

OUTFALL MONITORING SCIENCE ADVISORY PANEL (OMSAP) MEETING
Monday, January 13, 2003, 10:00 AM to 2:00 PM, WHOI
FINAL MINUTES

AGENDA TOPICS

- Public Interest Advisory Committee (PIAC) update
- Recent nitrogen isotope data from Massachusetts and Cape Cod Bays
- 2002 observations of right whales and their prey in Cape Cod Bay
- Exceedance of the 2002 *Phaeocystis* nuisance algae summer threshold
- Increasing the taxa included in the *Pseudonitzschia* nuisance algae threshold
- Proposed revisions to the ambient monitoring plan (urea, coliform, lobster, flounder)
- Summer 2002 mussel tissue contaminant exceedance (PAHs, chlordanes)
- Quality assurance for the MWRA ambient monitoring program
- Scheduling upcoming OMSAP technical workshops

SUMMARY OF ACTION ITEMS & RECOMMENDATIONS

1. OMSAP approved the July 15, 2002 and September 24, 2002 minutes with no amendments.
2. OMSAP requested MWRA return to OMSAP with a plan on the specifics of revising the *Pseudonitzschia* caution threshold and OMSAP will revisit this at a future meeting.
3. OMSAP recommends that the fecal coliform measurements in the effluent and urea measurements in the nearfield water column be dropped and that the proposed reduction in flounder and lobster sampling be reviewed at the OMSAP technical workshops.
4. OMSAP will form a focus group that will review the summer 2001 and 2002 mussel tissue contaminant exceedances and report back to OMSAP. [This meeting has been scheduled for Wednesday, March 5, 2003, 1:00-4:00 PM at MADEP Boston].

ATTENDANCE

Members Present: Andy Solow, WHOI (chair); Bob Beardsley, WHOI; Norb Jaworski, retired; Scott Nixon, U. Rhode Island; Judy Pederson, MIT/Sea Grant; Mike Shiaris, U. Mass Boston; Jim Shine, Harvard School of Public Health; and Juanita Urban-Rich, U. Mass Boston.

Observers: Adrienne Appel, freelance journalist; Ellen Baptiste Carpenter, Battelle; Theresa Barbo, Center for Coastal Studies; Bruce Berman, Save the Harbor/Save the Bay; Dave Borkman, U. Rhode Island; Peter Borrelli, Center for Coastal Studies; Mike Bothner, USGS; Jeanine Boyle, Battelle; Todd Callaghan, MCZM; James Collier, Center for Coastal Studies; Cathy Coniaris, MADEP; Larry Davoy; Mike Delaney, MWRA; Winnie Donnelly, MADEP; David Dow, NMFS; Bruce Estrella, MADMF; Anne Giblin, Marine Biological Laboratory; Maury Hall, MWRA; Doug Hersh, MWRA; Carlton Hunt, Battelle; Mingshun Jiang, U. Mass Boston; Chris John, MWRA; Ken Keay, MWRA; Ben Kelly, Save the Harbor/Save the Bay; Wendy Leo, MWRA; Matt Liebman, EPA; James Lindholm, NOAA/SBNMS; Steve Lipman, MADEP; Juan Mariscal, Narragansett Bay Commission; Stormy Mayo, Center for Coastal Studies; Robert Michener, Boston University; Mike Mickelson, MWRA; Owen Nichols, Center for Coastal Studies; Tara Nye, Association to Preserve Cape Cod; Sharon Pavignano, Narragansett Bay Commission; Jennifer Ponting, MWRA; Andrea Rex, MWRA; Steve Rhode, MWRA; Jack Schwartz, MADMF; Ted Smayda, U. Rhode Island; Dave Taylor, MWRA; Jane Tucker, Marine Biological Laboratory; Steve Tucker, Cape Cod Commission; Jeff Turner, U. Mass Dartmouth; Grace Vitale, MWRA; and David Wu, MWRA.

