Marina Bay: A Glimpse at the Neponset River Watershed

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A Glimpse at the Neponset River Watershed
Atlantic Middle School
North Quincy, MA

Ms. Glynn’s Grade 8
Students as Scientists
Girl’s Environmental Group
Outline view of the entire Neponset River Watershed, courtesy of NepRWA. Note the several waterways at Marina Bay. Starts in Foxborough, near the stadium.
Many sampling sites throughout the watershed, conducted mostly by citizens. No studies are currently conducted for our site through NepRWA – another good reason for why we chose our site.
This map shows the abundance of human land and water use in our site area. Boat traffic into the river, as well as at several local marinas in Quincy and Dorchester Bay. Also, gas tank, UMass Boston, Neponset River Bridge, MBTA, numerous residential and commercial uses.
Coincidentally, we found this photo Wed. night our weekly local paper, The Quincy Sun. Denison airport was the site of much fanfare, featuring well known Squantum festivals and air shows. Place of death for the famous Harriet Quimby, first licensed female pilot.
Because of its essentially exclusive access to 93N and close proximity to Boston, Marina Bay is home to many wealthy business people and local celebrities: Tom Brady, Ty law, Willie McGinest, Amalia Barreda, Chet Curtis, to name a few.
Some of the new construction next to our site was built on Lot 23, conservation land and bird sanctuary. The Neponset River Watershed Assoc went to court to fight the construction, but the land was cleared before a judge ruled. Mass. DEP current has signs posted and paths roped off to prevent further destruction of remaining conservation land.
New developments near our site
NOAA Coastal Chart of Marina Bay at the Neponset River
Topographical Map of Squantum and entry to Marina Bay
View of Marina Bay’s Commercial Developments: Boardwalk, Shops, Restaurants, Marina, Office Buildings, & Parking for Ferry Service
According to the MWRA

- Seven Combined Sewer Overflows (CSO) at North Dorchester Bay
- One directly across from our site
- Each activated 1-21 times per year
- Approximate overflow discharge 8 million gallons into North Dorchester Bay
- Additionally, 108 rain events/year discharge approximately 144 MG of stormwater

Two additional CSOs are located along the Neponset within a few miles of our site
Marina Bay:
impaired waters and facilities
Our site: view of impaired waters within 0.5 miles

Our Sampling Site is to the right of Commander Shea Blvd.
Our site: condos and T in background, as well as sample site at pipes
View from sampling site with new construction in the background; old bridge and outfall remnant visible.
Overflow into our sampling area through an old manmade structure
New construction across from our site, with Boston Scientific in the background
View of bus yard, auto body shop, & community center: debris flow toward site
Commander Shea Blvd. connector to 93N, only access to our site
Riverside, receives flows from our site, abuts Boston Scientific
Water Sample Analysis

LaMotte Kits
- pH
- Dissolved Oxygen
- Turbidity
- Nitrate NO₃-N
- Phosphate
- Carbon Dioxide
- Est. Total Dissolved Solids

Science Source Kit
- Copper
- Ammonium
- Lead
- Hydrogen Sulfide
- Oil
- Also FIA & IC
- Fluoride, Bromide, & Sulfates
- Phos. & NO₃-N
Phosphate test results are actually for Orthophosphates. Sample # 6 was taken at low tide.

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<th></th>
<th>pH</th>
<th>D.O.</th>
<th>Turb.</th>
<th>NO₃N</th>
<th>Phos.</th>
<th>CO₂</th>
<th>TDS</th>
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<tr>
<td>MB1</td>
<td>7.5</td>
<td>2.6</td>
<td>10 jtu</td>
<td>0.25</td>
<td>0</td>
<td>1.0</td>
<td>1.0</td>
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<td>1.6</td>
<td>10 jtu</td>
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<td>0</td>
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<td>MB6</td>
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<td>9.8</td>
<td>60 jtu</td>
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<td>1.2</td>
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<td>0.8</td>
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<td>0.25</td>
<td>0</td>
<td>0.8</td>
<td>1.0</td>
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</table>
Science Source Kit

