

**OUTFALL MONITORING SCIENCE ADVISORY PANEL (OMSAP) MEETING
Monday, June 29, 2009, 10:00 AM - 3:00 PM, Clark 507, Quissett Campus, WHOI**

SUMMARY

AGENDA TOPICS

- Review of proposed ambient monitoring revisions
- 2009 Red Tide update

ATTENDANCE

Members Present: Andy Solow, Woods Hole Oceanographic Institution (chair); Bob Beardsley, WHOI; Norb Jaworski, retired; Scott Nixon, U. Rhode Island; Judy Pederson, MIT/Sea Grant, and Jim Shine, Harvard School of Public Health.

Observers: Don Anderson, WHOI; Ellie Baptiste Carpenter, Battelle; Michele Barden, EPA; Bruce Berman, Save the Harbor/Save the Bay; Grace Bigornia-Vitale, MWRA; Jim Blake, AECOM Environment; David Borkman, URI; Mike Bothner, USGS; Brad Butman, USGS; Todd Callaghan, Mass Coastal Zone Management; Amy Coste, Provincetown Center for Coastal Studies; Mike Delaney, MWRA; Rich Delaney, PCCS; Martin Dowgert, USFDA; Maggie Geist, Association to Preserve Cape Cod; Rocky Geyer, WHOI; Maury Hall, MWRA; Paul Hogan, MassDEP; Michael Hornbrook, MWRA; Roger Janson, EPA; Chris John, MWRA; Ken Keay, MWRA; Yong Lao, MWRA; Wendy Leo, MWRA; Scott Libby, Battelle; Matt Liebman, EPA; Mike Mickelson, MWRA; Tara Nye, APCC; Brian Pitt, EPA; Andrea Rex, MWRA; Jaime Rooke, SH/SB; David Taylor, MWRA; Jane Tucker, Marine Biological Laboratory; and Cathy Vakalopoulos, MassDEP.

MEETING SUMMARY

Presentation slides can be viewed at:

http://www.mwra.state.ma.us/harbor/pdf/omsap/20090629_omsap_agenda.pdf

MWRA's proposed revisions are located at:

http://www.mwra.state.ma.us/harbor/html/omsap_090629.htm

Process for reviewing requested monitoring revisions

Roger Janson (EPA) introduced Michele Barden, Matt Liebman, and Brian Pitt from EPA as well as Paul Hogan from MassDEP. He said that EPA did not approve MWRA's original proposed modifications to their Ambient Monitoring Plan and is approaching this request as an annual modification proposal as outlined in MWRA's NPDES permit. This requires a full review which includes public input before EPA and MassDEP come to a decision. EPA is in the process of writing MWRA's new NPDES permit and some issues that are being addressed/revised are wet weather, whether to include MWRA member communities as co-permittees, and monitoring. MWRA does not want to have an ambient monitoring requirement in their new permit. EPA will review the draft permit with MassDEP, then MWRA, then all interested parties. The last time the permit was issued, there was a lengthy process, and many people were interested in it. He anticipates that folks will hear more from EPA in late summer/fall.

N. Jaworski asked if the ambient monitoring is eliminated, what will replace it. R. Janson replied that he won't prejudge what EPA will do with that request. MWRA's June 23rd letter did state that their intent was to continue their effluent monitoring but eventually stop the ambient monitoring program.

Need for revisions to monitoring

Michael Hornbrook (Chief Operating Officer, MWRA) thanked OMSAP for their volunteer work and said that MWRA appreciates their efforts. MWRA plans to argue that in their next permit, there is no need to include an ambient monitoring program and a Contingency Plan. Regardless of whether or not this happens, the new permit will require extensive effluent monitoring as well as a commitment to maintain the treatment plant. MWRA spends about \$250 million a year on maintenance. Included in maintenance projects for this year, MWRA is spending \$60 million to replace the stainless steel chains and associated hardware in the primary and secondary clarifiers.

