Report on the Validation of the MEP Pleasant Bay Report

Presented to the Board of Selectmen
Town Of Orleans

By the
Wastewater Management Validation & Design Committee

July 1, 2009
Findings – Environmental Health

- No short-term or long-term degradation of eelgrass or benthic infauna habitats shown

- No empirical evidence to support SMAST threshold nitrogen concentrations
Nitrogen Loading Biases

- Septic Systems
- Lawn Fertilizers
- Rainfall
- Road and Roof Runoff
- Natural Background

Generation of Nitrogen Gas

Rainfall

Pleasant Bay Water Column

Atlantic Tidal Water In

Atlantic Tidal Water Out

Benthic Flux

Sediment

Nitrogen Burial
## Nitrogen Loading Biases

<table>
<thead>
<tr>
<th></th>
<th>Units = kg/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>SMAST Present Total Load</td>
<td>399(^1)</td>
</tr>
<tr>
<td>Septic Nitrogen Reduction</td>
<td>38</td>
</tr>
<tr>
<td>Septic Reduction as % Total Load</td>
<td>10%</td>
</tr>
<tr>
<td>Present Total Load Bias Adj’d</td>
<td>180 to 300</td>
</tr>
<tr>
<td><strong>Adjusted Present Total Load as % of SMAST Total Load</strong></td>
<td>56 to 75%</td>
</tr>
</tbody>
</table>

[1] Pleasant Bay Report, May 2006, Exec Summary, Table ES-1b (Rounded Off)
Nitrogen in Pleasant Bay

At Mean Volume       ~39,000 kg
Daily Inputs/Loads    23,000 kg/day
Daily Output          28,000 kg/day
Input-Output          - 5,000 kg/day
Septic Load           89 kg/day
Septic Reduction      38 kg/day

Data from MEP Pleasant Bay Report and SMAST/Orleans Water Quality Monitoring
Findings – Nitrogen Model

- SMAST nitrogen simulation may be inadequate
- Lack nitrogen accountability
- Nitrogen inputs overstated
Findings – Environmental Health

• No short-term or long-term degradation of eelgrass or benthic infauna habitats shown

• No empirical evidence to support SMAST threshold nitrogen concentrations
PBA12 Namequoit Pt. Nitrogen Data

![Graph showing nitrogen concentration from 2000 to 2008](image)

- **Total Nitrogen**
- **Bioactive Nitrogen**
- **DEP Specification, 0.16 Mg/liter**

**Source:** Pleasant Bay Resource Management Alliance

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July 1, 2009

WMV&DC, Orleans, MA
PBA12 Namequoit Pt.  Bioactive N Data

Nitrogen Concentration, mg/liter

- 0.050 0.10 0.15 0.20 0.25 0.30 0.35

Year


Bioactive Nitrogen

DEP Specification, 0.16 Mg/liter

Atlantic Ocean, 0.081 mg/liter

April 2007 Breach

Trendline

Source: Pleasant Bay Resource Management Alliance
PBA16 Mtghouse Pond  Bioactive N Data

Source: Pleasant Bay Resource Management Alliance
PBA11 Pah Wah Pond  Bioactive N Data

Bioactive Nitrogen

DEP Specification, 0.21 mg/liter

Atlantic Ocean, 0.081 mg/liter

Concentration, mg/liter

Year

April 2007 Breach

Trendline
PBA15 Lonnies Pond Bioactive N Data

**Bioactive Nitrogen**

DEP specification, 0.21 mg/liter

Atlantic Ocean, 0.081 mg/liter
**PBA11 Arey’s Pond**

**Bioactive N Data**

- **Source:** Pleasant Bay Resource Management Alliance

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**Bioactive Nitrogen**

- **DEP Specification:** 0.21 mg/liter
- **Atlantic Ocean:** 0.081 mg/liter

**Trendline**

- **April 2007 Breach**

**Year**


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**Concentration, mg/liter**
The End