- Possible invalid results
- Test strip methods
- No indication of the following:
  - Copper
  - Ammonium
  - Lead
  - Hydrogen Sulfide
  - Oil
### FIA test results: Fall 03

<table>
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<th>Date</th>
<th>mg Phos./L</th>
<th>mg N-NO₃/L</th>
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<tbody>
<tr>
<td>Nov. 22-1</td>
<td>0.022</td>
<td>0.42</td>
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<tr>
<td>Nov. 30-2</td>
<td>0.019</td>
<td>0.47</td>
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<tr>
<td>Nov. 30-2</td>
<td>0.019</td>
<td>0.46</td>
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Possibly skewed because of high salt content in samples
### FIA results: Winter/Spring 04

<table>
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<th>Date</th>
<th>mg Phos./L</th>
<th>mg N-NO₃/L</th>
</tr>
</thead>
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<tr>
<td>Mar. 6-3</td>
<td>0.022</td>
<td>0.19</td>
</tr>
<tr>
<td>Mar. 13-4</td>
<td>0.023</td>
<td>0.43</td>
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<tr>
<td>Mar. 16-5</td>
<td>0.023</td>
<td>0.46</td>
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<tr>
<td>Mar. 20-6</td>
<td>0.042</td>
<td>0.35</td>
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<tr>
<td>Mar. 20-6</td>
<td>0.042</td>
<td>0.36</td>
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<td>Mar. 27-7</td>
<td>0.027</td>
<td>0.33</td>
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<tr>
<td>Mar. 30-8</td>
<td>0.017</td>
<td>0.99</td>
</tr>
<tr>
<td>Apr. 3-9</td>
<td>0.024</td>
<td>1.12</td>
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<tr>
<td>Apr. 6-10</td>
<td>0.017</td>
<td>0.59</td>
</tr>
<tr>
<td>Apr. 6-10</td>
<td>0.018</td>
<td>0.60</td>
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</table>

Some interference suspected due to high salt content
Heavy rain at end of March

<table>
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<th>Date</th>
<th>Fluoride</th>
<th>Bromide</th>
<th>Sulfates</th>
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<tr>
<td>11/22 -1</td>
<td>0.44</td>
<td>21.52</td>
<td>1041.74</td>
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<tr>
<td>11/30 -2</td>
<td>0.56</td>
<td>26.86</td>
<td>1400.16</td>
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<td>3/6 - 3</td>
<td>0.6</td>
<td>25.8</td>
<td>1310.84</td>
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<td>3/13- 4</td>
<td>n/a</td>
<td>32.14</td>
<td>1677.42</td>
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<td>3/16- 5</td>
<td>n/a</td>
<td>28.62</td>
<td>1535.52</td>
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<td>3/27- 7</td>
<td>4.04</td>
<td>96.32</td>
<td>1104.68</td>
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During the late winter and early spring, little life was observed. We suspect this was largely because of the extreme cold this winter. Also, coyotes have limited all other smaller populations.

**Additional Observations**

- Local Wildlife: we observed birds, some water fowl. Notified by QPD of coyotes
- Significant coyote population has decimated wild cats and rabbits, squirrels, as well as neighborhood dogs
- We observed various bird species due in large part to the DEP protected parcel
- Shells found most likely washed into site
Conclusions

Indicators of poor health:

- reduction of open space & wildlife
- increase construction & traffic
- some flow reduction – stagnant
- CSO overflows
- remnants of prior human use
- designated impaired waters
- historically polluted
Interpretation of Test Results

- Nutrient Analysis – generally low results
- Salt water inference suspected
- Some variations probably due to rain events
- D.O. levels suggest pollution present
- Grab samples taken close to surface due to site difficulty – could influence nutrient content
- More time is needed for study with so many factors influencing the area
The End
We Send Special Thanks To:

- Dr. Kevin Curry & Kim McCoy
- Atlantic Middle School Staff
- Principal Laura Bogan
- Asst. Principal Adam Wolf
- First Student Bus Company for getting us here!