Great Bay Nutrient Sensor Stakeholder Workshop

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1. Oceanography
2. Nutrient dynamics
Sources of nitrogen loading to the Great Bay Estuary.

- **Total NPS**: 48%
- **Direct AT Deposition**: 11%
- **Total Point Source**: 41%

NHEP, 2000
## Drainage Area and Discharge of Tributaries to the Great Bay Estuary

*Drainage area and discharge for rivers entering the Great Bay Estuary. From Short (1992).*

<table>
<thead>
<tr>
<th>Rivers</th>
<th>Drainage Area(^a) (km(^2))</th>
<th>Mean Discharge(^b) cfs</th>
<th>Period of Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamprey</td>
<td>543</td>
<td>278</td>
<td>1934-77</td>
</tr>
<tr>
<td>Squamscott</td>
<td>331</td>
<td>163(^c)</td>
<td>none</td>
</tr>
<tr>
<td>Winnicut</td>
<td>19</td>
<td>-</td>
<td>none</td>
</tr>
<tr>
<td>Oyster</td>
<td>78</td>
<td>19</td>
<td>1934-77</td>
</tr>
<tr>
<td>Bellamy</td>
<td>85</td>
<td>25(^c)</td>
<td>none</td>
</tr>
<tr>
<td>Cocheco</td>
<td>472</td>
<td>242(^c)</td>
<td>none</td>
</tr>
<tr>
<td>Salmon Falls</td>
<td>392</td>
<td>204</td>
<td>1968-78</td>
</tr>
<tr>
<td>Piscataqua</td>
<td>414</td>
<td>210(^c)</td>
<td>none</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2334</strong></td>
<td><strong>1141</strong></td>
<td></td>
</tr>
</tbody>
</table>
Seasonal Cycle of Nitrate in Great Bay

Ru Morrison
The GBB Satlantic ISUS NO₃ from the 2011 deployment

Nitrate (mg N/L)

Sensor Derived
Grab Data
Great Bay Buoy Nitrate with Lamprey River Flow (May to November, 2011)
Lamprey River Flow and Nitrate (May to November, 2011)

- **River–NO3**
- **River inflow**
Several dilution events

Apparent land subsidy events
Spatial NO$_3^-$ distributions throughout the Bay

October 2005 NO$_3$ (µM)  April 2006 NO$_3$ (µM)  October 2006 NO$_3$ (µM)
Nutrient (left) and f-dom (right) versus salinity
Great Bay Buoy: a tool for nutrient management

**Sensors:**
- Salinity, temperature
- Dissolved oxygen,
- Chlorophyll fluorescence
- Organic matter fluorescence
- Turbidity
- Downwelling light (PAR) at surface and 1 m
- Upwelling light at 1 m
- Wind speed and direction
- Air temp and pressure

**New Turbo edition**
- Wetlabs Cycle PO₄
- Wetlabs Cycle NH₃ (July)
- Satlantic SUNA NO₃⁻
- Sunburst SAMI CO₂
Recent Great Bay Buoy Nitrate (red) and Salinity (blue)
New instrumentation on the GBB

The Satlantic SUNA V2 UV nitrate sensor

The Sunburst Instruments SAMI CO₂

The Wetlabs Cycle PO₄
Great Bay Buoy data on the web

http://www.neracoos.org/realtime_map
Needs:

1. Work with stakeholders to generate needed value added products (e.g. TDN versus NO₃)

2. The role of NCP in modulating nutrient behavior

3. Robust circulation models (source and net loss terms)

4. The role of ocean side fluxes

5. DON flux and its bioavailability
Thanks!

NERACOOS
NOAA – IOOS
NOAA- OAP
UNH