Day in the Life of the Hudson River -10/20/2015 (9AM-2PM) Data

RIVER MILE 98

Tivoli South Bay (near Bard Field Station between mouth of Saw Kill & Blithewood Manor)

Tom O’Dowd, Bard College, Environmental and Urban Studies (EUS) program

Debbie Beam, Red Hook High School - 40 - 11th and 12th graders and 2 teachers

MUCK STATION

Turbidity
Long site tube (cm)
10:00 AM: 18 cm
10:30 AM: 22 cm
11:00 AM: 7 cm
12:00 PM: 16 cm
Average: 15.75

Observations: very turbid; seining and sediment sampling created more turbidity; falling tide led to muddier water. South Tivoli Bay tends to be very turbid.

Push Core Sediment Log

Sulfur smell (H2S): yes!
Clay: abundant
Mud: abundant
Sand: abundant
Gravel: common (We broke one sediment core tube because our site is so rocky!)
Leaves: rare (small flecks of flakey leaves were abundant; larger leaves not so much)
Wood: rare (small slivers and splinters)
Shells: rare
Freshwater mussels: Absent
Zebra mussels: Absent
Macroinvertebrates: common (esp. female giant water bug; also: dragonfly larva, snail, and walking stick)
Brick/coal/slag: Absent (we’ve seen brick shards at this site before but not today; hard to tell—very murky)
Living vegetation: common (duckweed and dead/dying water chestnut)
We bagged a core and sent with Ingrid.

Soils on land around the South Tivoli Bay

According to the Dutchess County “General Soil Map” (USDA NRCS), the most common soil at our site is “Hudson-Vergennes-Raynham” soil which is very susceptible to erosion with a K factor of 0.49 out of a range of 0.02-0.69 everywhere and 0.1-0.64 in Dutchess County.

Source: http://www.co.dutchess.ny.us/CountyGov/Departments/Planning/nrichapfour.pdf
AIR STATION: WIND, HUMIDITY, PRESSURE, AND AEROSOLS

Kestrel measurements
Beaufort scale observations
Compared to HRECOS/NERRS station at the Bard Field Station

Overall:
Humidity was highest by the river and decreased as we measured further and further inland. Wind speed varied throughout the day. Overall it decreased as the day continued, ending with 0 mph in the final group. Wind speed had major high point at the water and on a high altitude road surrounded by trees (possibly gusts or wind channeling). Temperature increased throughout the day. Learned about hydrosphere and atmosphere relationship, micro ecosystems along the river, and possible anthropogenic impacts on these measurements!!

<table>
<thead>
<tr>
<th>Location</th>
<th>Time</th>
<th>Relative Humidity (%)</th>
<th>Wind Speed (Beaufort)</th>
<th>Wind Speed (mph)</th>
<th>Temperature (F)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near water</td>
<td>10:20</td>
<td>52</td>
<td></td>
<td>1.2</td>
<td></td>
<td>High speed = trees make wind tunnel?</td>
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<tr>
<td>Field station</td>
<td>10:20</td>
<td>51</td>
<td>1</td>
<td>n/a</td>
<td>55</td>
<td>Humidity didn’t follow hypothesis!</td>
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<td>Up hill</td>
<td>10:20</td>
<td>48.5</td>
<td>0-2</td>
<td>2.3</td>
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<td></td>
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<tr>
<td>Near water</td>
<td>10:40</td>
<td>49.7</td>
<td></td>
<td>2.3</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>Field station</td>
<td>10:40</td>
<td>51.5</td>
<td>0-2</td>
<td>2.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up hill</td>
<td>10:40</td>
<td>50.2</td>
<td></td>
<td>n/a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near water</td>
<td>11:15</td>
<td>54.4</td>
<td>1-2</td>
<td>1.1</td>
<td>55.7</td>
<td></td>
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<tr>
<td>Field station</td>
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<td>49</td>
<td></td>
<td>1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up hill</td>
<td>11:15</td>
<td>51.8</td>
<td></td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near water</td>
<td>12:30</td>
<td>49</td>
<td>0-2</td>
<td>1.8</td>
<td>57.5</td>
<td>Question: What % humidity for it to rain?</td>
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<tr>
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<td>47.2</td>
<td></td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up hill</td>
<td>12:30</td>
<td>48.8</td>
<td></td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near water</td>
<td>12:50</td>
<td>64</td>
<td></td>
<td>0</td>
<td>58.3</td>
<td></td>
</tr>
<tr>
<td>Field station</td>
<td>12:50</td>
<td>56.7</td>
<td></td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Up hill</td>
<td>12:50</td>
<td>56.1</td>
<td></td>
<td>0</td>
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</tbody>
</table>

