and effectiveness of nature to take care of the lack of water or too much water.

The numbers are pretty staggering. We wrote about Widett Circle—turn that back into a wetland and the Bass River—that's a 300-acre area that then protects 3,000 acres of the city from catastrophic floods by 400x over existing circumstances.

Q: But won't this be extremely expensive?

No—we've created stormwater trading. We tried to figure out TMDLs, where do pollutants come from. The city of Boston could regulate phosphorus—and it could charge a fee. It would be based on the amount of phosphorus a parking lot or developed site would cost. And because some areas can't absorb water—they are ledge, etc.—if you can trade the cost of containing your own phosphorus with someone who can do it for less. Now, developers aren't interested in phosphorus. But you talk about flooding and they are very interested. And the two are exactly related. There's an opportunity here.

Q: But in Boston, there's construction everywhere & less and less

We are talking about a wall that will cost billions of dollars to keep the rising sea out. And we know it will eventually fail. Why invest in something like that when you can invest in something that is much lower risk of failure, builds in flexibility, returns money on your investment?

Q: But the political reality, when we can't even fix the MBTA, are we going to run out of time before this happens?

The economic effect on Boston of doing nothing could last a decade. If we do nothing, the risk of a catastrophe increases.

New Jersey put back exactly the things that had been hit hardest by Hurricane Sandy. The residents of the beaches resisted putting up dunes that would protect their homes.

Q: the strength of this proposal is to do just a few, incrementally, and work your way up the scale to prove that it works.

If MWRA were to build a few of these things—it could keep most of its money.

You can separate the components; don't all need to be on the same site.

Director's Report: 2/8/18 Water Resources Commission

Climate Adaptation and hazard mitigation planning—two workshops will be held in the last week of march for stakeholders.

Revisions to water conservation standards—a response to the 2016 drought, but in process before then. The standards are best practices that should be adopted. Recommendations are newer, encouraged where practical. Last updated in 2006, from 1992 draft. State needs more water data.

WSCAC 2/13/18

Michael Baron is WSCAC chair now.

WSCAC's Executive Committee has drafted priorities for WSCAC and will be vetting them next meeting.

Presentation: **Gypsy Moth outbreak 2016-7**. Valerie Pasquarella, UMass Amherst

Been in MA since 1868. Since 1905, 10 species of parasites introduced, and none really controlled it. Continuing to spread outward. Cyclic outbreaks every decade or so. In 1989 moth population crashed because of a fungus, which has been keeping moths at bay during wet years—needs to be wet in May & June. Dry springs in 2015 and 2016 led to increase in gypsy moth damage.

Valerie looking at remote monitoring of defoliation from satellites. Since 2008 satellite images from 1972 onward are available to researchers online.

Resolution isn't great, but can also track infrared rays, which detect vegetation well. With millions of images, able to determine what the forest should look like at any point in the year. 2016-17 is clear outlier in the green-ness of MA forests in the summer.

Match with field surveys and aerial sketches to determine if the issue is moths or development.

Can see the massive defoliation in RI forests in 2016, and how long it persists. And in 2017, how the area of defoliation doubled (the fungus came back, but late in the moth life cycle). Hoping to be able to predict forest damage based on the satellite models.

May take multiple years of wet springs for the moth outbreaks to really decrease.

After severe defoliation, trees are more vulnerable to other pests, and mortality can follow.

In MA don't do widespread pesticide spraying. Proven to be fruitless, and also detracts from the ability of the fungus to survive. Moths tend to like oaks (but are opportunistic). Avoid some trees, like conifers. Most birds avoid eating them. Mice eat them—but that drives up incidence of Lyme disease.

Lead and Copper Rule comments: EPA is opening comments on changes. Issue to make the rule better.

Not sure what EPA goal is under new administration. Are they trying to make the rules better, or trying to weaken environmental rules?

EPA originally opened to state & local government stakeholders ("Federalism Review"), not water professionals, but have now opened to water folks. Advisory Board and MWRA will comment.

Removal of lead service lines on sale is a better solution than disclosure on sale.

EPA's Pruitt wants a quick win here—so will look for a compromise in the regulations that won't inspire a lawsuit.

2/15 Advisory Board meeting

Director's Report: Acknowledgement of Mike Hornbrook on his retirement. John Carroll turning 90 Sunday. Walter Woods 100 in July.

DCR Watershed protection presentation: John Scannell, acting director of Div. of Water Supply Protection. Jonathan Yeo's position to be filled soon.

DCR has added 705 acres to the watershed holdings. Buying some land with grants, rather than ratepayer \$\$\$. Active outreach to the holders of conservation restrictions in the watershed.

