MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Frederick A. Laskey
Executive Director

Telephone: (617) 242-6000
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November 13, 2020

Mr. Todd Borci
EPA Region 1
5 Post Office Square, Suite 100
Mail Code ECAD4-4
Boston MA, 02109-3912

Ms. Catherine Vakalopoulos
Massachusetts Department of Environmental Protection
1 Winter Street
Boston, MA 02108

RE: Massachusetts Water Resources Authority
Permit Number MA 0103284
Submission Pursuant to Part I.7.c.iii – Ambient Monitoring Plan Modifications

Dear Mr. Borci and Ms. Vakalopoulos:

Pursuant to Part I.7.c.i of the Massachusetts Water Resources Authority's ("MWRA") National Pollutant Discharge Elimination System ("NPDES") Permit (Permit Number MA0103284), MWRA is proposing final modifications to the *Massachusetts Water Resources Authority Ambient Monitoring Plan Revision 2, July 2010*[1]*. Under Part I.7.c.i of the permit, a list of all proposed modifications to the Permit for the year, including any interim modifications that have taken effect under Part I.7.c.iii, must be submitted to EPA, MADEP and the public, and published in the Environmental Monitor for the purpose of receiving public comment.*

On June 5, 2020, MWRA proposed the modifications described below as interim modifications to the Ambient Monitoring Plan under Part I.7.c.iii of the permit. That interim request is attached in full to this letter. On July 6, 2020, EPA sent a letter documenting that the agency did not object to the proposed changes, allowing them to take effect on an interim basis.

The monitoring plan was developed and attached to MWRA's NPDES permit with the clear intention that it was to be a "living document." Therefore, the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP) included in the permit a separate procedure (Parts I.7.c.i and I.7.c.iii) for modifying the monitoring plan outside the permit modification process. The attached interim monitoring modification package includes a memorandum dated September 5, 2002 by Jeffrey Fowley of EPA's Office of Regional Counsel regarding changes to the monitoring plan. EPA, DEP, and MWRA used this approach previously to revise the monitoring plan in 2003-4 and again in 2009-10.

MWRA is proposing to remove from the monitoring plan two sediment monitoring studies and to modify the monitoring of winter flounder health. Evaluations of the results from the sediment studies, agreed upon by EPA and DEP's Outfall Monitoring Science Advisory Panel (OMSAP), have indicated that the studies have fully addressed the monitoring questions which led to their establishment and are no longer necessary to track potential impacts of MWRA's discharge. Evaluations of the winter flounder monitoring with which OMSAP has agreed indicate that the study has addressed its monitoring questions well and that monitoring effort can be reduced while maintaining data collection at two core locations.

[1] The monitoring plan (Attachment N to the DITP NPDES permit) is available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf.

After receiving EPA's acceptance of the interim modification proposal, MWRA implemented the proposed changes to sediment monitoring in summer 2020. The proposed change to winter flounder monitoring is intended to take effect next year (2021).

The proposed changes are:

- End the monitoring, scheduled for every third year (including August 2020), of contaminants[2] in sediments*;*
- End the annual monitoring (including August 2020) of sediments in western Massachusetts Bay using sediment profile imaging;
- Delete two reference stations (off Nantasket Beach and in eastern Cape Cod Bay) from the winter flounder monitoring while continuing to monitor fish on Deer Island Flats (Boston Harbor) and near the outfall site.

Other studies included in the monitoring plan will not be affected by these proposed changes.

This proposal is based on discussions with OMSAP members, regulators, and the public that occurred at OMSAP subcommittee meetings on July 9 and September 10, 2019, as well as at a meeting of the full OMSAP that occurred on October 3, 2019. Attachment A includes a summary of the evaluations and discussions. On October 3, 2019 OMSAP voted to endorse the monitoring changes proposed here.

As per the process laid out Part I.7.c.i of MWRA's NPDES permit, MWRA is submitting a public notice about this proposal for publication in the November 23, 2020 *Environmental Monitor*. This notice requests that any comments be submitted to USEPA and MADEP by December 23, 2020.

If you have any questions or need any additional information please contact me at (617) 788-4359.

Sincerely,

David Coppes
Chief Operating Officer

Attachment 1:

MWRA June 5, 2020 request for interim change to MWRA Ambient Monitoring Plan

[2] Contaminant monitoring in sediments includes metals, organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs) and polycyclic biphenyls (PCBs).