B. Berman asked if MWRA's plan is to eventually request that ambient monitoring no longer be a requirement, how come they didn't ask for it now? M. Hornbrook replied that their proposed revisions are based on what MWRA thought EPA would be comfortable with as an annual revision. MWRA felt that five years of post-outfall relocation monitoring data would be enough to answer the questions we had about the environmental/human health/aesthetic effects of the outfall. Now we have nine years of data. B. Berman thinks we should make a list of the new questions that need to be answered. A. Solow asked at what pace the permit process is moving. Roger replied that though the process is taking longer than MWRA would like, they are making some progress. The public comment period will be at least 60 days and there will be at least one public hearing. Then EPA responds to public comments and there may be an appeal process. This is a complex permit that ties up a lot of resources for all of us. We intend to put extra effort into the "tightness" of the fact sheet, permit, and response to comments.

S. Nixon asked how long the proposed revisions would be in effect if they were to be approved. M. Hornbrook said that they can't give an end date but it will be at least be a year, more if there is an appeal. S. Nixon asked why OMSAP has been tasked to spend time reviewing these proposed revisions if the group will eventually have to review an MWRA proposal to discontinue the ambient monitoring program. N. Jaworski thinks that we need to compile what other monitoring is conducted in the state (e.g. bacterial beach monitoring) and the state should have a responsibility with coordinating state-wide coastal monitoring. M. Hornbrook said that MWRA is proposing these revisions at this time because we don't know how long the permit renewal process will be.

Overview of MWRA monitoring, context for revisions

Andrea Rex (MWRA) discussed the proposed changes to the effluent floatables sampling, water column, and sediment monitoring design. Proposed revisions include changes to a number of sampling sites, sampling schedule, and parameters measured. The goal is to focus on a potential region of influence of the outfall, with reference sites for comparison. No changes have been proposed to: effluent monitoring (except floatables sampling), Contingency Plan reporting, modeling, fish and shellfish monitoring, red tide responsive monitoring, continuous monitoring Cape Ann (GoMOOS A) and nearfield (Buoy 44013), indicator bacteria monitoring around the outfall, and harbor and river monitoring. She then briefly reviewed the 33 original monitoring questions and how they have been answered.

Hydrodynamics in relation to water column monitoring design, and the role of instrumented moorings

Mike Mickelson (MWRA) updated the group on the continuous monitoring in Mass Bay on GoMOOS A and Buoy 44013. S. Nixon asked how often the chlorophyll sensors are calibrated. M. Mickelson replied twice a year and all of the instrumentation is swapped out in

the fall. A. Solow asked if MWRA wanted to eventually stop this. M. Hornbrook replied yes. A. Rex said that they are not proposing to stop this part of the monitoring now.

M. Mickelson then discussed the outfall plume dynamics. B. Berman said that these studies measure dilution by looking at a plume formed during a six-hour dye study when in reality, the plume is constant. M. Mickelson pointed out that the currents that dilute the plume are also constant. B. Berman asked what is meant when they say “the plume is gone”. K. Keay replied that it means that it can’t be distinguished from the background. R. Delaney said that he is struggling with this concept of the plume being “gone” after a certain amount of time. A March 2009 MWRA report discusses elevated nitrate in the nearfield and Cape Cod Bay. Though he understands that there are other sources of nitrogen to the bay, he feels that we need to understand what is going on.

Overview of water column monitoring results and proposed revisions to water column monitoring & OMSAP discussion

Scott Libby (Battelle) gave his presentation and then there was a group discussion. See link above for his slides. R. Delaney and B. Berman pointed out the higher ammonium concentrations measured in Cape Cod Bay since the outfall went on-line (slide #7). S. Libby said that model results indicate that this ammonium is from *in situ* nutrient regeneration and not outfall ammonium. Organic material sinks in the water column and is then broken down into dissolved inorganic nutrients. N. Jaworski noted that the model seems to over-predict and the same is true for modeling in the Chesapeake and the Potomac. J. Shine pointed out that the difference could be due to the fact that monitoring is only a snapshot in time whereas modeling is continuous.

B. Beardsley asked if trends in phytoplankton are tied to copepod populations. S. Libby replied that about five years ago, they explored the possibility that copepods did not find *Phaeocystis* appetizing, and that this reduction of available food would reduce copepod numbers. However, we found that copepods will eat *Phaeocystis* and their fecundity is not affected. Reductions in zooplankton could be tied to larger system issues such as the North Atlantic Oscillation (NAO). A. Coste asked if they looked at zooplankton on the species level, including non-transient species. S. Libby replied yes, and the trend for total copepods, copepodites, nauplii and other species follow a similar pattern as total zooplankton.