Just issued a 10-year comprehensive land management plan.

Forest management for resilience and removal of nutrients and contaminants. Cut trees to get variable-aged patches in the watershed. Some revenue, but revenue not the goal of logging.

Gulls on the reservoirs add fecal contamination, so harass or manage gulls, particularly near intakes.

Allow public on the watershed lands; now have 18 full time rangers, visitors center open more.

Biking issues are less in the Ware. Besides more rangers, the DCR can now ticket violations. Issued 50 in FY17.

Establishing pollinator fields and wildlife habitat by mowing less often (and saving in mowing costs).

Ensuring septic and sewer do not enter water. Also working on stormwater management, including making sure privately-held structures are being properly maintained. Removed all direct stormwater discharges to the Wachusett near the intake (Rt 70). Now working on three areas in the upper Wachusett to remove direct discharges. All major discharges are removed or treated.

Talk-Back: How are communities readying for the upcoming MS4 Permit?

Mo Handel: Needham just docketed a stormwater management law for May town meeting. Discussing how to implement a stormwater fee based on roof area.

Legislative update: \$500K in Debt Service Assistance in governor's budget for FY19. In FY 18 budget, looks like \$850K.

Primacy discussions are still live in this legislative session.

AB working to oppose legislation that moves all of MWRA's non-clerical employees onto a different pension plan.

Several new water connections currently possible—North Reading, Danvers, Peabody, Burlington

MWRA Board 2/21

Winter storms analysis

Jan 4-5 with King Tide: prediction for snow in Boston Harbor area, 2-4' storm surge predicted, but was 3' higher than forecast. MWRA facilities were not damaged, but flow increased 30-340%. At Chelsea, street flooding, MWRA excavators pulled people out of cars that stalled in the water. At Headworks, 3' of water. Event was under the predicted high tide/surge height that the renovated Chelsea Creek Headworks is being built to. Had an additional 65 mgd at the high tide point. Did not overflow capacity.

Columbus Park also saw a surge of 65 mgd at high tide. Could be a tide gate or two that aren't closing when they should. Inflow is not close to the headworks.

Braintree-Weymouth also saw flooding to the building foundation. Its utilities are also being elevated, and will end up higher than the flood waters came. Ran below capacity.

Squantum Pump Station in Quincy had less flooding than the model of flooding showed. Had a peak of flow at high tide.

Deer Island also saw increased flow with the high tide, but was still under capacity. Tidal flooding cut off access to the Island, to Squantum, and to Chelsea.

Jan 11-13 snow melt & rain: Deer Island reached capacity at 1.2 billion mgd. Cottage Farm was activated (CSO). Nut Island, in particular, jumped from below 100 mgd to over 270 mgd. Historically, higher impacts on south system during snow melt/rain events.

Jan. 29-30 High tide/no storm: Looked at this event to see how tide impacts flow. Columbus park Headworks showed a spike in flow at the high tide.

MWRA is going to continue to look at the tide impacts, work with communities, and find out where tide waters are entering the system. Know now that some facilities need to plan for extreme high tides.

South System may have more infiltration or manhole leakage at high tides. May also have some sump pumps putting water into the sewers. Don't have combined systems. During the storms, MWRA was particularly concerned with Nut Island's limits. Clearly, I/I is coming in. After a rain/tide event, the south system is still high flow for two days or more. Suspect sump pumps.

If capacity of DI or the headworks is full, the MWRA can shut down a facility and release sewage upstream—a targeted SSO is permitted under the DI NPDES permit (if “necessary to protect life & limb, or prevent severe property damage.”)

Average 110 wet weather events/year. Often not at capacity. Many of these are small.

Boston and MWRA were caught off guard by the impacts of the high tides and will be in touch on finding better information on surges in future, as well as better preparation to protect critical infrastructure.

Deer Island Gravity Thickeners. MWRA is required to have 5 operating gravity thickeners as part of its process (see memo for details). By the beginning of this year, was down to only 3 of 6 thickeners in operation. Rehabilitation of all 6 thickeners is part of the CIP, planned for this summer, but emergency repairs are underway for three that are now shut down—one for a cover that was broken during the snows of 2105, two with mechanical damage to the torque arms & cages. The MWRA is monitoring closely, installing a pipe to the centrifuge thickeners, and is prepared to use one of the off-line digesters to store solids as needed. In future, will examine the thickness of metal in the thickeners more regularly.

After renovation, the thickeners will have parts made of carbon coated steel, which won't deteriorate as quickly. These digesters & their metal are 23 years old, and are exposed to harsh chemicals. CIP project will take 3 years.