Cc:

Environmental Protection Agency, Region I
Matthew Liebman
Todd Borci

National Marine Fisheries Service
Kimberly Damon-Randall
Christine Vaccaro

Stellwagen Bank National Marine Sanctuary
Peter DeCola

US Food and Drug Administration
David Lamoureux

MA Executive Office of Energy and Environmental Affairs
Vandana M. Rao

MA Department of Environmental Protection
Cathy Vakalopoulos

MA Division of Marine Fisheries
Jeff Kennedy
Terry O'Neil

MA Dept of Public Health
Michael Moore

Cape Cod Commission
Timothy Pasakarnis

Outfall Monitoring Science Advisory Panel
Robert Beardsley
Peter Burn
Virginia Edgcomb
Loretta Fernandez
Robert Kenney
Mark Patterson
Judith Pederson
Jeffrey Rosen
Juliet Simpson
Juanita Urban-Rich

Public Interest Advisory Committee
Bruce Berman

Hyannis Library
Antonia Stevens

MWRA Library
Karen Graham

Attachment 1

MWRA Ambient Monitoring Plan June 5, 2020 Interim Modification Request containing:

- Cover letter
- Two attachments:
    - September 5, 2002 Memorandum from Jeffrey Fowley, US EPA;
    - Attachment A. Supporting Information

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June 5, 2020

Mr. Todd Borci
EPA Region 1
5 Post Office Square, Suite 100
Mail Code ECAD4-4
Boston MA, 02109-3912

Ms. Catherine Vakalopoulos
Massachusetts Department of Environmental Protection
1 Winter Street
Boston, MA 02108

RE: Massachusetts Water Resources Authority
Permit Number MA 0103284
Submission Pursuant to Part I.7.c.iii – Ambient Monitoring Plan Modifications

Dear Mr. Borci and Ms. Vakalopoulos:

Pursuant to Part I.7.c.iii of the Massachusetts Water Resources Authority's ("MWRA") National Pollutant Discharge Elimination System ("NPDES") Permit (Permit Number MA0103284), MWRA is proposing interim modifications to the *Massachusetts Water Resources Authority Ambient Monitoring Plan Revision 2, July 2010*[1].

The monitoring plan was developed and attached to MWRA's NPDES permit with the clear intention that it was to be a "living document." Therefore, the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (DEP) included in the permit a separate procedure (Parts I.7.c.i and I.7.c.iii) for modifying the monitoring plan outside the permit modification process. Attached to this letter is a memorandum dated September 5, 2002 by Jeffrey Fowley of EPA's Office of Regional Counsel regarding changes to the monitoring plan. EPA, DEP, and MWRA used this approach previously to revise the monitoring plan in 2003-4 and again in 2009-10.

MWRA is proposing to remove from the monitoring plan two sediment monitoring studies and to modify the monitoring of winter flounder health. Evaluations of the results from the sediment studies, agreed upon by EPA and DEP's Outfall Monitoring Science Advisory Panel (OMSAP), have indicated that the studies have fully addressed the monitoring questions which led to their establishment and are no longer necessary to track potential impacts of MWRA's discharge. Evaluations of the winter flounder monitoring with which OMSAP has agreed indicate that the study has addressed its monitoring questions well and that monitoring effort can be reduced while maintaining data collection at two core locations.

MWRA plans to implement the proposed changes to sediment monitoring in summer 2020. The proposed change to winter flounder monitoring is intended to take effect next year (2021).

[1] The monitoring plan (Attachment N to the DITP NPDES permit) is available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf.

The proposed changes are:

- End the monitoring, scheduled for every third year (including August 2020), of contaminants[2] in sediments;
- End the annual monitoring (including August 2020) of sediments in western Massachusetts Bay using sediment profile imaging;
- Delete two reference stations (off Nantasket Beach and in eastern Cape Cod Bay) from the winter flounder monitoring while continuing to monitor fish on Deer Island Flats (Boston Harbor) and near the outfall site.

Other studies included in the monitoring plan will not be affected by these proposed changes.

This proposal is based on discussions with OMSAP members, regulators, and the public that occurred at OMSAP subcommittee meetings on July 9 and September 10, 2019, as well as at a meeting of the full OMSAP that occurred on October 3, 2019. Attachment A includes a summary of the evaluations and discussions. On October 3, 2019 OMSAP voted to endorse the monitoring changes proposed here.

MWRA will follow this request for interim changes with an annual request for changes to the Monitoring Plan pursuant to Part I.7.c.i of its NPDES permit.

If you have any questions or need any additional information please contact me at (617) 788-4359.

Sincerely,

David Coppes
Chief Operating Officer

Two attachments:

Memorandum from Jeffrey Fowley, EPA, dated September 5, 2002 "Potential Changes to MWRA Ambient Monitoring Plan"
Attachment A. Supplemental Information

[2] Contaminant monitoring in sediments includes metals, organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs) and polycyclic biphenyls (PCBs).

