

Comprehensive Conservation and Management Plan Actions Nutrients

N-1. Upgrade municipal sewage treatment plants to achieve full secondary treatment

Key Elements: Ongoing sewerage treatment plant (STP) upgrades are expected to continue improving water quality in the Harbor/Bight, by reducing loads of nutrients and organic materials. There are 43 municipal STPs discharging to the Harbor core area and approximately 21 STPs discharging to the Bight, including the back bays. The Clean Water Act requires all municipal STPs to achieve full secondary treatment. Newtown Creek facility in NY is the only facility in the Harbor that does not meet full secondary treatment, but is currently being upgraded to meet secondary treatment requirements.

Description of Activities to Date

NYCDEP continued with the multi-phased construction upgrade of the Newtown Creek WPCP. This 310 mgd wastewater plant is currently being upgraded to provide secondary treatment at a cost of \$2.2 billion. When the upgrade is completed, all of the City's wastewater will receive full secondary treatment.

Planned Activities: Construction is underway and performance at the Newtown Creek WPCP has been continually improving. The entire construction project is projected to be complete by 2013 at which point the plant will be in full compliance with secondary limits.

(NYCDEP 2003, EPA—James Olander 2009, NYCDEP 2009)

NYCDEP completed the upgrade of the Owl Head Facility in May 1995. (NYCDEP- HEP tracking files)

N-2. Establish environmental objectives for the Harbor/Bight

Key Elements: HEP will use various environmental objectives to help determine the actions necessary, and measure the success of actions taken, to solve the eutrophication problems. In developing such objectives, HEP will gain a better understanding of the ecological significance of the various symptoms of eutrophication.

Description of Activities to Date

At the request of NYSDEC, EPA is working with the states to better assess and communicate the ecological benefits of various levels of dissolved oxygen improvements. (HEP Office 2009)

The EPA released a Marine DO guidance document. NYSDEC adopted revised water quality regulations for marine DO on February 16, 2008, based on the EPA guidance. This and other amendments to its water quality standards regulations (6 NYCRR Parts 700-704) are effective on February 16, 2008. To date, NJ DEP has not proposed any revisions to their DO criteria in the New Jersey waters of the NY-NJ Harbor Complex. (NYSDEC 2003, HEP Office 2009, IEC—Pete Sattler 2009)

N-3. Develop and implement, as appropriate, low-cost nitrogen reduction actions

Key Elements: According to the SWEM and harbor survey data some areas of the harbor experience low DO events that may be alleviated through improved treatment plant removals of either carbon and/or nitrogen. The SWEM model will be used to assess water quality benefits associated with various levels of treatment as defined by NYSDEC, NJDEP, NYCDEP, and dischargers, in consultation with HEP. The States and dischargers, in consultation with HEP, will also define any further research, monitoring, modeling, or studies needed to help attain HEP's goals related to nutrients and organic enrichment.

Description of Activities to Date

The Harbor-wide Eutrophication Model (HEM) was completed, except for the Newtown Creek facility (projected completion by 2013). (NYCDEP- HEP tracking files and NYCDEP 2009)

NYCDEP has completed its nitrogen feasibility studies and pilot projects in accordance with a modification to its 1988 SPDES Permit. The DEP is currently upgrading five of its WPCPs for Biological Nutrient Removal (BNR) in accordance with an approved 2005 Phase BNR Facility Plan. (NYSDEC 2003 and 2009)

Throughout 2008, the four Upper East River WPCPs (Wards Island, Hunts Point, Bowery Bay and Tallman Island) achieved compliance with the aggregate interim nitrogen discharge limits specified in its Nitrogen Consent Judgment. BNR construction is underway at all four Upper East River WPCPs and Hunts Point is projected to be complete by December 2009. (NYCDEP 2004 and 2009)

NYSDEC has issued permits for the NYC treatment facilities that incorporate the Nitrogen reductions required by the Long Island Sound TMDL and also have entered into a Nitrogen Consent Judgment that includes interim milestones associated with construction. (NYSDEC 2003 and 2009)

The four Jamaica Bay WPCPs (26th Ward, Coney Island, Jamaica Bay and Rockaway) are well below their interim 12-month rolling average discharge limit of 49,900 lbs/d as specified in the Nitrogen Consent Judgment to allow for BNR construction at the 26th Ward WPCP. BNR construction at the 26th Ward WPCP is projected to be completed by October 2009 at which the plant will implement separate centrate treatment and Step Feed BNR. (NYCDEP 2004 and 2009)

NYCDEP continues upgrading 5 WPCPs for Step Feed BNR and plans on conducting additional demonstration and research studies that will be used in developing a Phase II BNR Facility Plan that will include additional BNR enhancements for the Phase I upgrades..

