Great Bay Water Quality Management

Ted Diers, Administrator
Watershed Management Bureau

NHDES
Env-Wq 1703.14 Nutrients

(a) Class A waters shall contain no phosphorus or nitrogen unless naturally occurring.

(b) Class B waters shall contain no phosphorus or nitrogen in such concentrations that would impair any existing or designated uses, unless naturally occurring.

(c) Existing discharges containing either phosphorus or nitrogen which encourage cultural eutrophication shall be treated to remove phosphorus or nitrogen to ensure attainment and maintenance of water quality standards.

(d) There shall be no new or increased discharge of phosphorus into lakes or ponds.

(e) There shall be no new or increased discharge(s) containing phosphorus or nitrogen to tributaries of lakes or ponds that would contribute to cultural eutrophication or growth of weeds or algae in such lakes and ponds.
Biological Integrity Narrative

“The surface waters shall support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of a region”
Great Bay Estuary
Assessment Zones in the Great Bay Estuary

NEW HAMPSHIRE

SALMON FALLS RIVER

COCHECO RIVER

BELAMY RIVER

UPPER PISCATAQUA RIVER

LOWER PISCATAQUA RIVER-NORTH

LOWER PISCATAQUA RIVER-SOUTH

LITTLE BAY

LAMPREY RIVER

GREAT BAY

WINNICUT RIVER

SQUAMSCOTT RIVER

LITTLE HARBOR/BACK CHANNEL

PORTSMOUTH HARBOR

NHDES
Microalgae

**FIGURE 4.1** Chlorophyll-a trends at Adams Point in the Great Bay Estuary

- **Concentration (μg/L)**
  - Average and Standard Deviation
  - Years with samples in 10 out of 15 years
  - Data Source: UNH Jackson Estuarine Research Laboratory

**Condition Indicators**

![NHDES Logo]
FIGURE 4.2 Macroalgae percent cover at the Lubberland Creek site in Great Bay in 1979-1980 and 2008-2010

From Hardwick-Witt et al., 2015
Dissolved Oxygen

**FIGURE 5.3** Number of days during summer months of each year when datasondes measured violations of state standards for dissolved oxygen (less than 5 mg/L)

- **Great Bay**
- **Lamprey River**

Data Source: UNH Jackson Estuarine Laboratory
**Eelgrass**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cover (acres)</th>
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<tr>
<td>1990</td>
<td>500</td>
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<tr>
<td>1995</td>
<td>1,000</td>
</tr>
<tr>
<td>2000</td>
<td>2,000</td>
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<tr>
<td>2005</td>
<td>3,000</td>
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<tr>
<td>2010</td>
<td>4,000</td>
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<td>2015</td>
<td>5,000</td>
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- **Cover (acres)**
- **Year**

**Condition Indicators**

- Statistically significant trend
Nutrient Concentration

**Figure 3.2** Dissolved inorganic nitrogen concentration trends at Adams Point in the Great Bay Estuary

- **Average and Standard Deviation for Years with Complete Data**
- **Average for Years with Incomplete Data**
- **Trend for Years with Complete Data**

Years with samples in 10 or more months are considered to have complete data.

Data Source: UNH Jackson Estuarine Laboratory
Weight of Evidence Approach for Nitrogen Criteria

- Squamscott River: 0.75
- Upper Piscataqua River: 0.52
- Great Bay: 0.42

- Squamscott River:
  - Reference Concentration in Ports Hbr
  - Other Criteria

- Upper Piscataqua River:
  - Total Nitrogen Concentration (mg N/L) +/- 0.07 mg N/L

- Great Bay:
  - Total Nitrogen Concentration (mg N/L) +/- 0.07 mg N/L

- Other Criteria:
  - Ref. Conc. in Ports Hbr

- Selected Criteria:
  - Water Clarity
  - Macroalgae Proliferation
  - Ocean (Background)

- Minimum Water Clarity:
  - Total Nitrogen Concentration (mg N/L) +/- 0.07 mg N/L
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<th>*Design. Use Category</th>
<th>Desig. Use Threat</th>
<th>Parameter Name</th>
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<th>Parameter Category*</th>
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<td>Chlorophyll-a</td>
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Then, it got interesting …

- Permits
- Lawsuits
- State legislation
- Peer review
- Settlement
- What’s next?
Great Bay nitrogen data
Effect of Rochester WWTF Pilot Study

Total Nitrogen Load

Load (lb/day)

Date

Pilot Study Begins

WMI
EFF
15-CCH
7-CCH

NHDES
Figure ES: Summary of Non-Point Source Nitrogen Loads to the Great Bay Estuary

From PREP (2013)

Wastewater Treatment Facilities
390 tons/yr 32%

Non-Point Sources
835 tons/yr 68%

Total Load
1,225 tons/yr

Nitrogen Loading Model

Non-Point Source Load
800 ±100 tons/yr

Non-Point Source Load Delivered by Stormwater = 34%

DES Great Bay
Nitrogen Non-Point Source Study

Human Waste
240±30 tons/yr
29%

Atmospheric Deposition
350±50 tons/yr
42%

Animal Waste
120±20 tons/yr
14%

Chemical Fertilizer
130±20 tons/yr
15%

In State Sources
130±20 tons/yr

Out of State Sources
220±30 tons/yr
• PTAPP -- DES and EPA are working with 7 communities on a Pollutant Tracking and Accounting Pilot Program (PTAPP) that will track BMPs that are installed and give pollution reduction credit. This will likely need additional funding to finalize the system.

• Portsmouth WWTP – DES worked with Portsmouth to provide information so that they can make a decision about whether or not to pursue a regional treatment plant option.

• Eelgrass Workgroup – DES and EPA have been participating in a PREP led workgroup of both technical and policy participants from UNH and the communities to develop a workplan for eelgrass research and monitoring. This has been an extremely productive process and should result in much better information about eelgrass health.

• PRMC – DES and PREP have been developing the Piscataqua Region Monitoring Collaborative (PRMC) which is an attempt to build sustainable funding for a long-term monitoring effort. The PMRC would serve all the entities around the estuary to track progress toward meeting water quality and habitat restoration goals.

• EPA will soon release a final MS4 permit for NH. DES has been working closely with the communities
Questions?