N. Jaworski asked if the Boston Harbor clean-up has affected the nitrogen to phosphorus ratios. He noted a paper in Science which discusses the need to control both nitrogen and phosphorus in coastal waters (Controlling Eutrophication: Nitrogen and Phosphorus, Daniel J. Conley, Hans W. Paerl, Robert W. Howarth, Donald F. Boesch, Sybil P. Seitzinger, Karl E. Havens, Christiane Lancelot, and Gene E. Likens, Science 20 February 2009 323: 1014-1015). D. Taylor responded that phosphorus has decreased by 40% in Boston Harbor, in proportion to nitrogen. Also, though the nitrogen to phosphorus ratio of the effluent is higher than in ambient waters, we do not see this change in the ratio in the water column.

T. Callaghan asked why S. Libby’s slide #7 shows summer and winter and not spring and fall when we are more concerned about blooms. S. Libby replied that the purpose was to show stratification in the summer and well-mixed conditions in the winter. T. Callaghan asked about the higher observed nutrient values to the north of the outfall in the same slide. S. Libby thought perhaps it could be coming from the Merrimack River. S. Nixon asked why we are discussing this again. He doesn’t think anyone has come forth to credibly show that there has been a significant impact from the outfall. A. Solow does not think there is enough time today to develop recommendations on all of the proposed changes. OMSAP agreed to further discuss the proposed revisions during a conference call that is open to the public. A.

Rex pointed out the maps MWRA posted at the back of the room to help visualize the monitoring to date as well as the proposed changes.

A. Solow asked if the proposal to eliminate sampling in Stellwagen Basin and Cape Cod Bay was based on data showing no impact from the outfall. A. Rex replied yes. A. Solow asked if because these are proposed interim changes, they are constrained by how many changes they can propose. A. Rex replied yes. S. Nixon said, suppose we accept the fact that with all of these data, that there is no consequential effect of the outfall, and that this is a success story. As one of the major contributors of inputs to Mass Bay, MWRA has greatly increased our understanding of the coastal environment that is important for zooplankton and right whales. So if MWRA has to reduce expenditures, what kind of a program can be maintained so that MWRA remains a responsible steward of the environment? For example, we might want to have one station each in Cape Cod Bay, Stellwagen Bank, and the boundary and not focus on the plume because it has been studied thoroughly. A. Rex said that MWRA's proposal was developed to monitor the outfall discharge in a less resource-intensive manner. MWRA's major constraint is the fact that they have an expired permit (with the Contingency Plan attached to it) which is still in effect but can't be modified. M. Hornbrook said that the Outfall Monitoring Program was developed to address the impacts of the outfall. What is being discussed for coastal monitoring is something the state, or a coalition of dischargers could take on. Not MWRA alone.

N. Jaworski asked how stormwater is handled. M. Hornbrook replied that stormwater is managed by the local owners of stormwater systems, not MWRA. B. Berman said that in CSO systems, MWRA should be responsible. He thinks that every year, MWRA should take on the responsibility of showing that they are not affecting their neighbors, such as those in Cape Cod Bay. N. Jaworski thinks that if MWRA can show that their effluent is clean, then it is no longer their responsibility to monitor in the bays. B. Berman emphasized "if" they can show that. He wondered if MWRA will continue to have the will to maintain the plant. He thinks that the best protection we have is robust monitoring.

B. Beardsley said that if MWRA will eventually request no monitoring in the bays, then this will affect the modeling efforts. M. Hornbrook said that he doesn't know if there will be modeling requirements in the new permit. He added that MWRA conducts 95 tests per day of its effluent and the quality of the effluent is a measure of plant performance. If MWRA maintains the quality of the effluent, then we can say that the outfall is not causing a negative impact. If there is a significant plant upset, we would initiate a special sampling event.