Planned Activities: DEP has implemented its PO-88 research program that will further evaluate supplemental carbon addition, optimizing instrumentation and controls, and other low cost enhancements to be incorporated into the Phase II BNR Facility Plan.

(NYCDEP 2003 and 2009)

The Draft Hudson-Raritan Estuary (HRE) Comprehensive Restoration Plan (CRP) identified water bodies (specifically poorly flushed, enclosed waters) that do not meet State-defined designated uses (shellfishing, bathing, fishing, etc), are assumed to experience hypoxic or anoxic conditions, and areas with bathymetric depressions. The HRE CRP identifies restoration opportunities to improve water quality for these Enclosed and Confined Waters. (USACE 2009)

N-4. Develop and implement additional actions necessary to eliminate adverse effects of eutrophication, including hypoxia, on marine life in the Harbor, Bight, and Long Island Sound

Key Elements: A system-wide eutrophication model (SWEM) was developed and is currently being used to identify actions necessary to eliminate the adverse impacts of hypoxia and other eutrophic effects.

Description of Activities to Date

The main focus of the Nutrients Work Group (NWG) in recent years has been the refinement and use of the System Wide Eutrophication Model (SWEM) to assess nutrient and dissolved oxygen levels in the Harbor. While the model was originally developed by the City of New York as noted below, additional data collection and verification work was conducted in the New Jersey tributaries at the request of NJDEP. The states and EPA agreed to develop Total Maximum Daily Loads (TMDLs) for the Harbor under the auspices of HEP, with the NWG as the lead. The NWG has been very effective at addressing technical issues, but as policy decisions came more into play (e.g. how standards would be applied, etc), the states and EPA formed an oversight group to ensure that the recommendations of the NWG would meet regulatory rigor. The harbor system is very complex with multiple pollutant load sources, no single “hot spot”, varying standards within and among the states, and the apparent varying impact of carbon and nitrogen in different areas of the harbor. Several approaches or strategies were pursued before finally settling on an approach in which the harbor was divided into several geographic regions. The SWEM model is now being applied to these regions, beginning at the upstream portions and working towards the shared open waters. It is expected that this technical analysis will be complete by the end of 2009. Also, as noted below, additional data is being collected on dissolved oxygen in the Bight so that an assessment can be made of the SWEM model’s ability to analyze this portion of the system. Also, in 2008, the Bergen County Utilities Authority expressed an interest in developing and using an alternate model for the Hackensack portion of the system. EPA and the states agreed that the model would be considered for the TMDL work if a Model Evaluation Group (MEG) deemed it an enhancement to SWEM. A MEG has been formed and is expected to begin review in early 2009.

(HEP Office—Nyman 2009)

Develop baseline data for Norton Basin (Jamaica Bay).

Planned Activities: Restoration of Norton Basin has been identified as an opportunity within the Draft HRE CRP and the 2008 Update Dredged Material Management Plan for the Port of New York and New Jersey

(USACE 2008 and 2009, PANYNJ 2009)

Currently, the USACE, the NYCDEP and PANYNJ are identifying restoration options (wetlands restoration, dredging, shoreline bank stabilization, site cleanup/debris removal) for Flushing Creek and Creek in Queens, NY to potentially increase DO in back bay area of Flushing Bay near LaGuardia Airport.

Planned Activities: Complete Draft Feasibility Report.

(USACE 2004, USACE—Peter Weppler 2009)

NYCDEP has invested nearly \$10 million to develop the System-Wide Eutrophication Model (SWEM), a 3-dimensional mathematical hydrodynamic and water quality model that has now been completed. SWEM has undergone extensive peer review and has been adopted by HEP and LISS for TMDL development and regional water quality planning.

The HEP Nutrient workgroup is currently using the SWEM model to identify the DO problem areas in the Harbor and Bight and identify the major sources contributing to those problems. SWEM is also used to evaluate various wastewater management scenarios in the NY-NJ Harbor and Long Island Sound, and to assist in the development of long-term abatement plans.
(NYSDEC 2004, NYCDEP 2003, HEP Office 2009)

For the past 18 years IEC has conducted summer water quality surveys in the upper East River and western Long Island Sound (21 stations) to document low DO conditions. All data has been disseminated to the LISO, states, health departments, citizen groups and HEP Nutrient Workgroup modeler.