Cc:

Environmental Protection Agency, Region I
Matthew Liebman
Todd Borci

National Marine Fisheries Service Kimberly Damon-Randall

Stellwagen Bank National Marine Sanctuary
Peter DeCola

US Food and Drug Administration
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Public Interest Advisory Committee
Bruce Berman

Hyannis Library
Carol Saunders (hard copy)

MWRA Library
Karen Graham (hard copy)

Attachment to Attachment 1

Memorandum from Jeffrey Fowley, EPA

September 5, 2002

"Potential Changes to MWRA Ambient Monitoring Plan"

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 Congress Street, Suite 1100
BOSTON, MA 02114-2023

Memorandum

Date: September 5, 2002

Subj: Potential Changes to MWRA Ambient Monitoring Plan

From: Jeffry Fowley, Office of Regional Counsel, EPA

To: Roger Janson, EPA (cc: Matt Liebman, Brian Pitt, Janet LaBonte - Deshales, Ken Moraff - EPA; Steve Lipman, Pam Harvey - DEP; Andrea Rex, Chris John - MWRA)
By memorandum dated July 15, 2002, Andrea Rex of the MWRA requested a legal opinion from the EPA regarding the procedures to be followed if the MWRA proposes changes to its Ambient Monitoring Plan (Attachment N to its NPDES Permit). This request was forwarded to me by Matt Liebman, and I am responding to it now.

For most changes, the procedures to be followed are similar to those followed in making the recent changes to the MWRA's Contingency Plan. A formal permit modification is not required. Rather, if the MWRA is seeking interim approval of changes, it must submit these changes to the EPA (and DEP) as specified in Part I.1.7.c.iii of the Permit. If the MWRA is seeking long term approval of changes, it must submit these on an annual basis as specified in Part I.1.7.c.i of the Permit. In either case, the MWRA must give public notice of the proposed changes pursuant to Part I.20.e of the Permit by describing them on its web site and in documents filed in the two repositories established pursuant to the Permit. In addition, prior to obtaining long term approval, the MWRA must publish a Notice describing the proposed changes and seeking public comment, in the Environmental Monitor. The Notice in the Environmental Monitor should be similar to the one published by the MWRA regarding proposed Contingency Plan changes on November 8, 2000, but should be improved by specifying EPA and DEP (as well as MWRA) contacts to which any comments should be sent, and by specifying that the public has 30 days to comment. Thus, a future Notice should read as follows:

PUBLIC NOTICE REGARDING PROPOSED CHANGES TO MWRA AMBIENT MONITORING PLAN: Pursuant to Section I.1.7.c of its National Pollutant Discharge System permit, the Massachusetts Water Resources Authority has submitted a list of proposed modifications to its Ambient Monitoring Plan to the U.S. Environmental Protection Agency and the Massachusetts Department of Environmental Protection, as follows: [Describe proposed changes]. To obtain more information on this proposal and the opportunities for public comment, please visit

the MWRA web site at [list] or contact [give MWRA contact, with phone number]. Comments and questions on these proposed changes also may be directed to Janet-Labonte-Deshals at the EPA, mail code- CPE, One Congress St., Boston, MA 02114, tel: 617-918-1667, and Steven Lipman at the DEP, One Winter St., Boston, MA 02108, tel: 617-292-5698. The EPA and DEP will consider any comments received within 30 days of the date of this Notice.

There may be cases in which proposed changes to the Ambient Monitoring Plan are so significant as to instead require a formal Permit Modification, as provided by Part I.1.7.c.v of the Permit. An example would be a proposal to terminate a large portion of the monitoring. However, this does not mean that a permit modification is required for every major revision to the Plan or whenever there is an objection to a proposed revision. The Ambient Monitoring Plan (like the Contingency Plan) was intended to be a "living document" that would continually be reviewed and revised based on the assessment of information and current scientific understanding. By providing for public comment and regulatory agency decision-making outside the context of a formal permit modification, the Permit clearly contemplates that the regulatory agencies may make decisions, including to agree or disagree with public comments, without needing to utilize the formal permit modification process.

However, the EPA cannot commit in advance that whatever changes the MWRA proposes will not require a formal permit modification. Rather, the EPA (and the DEP) need to reserve the right to require a formal permit modification, when proposed changes are submitted and after assessing the extent of the proposed changes.

Changes to the Ambient Monitoring Plan which do not require a formal permit modification can continue to be processed even after the Permit expires but remains in effect pursuant to 40 C.F.R. § 122.6. Approving or disapproving such changes is part of permit administration which the EPA is authorized to carry out by 40 C.F.R. § 122.6(b) even for expired permits. However, changes which require a formal permit modification can be processed by the EPA only during the term of the Permit - not after it has expired. Thus, if the MWRA wants to propose very large and controversial changes to the Ambient Monitoring Plan, it should do so prior to the expiration of the Permit or as part of its application for its next renewed Permit.