A. Solow thinks that the problem here is that the current proposed monitoring revisions are related to any future request to drop the ambient monitoring altogether. But we are only being tasked to review the proposed revisions in front of us today. J. Shine agreed with S. Nixon. We are not seeing acute impacts of the outfall, so we should enter a new phase of monitoring for chronic effects.

A. Coste asked if MWRA would be able to show if local changes are due to the outfall or are regional events. A. Rex replied that they can see if algal blooms are regional events from satellite photos. A. Coste asked if they look at how increases in nitrogen affect zooplankton populations. A. Rex replied yes.

J. Pederson said that when the original ambient monitoring plan was developed, she compiled all of the comments and there were many differences of opinions. But there was an understanding that this plan would evolve. M. Liebman said that EPA would like to see OMSAP comment on whether the stations chosen by MWRA are appropriate. Are they

locations where we could see if there were effects of the plume? Are they good locations to monitor for changes in phytoplankton and zooplankton? There are certain trends and impacts that we are seeing now. Will we still be able to see them with the proposed sampling scheme?

A. Solow asked what Contingency Plan threshold exceedances would have been missed with fewer stations. A. Rex showed slide #35 that outlined their calculations of Contingency Plan exceedances using the current monitoring scheme and the proposed future sampling scheme. Even with the proposed sampling scheme, the efficacy of the Contingency Plan is preserved. In fact two “borderline” events would be considered exceedances in the proposed future sampling scheme. J. Shine asked how the smaller sample size affects the probability of having a Contingency Plan exceedance. A. Rex replied that it probably increases the likelihood of triggering an exceedance.

R. Delaney said that it would be perceived that MWRA is walking away if they stop monitoring in Cape Cod Bay after it has been documented that there has been an increase in nitrogen and a decrease in zooplankton since the outfall went online. M. Hornbrook replied that the data show that the decrease in zooplankton is not due to the outfall. D. Borkman asked if they could address that question in the future if there was a reduction in monitoring. M. Hornbrook replied yes, if the effluent monitoring results were good. W. Leo added that the changes in zooplankton populations in Cape Cod Bay have also been seen regionally over the past 17 years.

Overview of sediment monitoring results and proposed revisions to sediment monitoring & OMSAP discussion

Ken Keay (MWRA) gave his presentation and then there was a group discussion. See link above for his slides. J. Shine asked if they recalculated the Contingency Plan exceedances for the sediment monitoring. K. Keay replied, yes, and the proposed sampling scheme would still support the Contingency Plan.

2009 Red tide update

Don Anderson (WHOI) described the 2009 red tide which to date, has been a moderate event with toxicity in Mass Bay and Boston Harbor. He then showed *Alexandrium* population model simulations to show how extensive the bloom has been to date. He thinks the model has been proven to be quite accurate. He then showed maps of the *Alexandrium* cyst distributions during the fall from 2003-2008. Using the 2008 fall cyst map, they ran the model with hydrological and meteorological data from previous years to examine various scenarios. As a result, they had a press release on March 24th, 2009 predicting a moderate bloom. He then described the bloom progression to date. Data show that Boston Harbor can receive blooms but blooms do not initiate there. Toxicity in Mass Bay relates to transport and not stimulation within Mass Bay. Overall, we still believe that we have recently entered a new era of frequent and high levels of paralytic shellfish poisoning (PSP) toxicity in the western Gulf of Maine.

N. Jaworski asked if these are in fact more intense blooms, or are we just measuring better? D. Anderson replied that the pattern is real because we are still measuring in the same units, cells per liter. B. Berman asked about the apparent “eddy” off of Cape Ann. D. Anderson said that he plans on examining U Mass modeling results to see if the model is picking up other discharges, including the Merrimack River. MWRA data are very valuable in this effort. B. Butman and D. Anderson then had a brief discussion on cyst bed formation and bloom dynamics.