Chelsea Creek Headworks: a change order for additional painting of the structural steel, safer access to stop logs for influent channels. Adds \$937,000 to the contract, bringing the total above \$77million for the upgrade and renovation.

David Coppes will fill Mike Hornbrook's position when Hornbrook retires.

New TRAC director: **Rebecca Weidman**, now at the DEP on the drinking water side.

Orange Notebook: Plant flows initially lower than average at Deer Island.

\$18 million already distributed under the sewer grant program (I/I). Also, strong demand for the water loan funds. \$1.5 million distributed to communities for replacing lead service pipes. Several communities are close to requesting the lead funds.

MWRA has bought two new electric vehicles to see how they perform, in an attempt to curb its greenhouse gas emissions. Will be required to have more efficient vehicles and more of them as the state's GHG reduction rules get tighter. Heavier vehicles will also face these requirements for lower GHG emissions—more of a challenge.

Financial: Projecting \$22.5 million surplus. Revenue is up, spending down. Much of revenue surplus is from the LIBOR settlement. Planning to use the surplus for defeasance. Expect to see interest rates rise.

Sewer system adjustments: Community sewer rates get adjusted when the community or the MWRA find discrepancies in the data during the year. These changes will be reflected in 2019 assessments.

Current Expense Budget—Water & Sewer rates: 3.9% proposed.

AB Operations 2/22

Wastewater metering:

Steve Estes-Smargiassi—Now in third round of meter replacement. Last replaced in 1994.

In the midst this winter of looking at unmetered areas 6.75% of the system is unmetered (whole system—each community has a different percentage).

Temporary metering for 12 months will start this spring. Then will evaluate whether want to add permanent meters. Starting in the summer, will assess available metering technologies. Summer of 2019 will recommend meter system.

Procurement and lowest bidder are a challenge, because the meters have to work, have to communicate with SCADA, have to last at least 10 years....

That system will be installed over 12 months beginning fall 2019. Have 12 months of warranty. MWRA doesn't anticipate major surprises, but are prepared to deal with them should they occur.

In the meantime, MWRA has done a Health & Safety plan for workers likely to touch the meters, a schedule for Phase I, gotten a contractor, etc.

Community meters may have to change their communications interface with MWRA.

Ops committee suggested that meter replacement happen in the winter because of shortage of detail officers.

Wastewater fee are set based on: average flow share + max month flow+population on sewers+total population+high-strength users. There's an AB Greensheet video that explains the weighting of each piece. Roughly ½ of rates based on flow. Population numbers come from US Census and sewerage percentage based on community data.

High-strength users: Community charged (can choose to pass on to users or to spread out over all users—depends on whether want to attract industry), TRAC charges a permit fee on top of that.

I /I Financial Assistance:

Carl Leone—So far approved \$461 million. 76% already distributed. Does not include Clinton and Lancaster. All sewer communities have participated. Allocations are based on community's percent share of sewer charge.

Phase 9 and 10: \$160 million, higher % of grants (75%) to loans. Also loans now 10-year, vs 5-year.

13 communities have withdrawn all their funds. Rate of distribution is about double what it was in the 1990s. To meet new DEP I/I regulations, communities will need more funds. With sunset provision, some communities may lose their Phase 6 funds shortly. Grant \$ goes away, loan \$ still available.

Proposed 11 and 12 phases, \$120 million (\$60m/year) proposed, with same structure. AB Operations Committee is proposing that be increased to \$180 million—\$10 million more than the previous two phases.

South system is seeing weird I/I flows—not combined system. Not getting worse, maybe getting a little better, but still seeing gradual and sustained increase in flow during wet weather in winter and spring. Perhaps groundwater seepage or sump pumps.

Question of whether the public understands the operation of sewer infrastructure. How do you educate public better and the value of it?

Slow & steady I/I in first phases didn't make much impact on sewer flows. The higher amounts and earlier availability of money finally made a difference.

OMSAP/PIAC 2/28

Alexandra Dunn, EPA regional administrator—introduced herself. Worked with Marty Suuberg before. Originally a water person, attorney.

Says that OMSAP kept MWRA on track to ensure the Bay was unharmed by the outfall. One of the first science advisory panels in the US/Clean Water Act. Importance of third parties/partners to EPA's success. Earns public trust.

Betsy Reilley: **26 years of Harbor monitoring**—from dumping raw sewage to the Boston Harbor Project.

Why OMSAP? Monitoring a concern when outfall sited. Contingency Thresholds (CT) set so there could be a quick response to contaminant exceedences. Permit 2000. 9 years of baseline data compared to years after the outfall opened. Bottom line: No adverse effects. Mass Bay is healthy. CT exceedences are phaeocystes (not related to the outfall) and red tide (2017), biological diversity (not an adverse effect).