Attachment A to

Attachment 1

Supporting Information

Supporting Information

MWRA March 2020 Proposed

Interim Modifications

Ambient Monitoring Plan

Background

Massachusetts Water Resources Authority's ("MWRA") National Pollutant Discharge Elimination System ("NPDES") Permit (Permit Number MA0103284) requires that MWRA implement an Ambient Monitoring Plan (Attachment N[1]). The Ambient Monitoring Plan ("monitoring plan") was developed and attached to the permit with the clear intention that it was to be a "living document." Therefore, EPA included in the permit a separate process for modifying the monitoring plan outside the permit modification process (Parts I.7.c.i and I.7.c.iii).

In 2003-2004, MWRA used this process, working with EPA and DEP, their Outfall Monitoring Science Advisory Panel (OMSAP) and its subcommittees in a public process to modify the monitoring plan. Some interim changes to the monitoring took effect during 2003; Revision 1 to the monitoring took full effect in 2004[2].

In 2009-10, MWRA again used this mechanism, working with regulators, OMSAP, and other interested parties to further modify the monitoring plan. Revision 2 of the monitoring plan[3] has been in effect since its approval by regulators on December 6, 2010.

Monitoring Plan revision process, 2018-2019

November 13, 2018 workshop, Boston. OMSAP, its Public Interest Advisory Committee (PIAC), EPA and DEP, with support from MWRA staff, conducted a public workshop. This meeting brought together environmental scientists who helped design and conduct MWRA's monitoring, along with others who have not been involved in the work, to review monitoring results and emerging environmental issues, identify if any monitoring questions were completely answered, and begin developing new monitoring questions related to potential impacts of MWRA's discharge.

Workshop participants agreed[4] that the more than a quarter century of monitoring has shown that the outfall has not adversely affected Massachusetts Bay. Similarly, there was consensus that the existing monitoring questions underlying MWRA's permit-attached Ambient Monitoring Plan ("monitoring plan") have been well addressed and answered[5].

April 24, 2019 OMSAP meeting, EPA, Boston. At this meeting, OMSAP continued the discussion, begun at the workshop, of possible changes to the monitoring. OMSAP discussed a

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[1] Available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/1997-ms-44.pdf

[2] Available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/2004-ms-92.pdf

[3] Available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf.

[4] J. Pederson, 2019. 2300 Days at Sea: Monitoring the Impacts of the Outfall on Massachusetts Bay. Executive Summary of the Outfall Monitoring Science Advisory Panel Workshop. 8 p. https://seagrant.mit.edu/wp-content/uploads/2019/05/ExecSummary_OutfallMonitoringSciAdvPanelWorkshop_11_13_2018.pdf

[5] Participants also noted that environmental issues that may be related to MWRA's effluent discharge have arisen since the monitoring was designed in the early 1990s. These new issues may not be addressed by the current monitoring. Though unrelated to this interim proposal for monitoring plan changes, it is important to note that OMSAP, regulators and MWRA are engaged in ongoing discussions about these issues, which include, for example, contaminants of emerging concern.

framework for revising the current monitoring, which included setting up a series of subcommittee meetings. Subcommittees were to identify and evaluate monitoring studies which could end based on strong evidence that all related monitoring questions had been fully answered.

July 9, 2019, Woods Hole. At this OMSAP subcommittee meeting, discussions between MWRA, regulators, OMSAP members and representatives of public interest groups identified four monitoring studies for consideration regarding elimination or modification. These were:

- Sediment contaminant monitoring, currently conducted every third year and next scheduled for summer 2020;
- Annual monitoring of the depth f oxygen penetration (the apparent Redox Potential Discontinuity or RPD depth) in sediments (and other parameters) using sediment profile imaging;
- Monitoring of contaminants in tissues of winter flounder and lobster, and contaminant bioaccumulation studies using blue mussels. This monitoring occurs every third year and is next scheduled for 2021.
- Annual monitoring of contaminant-associated lesions in the livers of winter flounder.

During discussions, OMSAP members requested information to help evaluate these studies.

September 10, 2019, MIT, Cambridge. Prior to this second OMSAP subcommittee meeting, MWRA disseminated two documents:

- A September 5, 2019 technical memorandum[6] providing the information and evaluations requested by OMSAP on July 9;
- A draft technical report ("the monitoring questions report") summarizing Ambient Monitoring Plan results in the context of providing answers to all 23 monitoring questions currently addressed by the monitoring, and presenting a summary of Contingency Plan threshold test results from 2000-2018. This report has since been finalized and was submitted to regulators, other interested parties, OMSAP, and the public on October 11, 2019[7].

During the discussions, OMSAP members concluded that the evaluations supporting the ending of sediment contaminant monitoring and the ending of measurements of apparent RPD using sediment profile imaging were persuasive.

Members failed to reach consensus at this meeting that all questions related to the monitoring of the existing suite of contaminants in the tissues of fish and shellfish have been completely addressed. Similarly, members failed to reach consensus that winter flounder monitoring could be ended completely, but supported suggestions that reductions could be considered.