MINUTES

C. Coniaris introduced W. Donnelly from MADEP who will help out with OMSAP-related activities. C. Coniaris will be preparing less detailed minutes so that she can work on other projects at MADEP.

PUBLIC INTEREST ADVISORY COMMITTEE (PIAC) UPDATE

On behalf of Patty Foley (PIAC chair), B. Berman updated OMSAP on recent PIAC activities. At the September 2002 PIAC meeting, members present discussed how they would like to make sure that the public is informed of the OMSAP review of MWRA's outfall monitoring program. The group discussed possibly broadcasting a public meeting over the radio or Internet. This afternoon, PIAC plans on reviewing today's OMSAP meeting, as well as discussing the impact of the loss of state rate subsidies on MWRA.

RECENT NITROGEN ISOTOPE DATA FROM MASSACHUSETTS AND CAPE COD BAYS

J. Montoya presented recent results of the Center for Coastal Studies funded nitrogen isotope monitoring in Massachusetts and Cape Cod Bays ("the bays") [for details, see J. Montoya's 1/13/03 information briefing]. The goal of this project is to use nitrogen isotope measurements as a tool to track the movement of nitrogen into the planktonic ecosystem. He first described nitrogen isotopes in the marine environment and then presented recent measurements in the bays. This included a discussion of the spatial influence of the MWRA outfall and its contribution to the nitrogen budget.

J. Montoya explained that nitrogen has two naturally occurring stable isotopes (^{14}N and ^{15}N). We can use the isotopic signature of nitrogen, known as $\delta^{15}\text{N}$, to track the movement of nitrogen through ecosystems. The $\delta^{15}\text{N}$ of a compound is the measure of the amount of ^{15}N relative to the amount of the lighter ^{14}N (the more positive the $\delta^{15}\text{N}$, the more ^{15}N present in that sample). Most biological reactions have a slight preference for the lighter isotope ^{14}N creating "biological imprints" on the distribution of nitrogen isotopes in ecosystems.

J. Montoya then stated that the nitrogen isotope monitoring program seeks to define and monitor critical chemical and biological parameters in the bays and attempts to assess the impact of the MWRA outfall on the ecosystem of the bays. Stations in Cape Cod Bay are sampled monthly and stations between the MWRA outfall and Cape Cod Bay are sampled quarterly. Parameters measured include suspended particles (to measure particulate nitrogen, PN), zooplankton, and dissolved nutrients.

J. Montoya showed results of their analyses that indicate that the $\delta^{15}\text{N}$ of zooplankton in Cape Cod Bay has not changed appreciably in the last decade. This implies that the nitrogen injected into Massachusetts Bay by the new MWRA outfall has not yet had a significant impact on the nitrogen supply to Cape Cod Bay. The project has added stations north of Cape Cod Bay to the south of the outfall to measure the extent of the influence of the outfall. J. Montoya then showed $\delta^{15}\text{N}$ PN and zooplankton results of their summer 2001, autumn 2001, and spring 2002 sampling. He described the patterns of $\delta^{15}\text{N}$ in PN and zooplankton that imply that nitrogen from the outfall is entering the biota. He believes these patterns show the response of the ecosystem to an increase of particulate nitrogen (that he hypothesizes might be due to the discharge of dissolved inorganic nitrogen available to phytoplankton), followed by dilution farther south, and a response in the zooplankton after consuming those suspended particles. Taken together, these patterns define what the region of influence of the outfall actually is, at least in terms of the planktonic ecosystem. Though we cannot entirely rule out local sources of nitrogen, he thinks they have good evidence that the MWRA outfall is having an

influence on the nitrogen cycle in the plankton. To his knowledge, this is the first time anyone has attempted to use nitrogen isotopes to measure or trace the movement of nitrogen into a coastal planktonic ecosystem.