Planned Activities: Continue water quality surveys in the upper East River and western LIS (IEC 2009)
(IEC—Pete Sattler 2009)

The NJHDG Harbor monitoring is being used to supplement and validate the SWEM model. The PVSC provided monitoring and mooring equipment, staff for maintenance, and funds to hire workboat and crew for deployment for targeted continuous DO monitoring in the NY-NJ Harbor for confirmation of SWEM nutrient modeling outputs. The NJHDG provided laboratory services, staff, maintenance, sampling equipment and vessels for water quality sampling of the NJ portion of the NY-NJ Harbor Estuary.

Planned Activities: Continue Harbor-wide ambient monitoring
(PVSC 2004, PVSC—Ashley Pengitore 2009)

To support the Nutrients Work Group, the NJHDG developed a cost analysis report on nutrient reduction options in May 2007 entitled “Nutrient Reduction Cost Estimation Study”. (PVSC—Bridget McKenna 2008)

US EPA initiated a monitoring program for DO in the Bight. Water samples were collected and analyzed to determine what impact nutrients have on the levels of dissolved oxygen.

(EPA—Doug Pabst 2008)

Step Feed BNR upgrades are underway at four Upper East River and one Jamaica Bay WPCPs. The PO-55A research has been completed and a subsequent PO-88 study has commenced. A large portion of this PO-88 research will focus on evaluating a 1.85 MGD SHARON demonstration study at the Wards Island WPCP that is scheduled to commence in July 2009 and operating a 25 MGD Step Feed BNR demonstration tank at Wards Island to develop design criteria associated with supplemental carbon addition and low cost Step Feed BNR optimizations.

Planned Activities: BNR construction continues at all four Upper East River and one Jamaica Bay WPCPs. Both Hunts Point and 26th Ward WPCPs are projected to be completed towards the end of 2009. PO-88 research has been initiated and both pilot and demonstration studies will commence towards the middle of 2009.

(NYCDEP 2004 and 2009)

To support the work of the Nutrient Work Group, the City of New York developed a report in June 2007 that evaluated cost associated with various levels of nutrient reduction. The report is entitled “Conceptual Design at North River, Owls Head, Port Richmond, and Red Hook”.

(NYCDEP—Keith Mahoney 2008)

The National Fish & Wildlife Foundation (NFWF) provided grants with funding from the trustees of the Dissolved Oxygen Environmental Benefit Fund (DOEBF) for a total of nearly \$1 million for various projects in NJ and West Long Island Sound to improve water quality, including habitat restoration, boat sewage pumpout services, and development of low impact development (LID) tools and techniques.

(NFWF—Lynn Dwyer 2008)

N-5. Conduct additional studies to understand the causes of hypoxia, algal blooms, and other eutrophication effects

Key Elements: In order to understand the causes of hypoxia, algal blooms, and other eutrophication effects; HEP needs to conduct additional studies. HEP could evaluate past changes in water quality by using the historical water quality data from NYC Department of Environmental Protection. Historical occurrences of novel algal conditions should be documented. The normal phytoplankton community should be documented. Research on the causes of low dissolved oxygen as well as algal blooms should be conducted if funding is available.

Description of Activities to Date

The historical Harbor Survey water quality data was computerized and a report on the historical occurrences of novel algal conditions was developed by NYCDEP and HEP. (NYSDEC 2003)

NYCDEP has analyzed the historical data in many of its reports. The Nutrient Workgroup has requested a bibliography of those reports (NYSDEC 2004)

IEC has been documenting hypoxia, 1991 to date, in the upper East River and western Long Island Sound. 21 stations (2 within the HEP core area) monitored weekly for dissolved oxygen, salinity, temperature, Chlorophyll a, and Secchi depth.

Planned Activities: Continue hypoxia monitoring.

(IEC 2003, IEC—Pete Sattler 2009)

NYCDEP has developed the System-Wide Eutrophication Model (SWEM). See N-4. (NYCDEP 2003)

IEC activities on phytoplankton blooms: 1) Water quality samples are collected in 3 embayments for phytoplankton identification. 2) On a subset of the sampling network (2 East River stations), a cooperative sampling program with University of Connecticut was conducted in 2002/2003 to establish the presence of *Pfiesteria piscicida* and *Pfiesteria shumwayae*.

(IEC 2003)

NYCDEP has developed the Jamaica Bay Eutrophication Model (JEM) to evaluate the causes of algal blooms and hypoxia. The model has been successfully peer reviewed and is being used for evaluation of water quality management alternatives.

Planned Activities: JEM is being applied to evaluate the effectiveness of various alternatives to reduce eutrophication and hypoxia in Jamaica Bay.

(NYCDEP 2003)