[6] September 5, 2019 memorandum to OMSAP subcommittee.
http://www.mwra.state.ma.us/harbor/pdf/OMSAP_20190905_potential_revisions.pdf

[7] MWRA. 2019. Ambient Monitoring Plan and Contingency Plan for the Massachusetts Bay Outfall: Monitoring Questions Status and 2000-2018 Threshold Test Results Boston: Massachusetts Water Resources Authority. Report 2019-03. 36 p. available online at http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-03.pdf.

October 3, 2019 OMSAP Meeting, Scituate. At this OMSAP meeting members discussed and endorsed the September 10 subcommittee recommendations, voting to support a subsequent MWRA proposal that would include:

1. Ending the monitoring of the existing suite of contaminants in sediments;
2. Ending the monitoring of apparent RPD using sediment profile imaging; and
3. Modify the monitoring of contaminant-associated lesions in winter flounder livers by eliminating two reference stations, one off Nantasket Beach and another in eastern Cape Cod Bay.

Summary of affected monitoring studies and rationale for modification.

Sediment contaminant monitoring. This sampling is outlined in Section 4.3.1 of the monitoring plan[8]. Every third year (most recently in 2017 and scheduled for 2020) during the summer infaunal sediment monitoring, samples are collected and analyzed for concentrations of metals, organochlorine pesticides, polynuclear aromatic hydrocarbons (PAHs) and polycyclic biphenyls (PCBs). Figure 1 shows the monitoring stations.

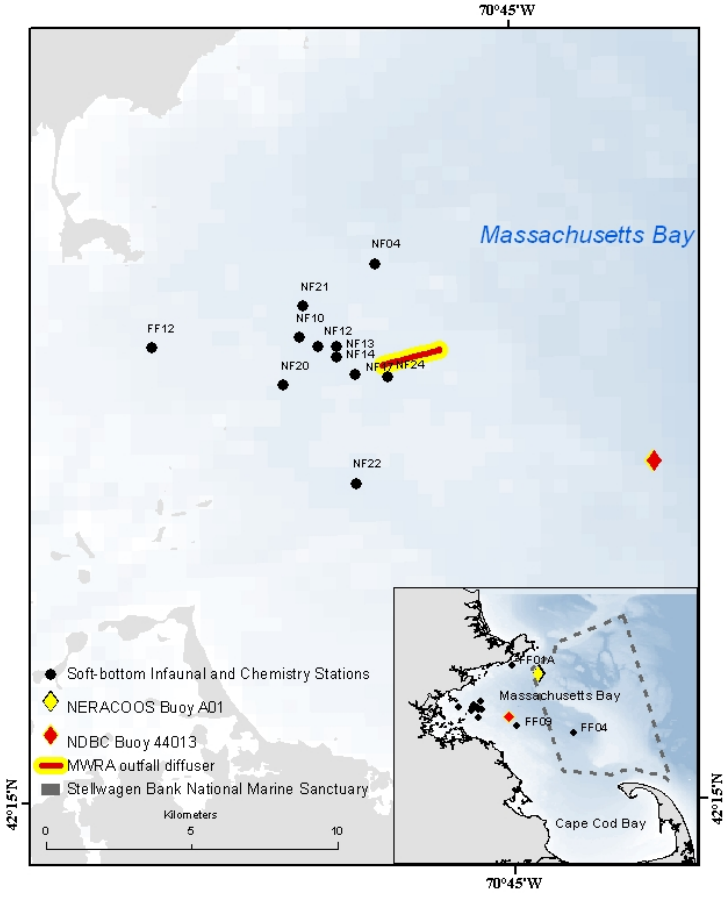

Figure 1. Monitoring stations for sampling of infauna, sediment conditions and contaminants in sediments

[8] http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf .

Evaluations of results of the sediment contaminant monitoring are presented in Section A of MWRA's September 5 memorandum[9], in the monitoring questions report[10] and in multiple references therein. Briefly, monitored contaminants are not accumulating in sediments near MWRA's outfall (the nearfield). Rather, the general trends are for decreases in the contaminants monitored in nearfield sediments, with the lowest observed concentrations tending to occur in the past 5-10 years. PCBs are an example of these trends (Figure 2).