J. Montoya concluded that:

- The $\delta^{15}\text{N}$ of PN and zooplankton vary significantly in the region of the outfall. The $\delta^{15}\text{N}$ minimum south of the outfall provides a biogeochemical index to the penetration of effluent nitrogen into the planktonic ecosystem.
- The spatial spread of effluent nitrogen into the plankton appears to vary seasonally. The boundary of the zone of measurable effluent input to the plankton varied between ~40-70 km south of the outfall in their three surveys to date.
- A simple isotopic mixing model suggests that effluent makes a significant contribution to both PN and zooplankton biomass in the region of the outfall. Effluent may account for over half the nitrogen in PN and roughly a third of the nitrogen in zooplankton.
- Isotopes are a leading indicator of effluent impact. Shifts in the isotopic boundary may be the first indicator of impending ecosystem-level changes associated with effluent inputs.
- However, ecosystems are highly complex networks and community level changes may extend beyond the isotopically defined zone of effluent impact.

J. Montoya then answered questions about methods and results from OMSAP members and the audience. S. Nixon noted that the signal that they saw in the effluent was not much different from what was seen in the background. He asked how they can distinguish whether the signal they see is a bloom operating on the effluent nitrogen versus the nitrogen from the background. He does not see how they can clearly attribute the nitrogen source. J. Montoya agreed that this conclusion could not be clearly drawn because they need a measurement of the $\delta^{15}\text{N}$ of inorganic nitrogen throughout the bays. Right now they can qualitatively make a case that the bloom downstream of the outfall is using effluent nitrogen, but they cannot fully rule out a more localized source. J. Montoya noted that in his information briefing to OMSAP, there is a typographical error: the open circles are surface samples and the closed circles are deep samples.

2002 OBSERVATIONS OF RIGHT WHALES AND THEIR PREY IN CAPE COD BAY

S. Mayo described the 21-year right whale monitoring conducted by the Center for Coastal Studies [for details, see S. Mayo's 1/13/03 information briefing]. Right whale numbers observed in Cape Cod Bay during the late winter/early spring of 2002 appear to be the lowest on record. Possible reasons may include: competition from other high quality habitats, migratory and searching plasticity, and food resource density and competition.

S. Mayo showed plots of right whale observations and food (copepods) for 1999, 2000, 2001, and 2002. He then showed comparisons of abundances of the major types of zooplankton that right whales feed on (*Centropages*, *Pseudocalanus*, and *Calanus*) for these four years during the late winter and early spring. The preferred right whale food (*Calanus*) abundance during the early spring of 2002 was extremely low compared to 1999, 2000, and 2001. However, *Calanus* did bloom later after the right whales left Cape Cod Bay.

S. Mayo then described the *Acartia* hypothesis that was discussed a few years ago. The *Acartia* hypothesis states that a switch to *Acartia* dominance in the marine environment may indicate a potential shift to estuarine conditions not conducive to right whale aggregation. In early spring 2002,

Acartia, because of low *Calanus* abundances, was numerically dominant for the first time in eastern Cape Cod Bay. However, his data do not support the *Acartia* hypothesis because though *Acartia* was numerically dominant due to the delayed *Calanus* bloom, *Acartia* abundances match previous years. So far in 2003, right whale observations in Cape Cod Bay are low for this time of the year.

OMSAP and the audience then asked S. Mayo questions. B. Beardsley asked how 2002 compares to 1996 when the right whale observations were also low in Cape Cod Bay. S. Mayo replied that in 2002, the feeding rates were lower, the residency times were lower, and no calves were observed in Cape Cod Bay. D. Dow asked where the right whales were in 2002. S. Mayo replied that the right whales were observed to be feeding on rich densities of adult zooplankton east of Cape Cod Bay, along a thermal boundary northeast of Highland Light.