OMSAP recommendations

OMSAP discussed MWRA's proposed revisions to their ambient monitoring plan. J. Shine noted that the group is not here to look at long term issues. He wondered if the group would be able to make recommendations today. He said that the ambient monitoring program was developed to look at pre-diversion and post-diversion. He asked if reducing the number of stations and the resulting loss of diagnostic power was "mission critical". He liked the comparison of Contingency Plan exceedances with the current and proposed sampling scheme but he wondered to what extent will there be more exceedances with a smaller sample size. A. Rex noted that the number of surveys will be reduced too. J. Shine thinks we need more time to review this, for example he thinks we need to have more of a discussion on primary productivity. The C¹⁴ technique is the "gold standard" for measuring productivity, but it is a costly method. Perhaps there is a surrogate measure of productivity that could be calculated using data MWRA already collects. K. Keay said that on the other hand, if the question of increased productivity has been answered, then there is no need to continue monitoring it.

N. Jaworski suggested OMSAP recommend approving the proposed revisions but that we also request additional syntheses of data that have already been collected. OMSAP should also encourage collaborative bay-wide sampling using multiple sources of funding. A. Solow does not think the group is comfortable approving the proposed revisions today. It seems like there is more work to do. J. Shine wants to make sure that the proposed farfield stations will give enough diagnostic power. The sampling should not only focus on the nearfield. A. Rex pointed out that with the proposed revisions, the farfield stations in the plan will actually be sampled more frequently than the current farfield sampling schedule.

B. Beardsley understands that one rationale in choosing the stations was to be able to conduct a survey in one day. He would like to hear what other factors were considered when choosing station locations. S. Libby replied that F22 is a boundary station with influence from the rest of the Gulf of Maine. Data from this station are useful when looking at GoMOOS A buoy data. The station can be reached during a one day survey, and there is no effluent signal measured there, so it is considered a good "upstream" station. B. Beardsley asked if it is far away from other discharges. S. Libby replied that they could measure a signal from the Salem discharge at station F18, but not at F22 which is in Stellwagen Basin. B. Beardsley and S. Libby then briefly discussed other data available (from buoys, the Provincetown Center for Coastal Studies, and the Stellwagen Bank National Marine Sanctuary). B. Beardsley thinks it would be nice to have a central repository for all of these data – it would also help the modeling effort. W. Leo said that MWRA often shares data with others. She agrees that there is a need for a central repository, but it shouldn't be MWRA. B. Butman suggested that perhaps the Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS) would be a good candidate.

R. Delaney said that our intent is to continue sampling as it relates to right whales, but the PCCS does have its own funding stresses. Therefore, collaborating and sharing data are good ideas. B. Berman agreed but does not think the burden should be on a small non-profit organization. J. Pederson wondered if the data will be available in the future with a federal program like NERACOOS. B. Butman added that it is unclear who would be responsible for this. B. Beardsley said that as OMSAP reviews this proposal, it would be useful to have a list of monitoring/research conducted by others, so that we can see who is doing what. M. Liebman suggested that perhaps the Mass Bays Program could be a repository.

A. Solow would like OMSAP to have more time to review today's presentations, then have a publicly-accessible conference call, after which, OMSAP can draft a letter with their

recommendations. Though we could comment on other sampling efforts, it would be beyond OMSAP's charge. J. Pederson agreed that it is too soon to decide on whether or not to recommend that the proposed revisions be accepted. B. Berman asked for a time table and understands that OMSAP should take the time it needs to review this. J. Pederson thinks they could do the review in about a month. A. Rex asked OMSAP to provide a list of any additional information/analyses they need to her as soon as possible.

A. Solow thinks OMSAP should look at whether the monitoring questions have been answered, and if the Contingency Plan is being addressed with the proposed revisions. Though MWRA also has a social obligation to monitor, there needs to be a balance. He wondered what would happen if the environment shifted so that the outfall began to have a negative impact on the environment. M. Barden said that EPA is considering this proposed revision as an annual submission. B. Pitt added that there isn't a timeline in the permit for an annual submission but the permit does state that OMSAP will advise EPA and MassDEP and the proposed revisions will go out for public notice. B. Berman told the group that OMSAP's Public Interest Advisory Committee (PIAC) will meet today after this meeting and the committee will be working on its own recommendations. R. Janson said that any changes to the monitoring before the new permit comes out would form the basis of discussion on ambient monitoring in the permit. EPA and MassDEP have an obligation to respond in a timely manner but taking extra time for a careful review makes sense.

ADJOURNED

Summary prepared by C. Vakalopoulos.