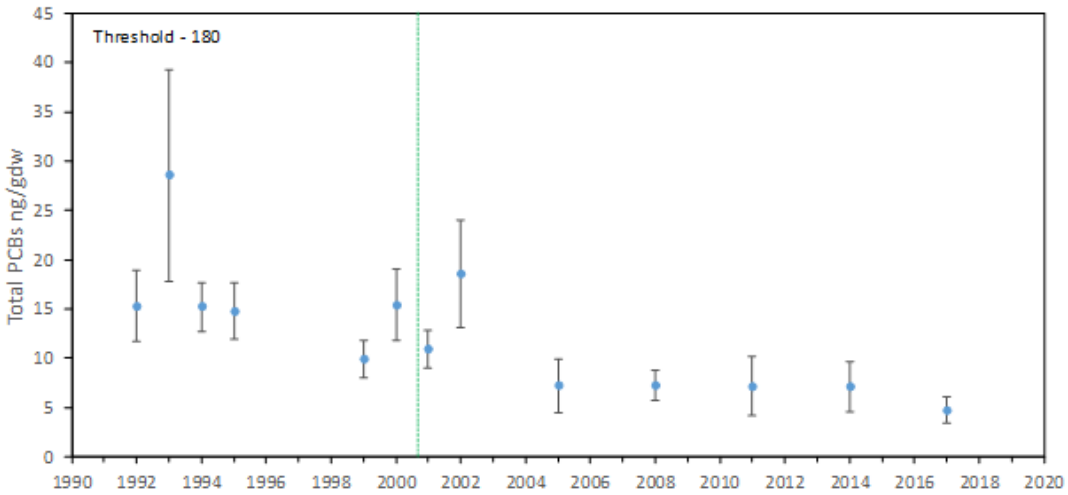

Figure 2. Average Total PCB concentrations (+/- 1 standard error) in nearfield sediments 1992-2017. Dotted green line marks outfall start up.

MWRA believes that since these contaminants of concern are not building up in sediments near the outfall, all relevant monitoring questions have been fully addressed and related monitoring can end. OMSAP supported this position.

Additionally, MWRA believes the ongoing monitoring of these contaminants in final effluent using low detection levels, as required in Section 2.3.3 and Table 2-6 of its monitoring plan[11] is environmentally protective. MWRA summarizes the results of this monitoring in its annual *Outfall Monitoring Overview*[12], and expects to finalize a technical report in spring/summer 2020 further documenting the low concentrations of contaminants observed in effluent from the Deer Island Treatment Plant.

Sediment profile imaging monitoring. This sampling is also outlined in Section 4.3.1 of the monitoring plan[13]. Every August, sediment profile images are collected at 23 stations in Western Massachusetts Bay (Figure 3). Image analysis provides measurements of apparent RPD and other biological and physical parameters at these stations.

[9] http://www.mwra.state.ma.us/harbor/pdf/OMSAP_20190905_potential_revisions.pdf
[10] http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-03.pdf.
[11] http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf .
[12] For example, Chapter 2 of Werme C, Keay KE, Libby PS, Codiga DL, Charlestra L, Carroll SR. 2019. 2018 Outfall monitoring overview. Boston: Massachusetts Water Resources Authority. Report 2019-07. 53 p. http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-07.pdf
[13] http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf .

Evaluations of results of the sediment profile image monitoring are presented in Section B of MWRA's September 5 memorandum[14], in the monitoring questions report[15] and references therein, and in the 2018 Outfall Benthic Monitoring Report[16].

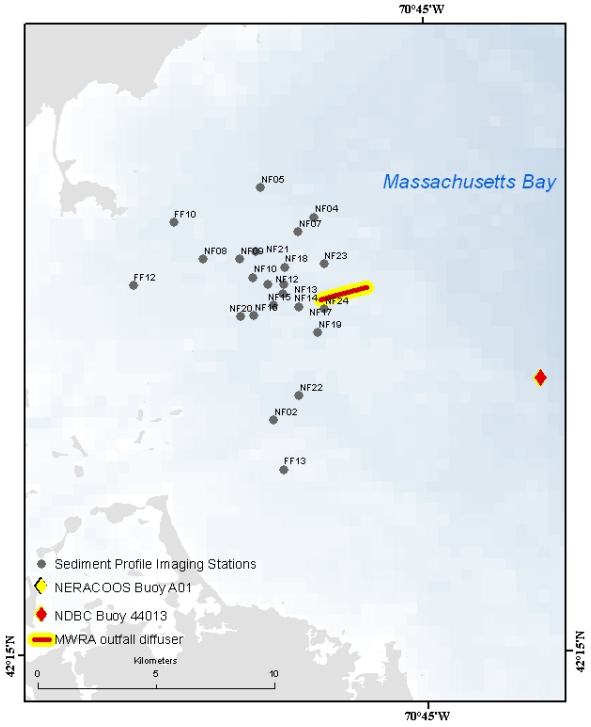

Figure 3. Sediment profile imaging stations at which Apparent RPD measurements are made annually.

Figure 4 contains a plot of the apparent RPD results through August 2019 compared to its Contingency Plan threshold. As in past years, in 2019 the RPD depth in nearfield sediments was deeper than the maximum observed before outfall discharge began in September 2000, indicating a lack of adverse impacts. Such impacts would have resulted in a decrease in the RPD depths.