EXCEEDANCE OF THE 2002 PHAEOCYSTIS NUISANCE ALGAE SUMMER THRESHOLD

M. Mickelson presented information on the summer 2002 *Phaeocystis* caution threshold exceedance [for details see MWRA's notification of the exceedance at: <http://www.mwra.state.ma.us/harbor/pdf/20021209amx.pdf> and MWRA's 1/13/03 information briefing]. *Phaeocystis* is a globular, colonial, mucillagenous nuisance algae. The threshold was triggered because a sampling survey that normally takes place in late April was delayed until early May due to bad weather. The "summer" season, used to calculate the seasonal threshold begins May 1 and this May survey sampled a spring *Phaeocystis* bloom that was in decline. The summer threshold was triggered because it is much lower than the spring threshold, which is when *Phaeocystis* is typically measured. M. Mickelson noted a typographical error in the *Phaeocystis* information briefing: in figure 3, in the 1997 plot, there should be a box around "5". He then answered the questions provided by the Inter-Agency Advisory Committee before today's meeting to MWRA. OMSAP had a brief discussion and agreed that this threshold exceedance was more of a sampling artifact, and not an environmental concern.

INCREASING THE TAXA INCLUDED IN THE PSEUDONITZSCHIA NUISANCE ALGAE THRESHOLD

K. Keay presented a proposal from the MWRA to OMSAP to revise their *Pseudonitzschia* caution threshold by adding more species within the family *Nitzschiaceae* that produce domoic acid. Domoic acid is a toxin that can cause amnesic shellfish poisoning in humans. Computation of the threshold is based on the 95th percentile of the distribution of baseline seasonal means, thus adding additional species would increase the threshold, but not change the sensitivity of the threshold. [For more information, see MWRA's 1/13/03 information briefing.]

OMSAP and the audience then discussed this proposal. T. Smayda does not think that revising the threshold by adding species would give any advanced warning or additional protection, in fact, he feels that it would give a false sense of security. He thinks *Pseudonitzschia* should be measured, but that the threshold should be removed unless there are numbers measured for each species as well as measurements of domoic acid. After discussing the sampling and analysis methods, several OMSAP members thought that MWRA should perhaps be conservative and group domoic acid-producing species of *Nitzschiaceae* together. However OMSAP then decided to postpone any recommendations and asked MWRA to come back to OMSAP with a plan on the specifics of revising the threshold and OMSAP will revisit this request.

ACTION: OMSAP requested MWRA return to OMSAP with a plan on the specifics of revising the *Pseudonitzschia* caution threshold and OMSAP will revisit this at a future meeting.

PROPOSED REVISIONS TO THE AMBIENT MONITORING PLAN (UREA, COLIFORM, LOBSTER, FLOUNDER)

A. Rex reviewed MWRA's proposed revisions [for details go to: http://www.mwra.state.ma.us/harbor/pdf/20021113_amb_mon_mods.pdf and MWRA's 1/13/03 information briefing]. There are four proposed revisions: (1) drop the requirement for measuring total coliform in the effluent, since fecal coliform is currently measured to measure the effectiveness of disinfection; (2) drop two of the four reference sites (Nantasket Beach and Broad Sound) for flounder sampling; (3) drop the Deer Island Flats and East Cape Cod Bay sampling locations for lobster because they are not relevant to interpretation of the data at the outfall site; and (4) stop measuring urea in the water column monitoring since urea is included in the extensive total dissolved nitrogen measurements. OMSAP then discussed each proposed revision.

Total coliform: OMSAP agreed to recommend that total coliform measurements be dropped since fecal coliform is also being measured, as is *Enterococcus*.

Flounder: J. Schwartz noted that several years ago, there was a discussion on whether there was a need for more detailed flounder population studies by measuring contaminants in individual fish rather than compositing. He wondered if there was any interest to do that, and since many of the toxins bioaccumulate over several years, he questioned whether there is a need for annual flounder sampling. J. Pederson said that compositing was thoroughly discussed in the past and it was agreed that the pooling of flounder samples was appropriate because we are looking at human health as opposed to individual differences within the fish population. S. Nixon suggested that since changes are being seen and because the changes in flounder tissue take place over several years, that MWRA keep the same number of stations, but sample less frequently. OMSAP decided to postpone recommendations on flounder monitoring until the OMSAP technical workshops.