2016 was drought year. More saline environment in MassBay. MWRA was able to detect that. Gives confidence that could detect any issues related to the outfall. Storms meant that the Bay remained oxygenated despite warm dry weather. MWRA is now participating in a study of acidification of the ocean.

Ammonium (nitrogen) is higher near the outfall, and even in 2016, with higher load, no detectable effect at outfall.

Modeling shows even 50% increase in Ammonium would not affect outfall area. Using MassBays nitrification model from the 1990s. Consistent with field sampling, except for chlorophyll.

Sediments continue to lighten even further down. Well-oxygenated and more diverse. Outfall area highly impacted by storms and storm currents, which helps to aerate the sediments.

Flounder health is better. 2016 lowest level of flounder liver issues ever recorded!

Why? Source reduction, treatment. Less water “blending” (primary treatment only), which is due to high influent volume, above capacity of secondary treatment. 90% reduction in solids released in effluent. Same trend in Biological Oxygen Demand (BOD), metals, organic contaminants.

Nitrogen—effluent loading/year has risen. In 2016 close to the “caution threshold” (caution = in early 1990s set based on population projections in 2020, discharging 14 metric tons. Threshold set at 90% of that.) What is the impact? Not seeing any eutrophication. No discernible impact in the modeling for even double that amount. Nitrogen sources—MWRA 3-5%, rest mostly from Gulf of Maine.

Bacterial water quality in Boston Harbor—much better than in 1989-91. Meeting standards most of the time in most areas even in wet weather.

Case to be made that the questions asked by the permit should be changed. Eutrophication, etc. are no longer open questions.

Q: Is there data to show changes in the species in the Harbor & Bay?

A: Some changes, but not yet southern species we have never seen before.

Q: now seeing Black Sea bass, anecdotally. Any data?

A: Seen cycles, but no big changes.

Q: Monitoring—not looking for changes that might be associated with pharma or plastics, correct?

A: True, but some tissue sampling is being done, and we aren't seeing plastics or evidence of pharma impacts.

***Alexandrium* bloom of 2017 (red tide).** Scott Libby, consultant to MWRA. No real impact on the Bay.

MWRA monitors for red tide 9x/year at 10 stations. Trigger is more than 100 cells/meter—then monitor at 19 stations. Question of whether outfall creates favorable conditions for a bloom (already answered—no). This one was no exception.

Bloom was offshore—affected southern Maine and Gloucester. Monitoring stations near shore of the Bay and along the south shore found no elevated concentrations. Red tide comes from Casco Bay, and depending on conditions, can be blown in to MassBay.

Enterococcus: David Wu, MWRA

70-fold dilution factor for the outfall bacteria levels. Current limit for fecal coliform. Effluent samples collected 3x/day every day at the plant. Outfall calculations use the dilution factor.

Also monitor shell fishing water quality. Much more stringent.

Anticipating having to monitor enterococcus for swimming standard, but unlikely at 9 miles out in the Bay. Sample monthly and as-needed based on plant conditions (wet weather or a disinfection malfunction).

Outfall is 15-50 meters under surface. Winter—surface waters get effluent; summer—stratification keeps effluent under the surface. At the outfall, 90% of samples do not detect fecal coliform. Some high counts are single surveys at the coast, not at the outfall.

Test for enterococcus also. Majority are non-detects. Results are higher near the outfall surface, but still well below the swimming standards. Using same dilution factor of 70x. seasonal pattern of enterococcus. Highest in cold weather, lowest in summer until October. At the outfall, sampling shows no correlation to the effluent levels of enterococcus.

MWRA believes effluent has very minor effect on levels of enterococcus and fecal coliform in the Bay.

Colder water lets more enterococcus survive disinfection. Lower contact time (higher flow) also means less is killed. Could increase amount of chlorine but can't increase contact time. Higher dosing means higher likelihood of toxic side effects on the Bay, more trucks into DI, higher costs, higher chance of crashes. Suggest seasonal limits, since swimming and boating are not frequent in the colder weather.

OMSAP's Judy Pederson suggests a **one-day workshop** to examine what should be monitored—accepting suggestions of changes to the monitoring plan, dropping questions that have been answered and adding items like climate change.

Original questions:

- ❖ Is it safe to eat fish and shellfish?
- ❖ Is it safe to swim?
- ❖ Are aesthetics being maintained
- ❖ Are natural/living resources protected

So far, outfall not significantly affecting these four

What are trending issues?

Berman/PIAC: public concerns about what we don't know. Don't even know the impacts of what we don't know.