While results have demonstrated improvement, rather than deterioration, it is still of interest to understand the reason for these changes. Analysis of the data, including an evaluation of storminess between 1992 and 2018[17] indicates that increases in the numbers and durations of winter storms in recent years helps explain the observed increase in RPD depth.

[14] http://www.mwra.state.ma.us/harbor/pdf/OMSAP_20190905_potential_revisions.pdf
[15] http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-03.pdf.
[16] Rutecki DA, Diaz RJ, Nestler EC, Codiga DL, Madray ME. 2019. 2018 Outfall Benthic Monitoring Results. Boston: Massachusetts Water Resources Authority. Report 2019-06. 59 p. http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-06.pdf
[17] http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-06.pdf

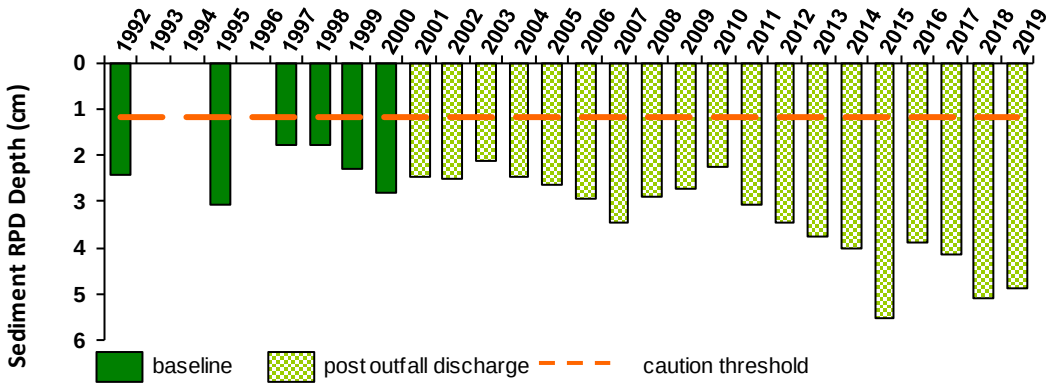

Figure 4. Apparent Redox Potential Discontinuity depths in nearfield sediments 1992-2019.

MWRA believes that the available data have completely addressed the monitoring question underlying the sediment profile image monitoring, and that the study can end. OMSAP has endorsed this position. However, during its sampling for benthic infauna and for other sediment parameters[18], MWRA routinely makes observations that qualitatively document deep oxygenation in sediment grabs from Massachusetts Bay. MWRA is reviewing these observations with its monitoring team, and intends to include relevant information in future reporting.

Winter flounder monitoring. This sampling is outlined in Section 5.3.1 of the monitoring plan[19]. Every April, flounder are collected from four sites in Boston Harbor, Massachusetts Bay, and Cape Cod Bay (Figure 5). Samples of liver tissue from 50 flounder per site are collected and analyzed for the presence and severity of contaminant-associated liver lesions.

Results of the winter flounder monitoring are evaluated in Section D of MWRA's September 5 memorandum[20], in the monitoring questions report[21] and references therein, and in the 2018 Flounder Monitoring Report[22].

The recovery of the winter flounder population in Boston Harbor from the extremely high levels of contaminant associated pathology that were observed in the 1980s is one of the great environmental success stories associated with the Boston Harbor clean-up project[23]. The

[18] grain size, Total Organic Carbon, and *Clostridium perfringens* spores
[19] http://www.mwra.state.ma.us/harbor/enquad/pdf/2010-04.pdf .
[20] http://www.mwra.state.ma.us/harbor/pdf/OMSAP_20190905_potential_revisions.pdf
[21] http://www.mwra.state.ma.us/harbor/enquad/pdf/2019-03.pdf.
[22] Moore MJ, Nestler E, Rutecki DA. 2018a. Flounder monitoring report: 2018 results. Boston: Massachusetts Water Resources Authority. Report 2018-08. 18 p. http://www.mwra.state.ma.us/harbor/enquad/pdf/2018-08.pdf
[23] Moore M, Pembroke A, Nestler E, Hall M, Lefkovitz L, Lambert M, Keay K 2018b. Toxics source reduction and sewage upgrades eliminated winter flounder liver neoplasia (1984-2017) from Boston Harbor, MA, USA. Dis Aquat Org 131:239-243. https://doi.org/10.3354/dao03299

incidence of targeted disease in winter flounder has decreased, both in fish caught in Boston Harbor and in those caught near the outfall (Figure 6).