Lobster: B. Berman noted that lobsters are important from the public's perspective and he feels that lobster monitoring should continue. J. Schwartz thinks it is premature to stop sampling at the Deer Island Flats and E. Cape Cod Bay stations. As with the flounder sampling, he thinks compositing loses detailed information about the population. J. Shine thinks that the approach should be tailored to what we are monitoring for. Are we monitoring for the health of the lobsters or humans? If it is for lobster health, we would want to know what the source of the contamination was. If it is for human health reasons, then sampling at the outfall is all that is necessary. D. Dow thinks it is important to keep the same level of lobster monitoring so that if the decline in lobsters observed in Long Island Sound and S. Cape Cod moves into Massachusetts Bay, then there will be data to show that the outfall was not causing the decline. N. Jaworski thinks that there is value in keeping the lobster monitoring for another 2-3 years. J. Urban-Rich agreed and suggested instead of reducing the stations, to sample less frequently. J. Shine suggested sampling at the outfall every year, but the sampling the reference sites every other year. OMSAP decided to postpone recommendations on lobster monitoring until the OMSAP technical workshops.

Urea: OMSAP agreed to recommend that MWRA drop the urea water column measurements since total dissolved organic nitrogen is thoroughly measured.

ACTION: OMSAP agreed to recommend that the fecal coliform measurements in the effluent and urea measurements in the nearfield water column be dropped and that the proposed reduction in flounder and lobster sampling be reviewed at the OMSAP technical workshops.

SUMMER 2002 MUSSEL TISSUE CONTAMINANT EXCEEDANCE (PAHS, CHLORDANE)

M. Hall described the summer 2002 mussel tissue contaminant exceedance [for more details see: <http://www.mwra.state.ma.us/harbor/pdf/20021213amx.pdf>]. M. Liebman thinks that this is a complicated issue that requires an in-depth discussion and that there is not enough time on the agenda. In addition, he would like to invite scientists from the EPA Narragansett Lab to participate in the discussion. He suggested that OMSAP form a focus group to review the exceedances and report back to the entire group.

ACTION: OMSAP agreed to form a focus group that will review the summer 2001 and 2002 mussel tissue contaminant exceedances. The focus group will meet in February or March and will report back to OMSAP. [This meeting has been scheduled for Wednesday, March 5, 2003, 1:00-4:00 PM at MADEP Boston].

QUALITY ASSURANCE FOR THE MWRA AMBIENT MONITORING PROGRAM

W. Leo gave an overview of MWRA's quality assurance program, as requested by OMSAP at their July 15, 2002 meeting. [For details see MWRA's 1/13/03 information briefing]. There was a brief discussion of the topic. N. Jaworski asked where EPA's data quality objectives are addressed. W. Leo replied that the MWRA program was set up when EPA's data quality objectives were still being formalized. However, the ambient monitoring plan does address EPA's objectives and the details have all been outlined in the Combined Work/Quality Assurance Project Plans [go to: <http://www.mwra.state.ma.us/harbor/enquad/>].

SCHEDULING UPCOMING OMSAP TECHNICAL WORKSHOPS

C. Coniaris asked OMSAP and the audience what dates during the months of April through June 2003 to avoid scheduling the OMSAP technical workshops. The purpose of these workshops is to review MWRA's ambient monitoring plan. The first workshop will address effluent, pathogens, sediment chemistry, and fish/shellfish monitoring. The second workshop will address water quality and benthic community monitoring. OMSAP and audience members suggested not scheduling the workshops during April school vacation and the month of May (professors are busy then). C. Coniaris noted that W. Donnelly will assist OMSAP in scheduling and planning for the workshops.

ADJOURNED

MEETING HANDOUTS:

- Agenda
- January 2003 OMSAP/PIAC/IAAC membership lists
- July 2002 and September 2002 draft OMSAP minutes
- Information briefings

Summary prepared by C. Coniaris. Post-meeting comments are included in [brackets]. All such comments have been inserted for clarification only. They do not, nor are they intended to, suggest that such insertions were part of the live meeting components and have been expressly set-off so as to avoid such inference.