Two broad areas:

1. climate change—deeper, warmer, more turbulent
2. Contaminants of emerging concern: micro-beads, plastics, polymers, pharmaceuticals, endocrine disrupters

Also start to think about how to preserve the data sets we care about, and keep it available.

Betsy Reilley: Some areas more interesting and helpful than others. Want to do things of more value.
Eg: effluent monitoring not bringing much new information to the questions we still have.

Flounder lesions—how far should we go with that? Look at tissues or something else to detect effect of plastics/pharma/endocrine disrupters?

Some conditions worsened by climate: algae, nutrients, want to keep an eye on.

Right whale populations: some local reduction a result of warming—they are moving north. Only one calf seen this year. Record low. Reproduction is down because prey is less predictable or less abundant.

CZM—contaminants of emerging concern/what effects they have & what to do—interest in research.

Kelly Coughlin—a lot of questions answered and concerns of the 1990s aren't what they were. Time to look at what the next phase of questions will be.

OMSAP membership—looking for new, regular members who can send alternates. Need a microbiologist, a toxicology/human health/ statistical member. Recommendations: jpederso@mit.edu

Changes to the Structure and Metabolism of Boston Harbor During the Reversal of its Hypereutrophication 1990-2010—David Taylor, MWRA

Boston Harbor was hypereutrophied, but didn't demonstrate the expected consequences of that.

Nutrients to the harbor were significantly reduced by the BHP, some Carbon (C), Nitrogen (N) and Phosphorus (P) remain, coming in from the rivers, CSOs and other non-point sources. Comparatively much more of an impact than in some European and American systems.

Phytoplankton biomass is directly related to the nutrient load from the effluent. Biomass is high, but relatively low compared to other eutrophic waters. Mostly due to the regular flushing of the harbor.

Benthic health is more related to sludge than to the nutrient loads in the effluent.

Eelgrass rebounding, perhaps speeding up of late.

Response of Boston harbor much more pronounced than in other salt-water bodies.

Harbor still mildly eutrophic.

Sediment monitoring and biodiversity in the harbor—Ken Keay, MWRA

Finding sediments are now deeply oxygenated and densely populated, even where sludge was once dumped.

Wastewater trace elements dropped quickly after sludge stopped being dumped into the harbor. Total organic carbon also gradually reduced.

Ampelisca—a tube-based animal—increased for a few years after the cessation of sludge dumping, eventually crashed, and come back in waves.

Communities of creatures are based on the grain size of the sediments.

Now the top species are fairly stable. Biodiversity has increased steadily over the last 15 years.

Winter Flounder and the discharge

1984-2017—paper about to be published on how TRAC and better treatment of sewage led to the elimination of flounder liver cancer. Linked to petroleum products and PAHs, PCBs, dioxins...etc.

Incidence of flounder liver cancer was 12% in 1988 in the Deer Island Flats. Some up to 2% near Nantasket Beach in 1994. No further incidence of cancer outside of 1 fish in 2004 at the flats or any other measured site (outfall, cape cod bay, etc.)

Percentage of female flounder still higher than 50%. Not sure why.

Fewer blind side ulcers on flounder, but persist. Not sure of cause (viral, chemical, etc.)

Can the fish be eaten?

Yes—under the FDA thresholds for contaminants of concern.

How about emerging contaminants, like PFOAs?

Some work has been done on that. Don't see correlation between endocrine disruptors and fish gender.

Next meeting: this time next year?

PIAC—Public Interest Advisory Committee

Bruce Berman: Recruitment of folks for PIAC who can ask the next series of harbor monitoring questions, involve new people in harbor science. Reach out to all organizations from Gulf of Maine to Cape Cod Bay —ask about their concerns—trending issues or emerging issues.

MWRA: Keep questions within the effects by the outfall.

Build flexibility into the permit. Perhaps need planning and literature searches to know what is out there, respond to crises.

Berman: Permit in the future will decide mission and scope.

Nahant SWIM—Nahant is in state of turmoil. Northeastern is pumping water from the sea into its aquaria from 0.5mgd to 3.6 mgd. MEPA hearing (link to ENF [Northeastern University MSC Seawater Intake Replacement](#)). No idea of impact on the surrounding waters. Question is why. Also putting in a large office building—using seawater to cool buildings. Lobstermen are watching this closely.

➔ Lobstermen should be included in OMSAP meetings, because they think outfall affects lobster health. MassBay lobstermen's association. Nahant's Mahoney lobster dynasty

Pederson (of OMSAP): think about continuing to update monitoring data (not for its own sake, but because entering a period of change). Change ways to monitor as drones and other instruments add tools.