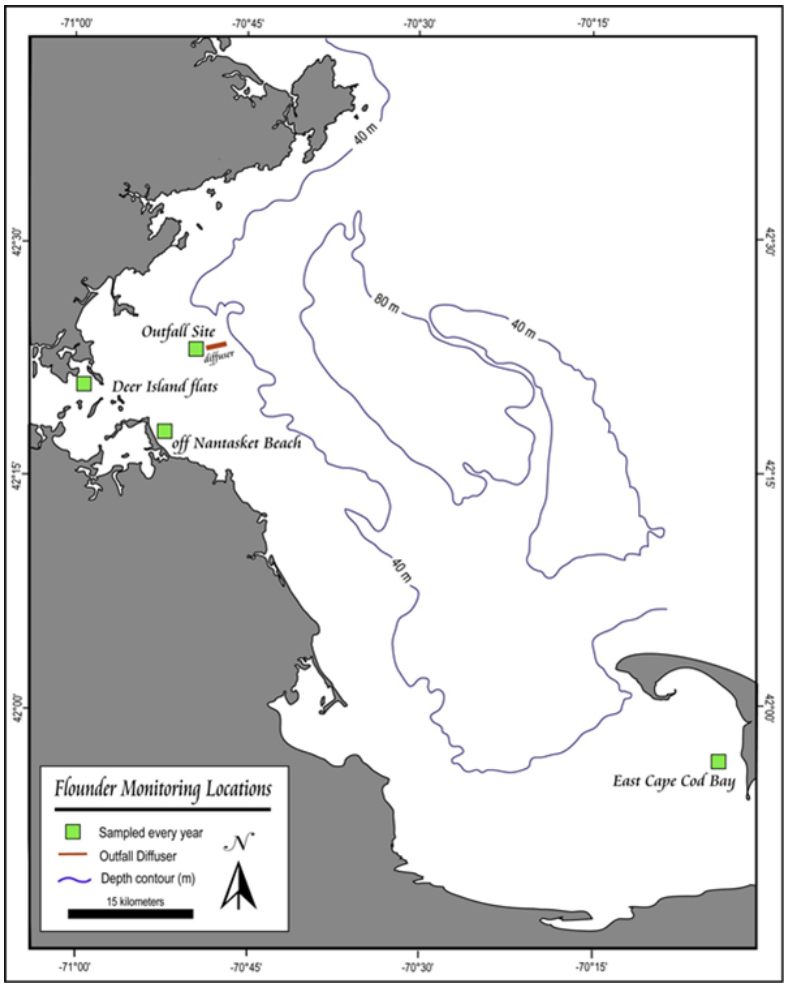

Figure 5, winter flounder monitoring stations.

Despite the decrease in lesion prevalence in fish from both Boston Harbor and the outfall site, some participants at the September 9, OMSAP subcommittee meeting had reservations about ending the study altogether, given that moderate levels of the contaminant associated liver lesions persist in Harbor flounder. Members asked to see results from all stations (Figure 7).

Figure 6. Centrotubular Hydropic Vacuolation prevalence in winter flounder from Deer Island Flats and the outfall site, 1987-2019.

At the October 3 OMSAP meeting, members agreed that continued monitoring of winter flounder from Boston Harbor and the outfall site is warranted. OMSAP concluded ongoing monitoring at the reference stations off Nantasket Beach and in eastern Cape Cod Bay is of limited further use and could be stopped.

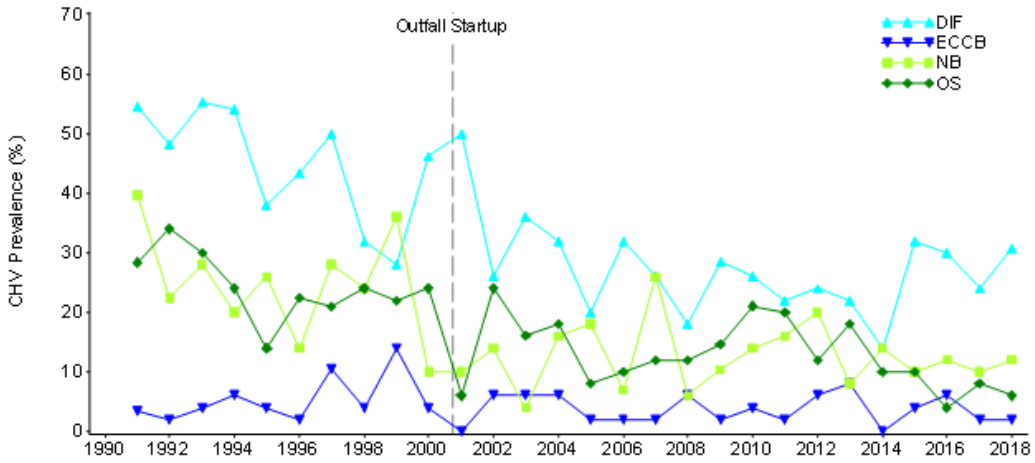

Figure 7. Centrotubular Hydropic Vacuolation in flounder livers from all stations, 1991-2018. DIF –Deer Island Flats. ECCB – eastern Cape Cod Bay. NB – Nantasket Beach. OS – Outfall Site.