Side study: “Anthropogenic wind speed” (blowing on the instrument with mouth):
Group 2: 19.7 mph, fresh breeze
Group 3: 22.5 mph
WATER CHEMISTRY STATION

Salinity
Using quantabs, quantabs # = 1.8 or 2, therefore 41-48 ppm chloride or 74-88 ppm total salinity. Erik Kiviat hypothesized that road salts are impacting salinity levels despite winter being a thing of the distant past. Apparently pools of salty water persist in the environment and produce salty runoff throughout the year (we even saw salt accumulated on the Bard Field Station driveway uphill from the building; and tasted it—not recommended. We rinsed our mouths out afterward). Erik said normal salinity would be under 20 ppm in true freshwater.

pH
Using color match test
9:52 AM: pH = 8
10:30 AM: pH = 7.5 (with someone blowing bubbles into it—testing that the edition of CO2 increases acidity and reduces pH)
11:00 AM: pH = 8
12:10 PM: pH = 8
We hypothesized that algal photosynthesis might be reducing CO2 and therefore reducing acidity and increasing pH.

Dissolved Oxygen
9:52 AM: water temperature 8*C. DO = 13 ppm which equals 110% saturation!
10:30 AM: water temperature 8*C. DO = 10 ppm which equals 90% saturation.
11:00 AM: water temperature 8*C. DO = 10 ppm which equals 90% saturation.
We hypothesized that the day started cold, with a large input of highly oxygenated water from the nearby Saw Kill and its waterfalls, plus photosynthesis by algae and other plants may have contributed.

Data from nearby sampling stations
HRECOS data South Tivoli Bay
NERRS data South Tivoli Bay
NERRS data Saw Kill Creek

Doing DO, pH, and salinity tests.
Photo credit: Tom O’Dowd
LIFE STATION: FISH AND BIRDS AND MACROINVERTEBRATES

Fish
With ~2 meter beach seine net
5 Banded killifish (size of largest: 4 cm)
1 blue-gill sunfish (size of largest: 3 cm)
2 pumpkinseed sunfish (size of largest: 3 cm)
2 stickleback (size of largest: 3 cm)
1 American eel (size of largest 7 cm)

Macroinvertebrates
(in the seine net)
1 dragonfly larva
5 female northern water bugs
1 walking stick

Birds
Spotted with binoculars and the naked eye
~50 Canada Geese (seen and heard at 9:00 AM)
9 Mute Swans
1 adult Bald Eagle (around 8:30 AM)
2 juvenile Bald Eagles (pestering a great blue heron, seen and heard)
4 great blue herons
2 Kingfishers (seen and heard)
~25 gulls (at 12:00 PM)
~20 Cormorants (likely Double-Crested); half stationary, half in motion
Various seagulls (25+)
1 Blue Jay
4 American Crows
1 Red-Tailed Hawk

Photo credit: Tom O’Dowd
PHYSICAL CONDITIONS STATION: TIDES AND CURRENTS AND WATERSHEDS

Tides (observed)
Currents (observed in the “center” of the Saw Kill)
Currents (observed near the “shore” of the Saw Kill)

CURRENT (ft in 30 sec)

<table>
<thead>
<tr>
<th>Time</th>
<th>Center</th>
<th>Shore</th>
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<tbody>
<tr>
<td>10 am</td>
<td>14.1</td>
<td>8.8</td>
</tr>
<tr>
<td>10:30</td>
<td>27</td>
<td>4.9</td>
</tr>
<tr>
<td>11:00</td>
<td>28</td>
<td>9</td>
</tr>
<tr>
<td>12:00</td>
<td>32</td>
<td>11</td>
</tr>
<tr>
<td>12:40</td>
<td>20</td>
<td>7</td>
</tr>
</tbody>
</table>

TIDE (Inches above an arbitrary point)

<table>
<thead>
<tr>
<th>Time</th>
<th>TIDE</th>
</tr>
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<tbody>
<tr>
<td>10:15</td>
<td>9.5</td>
</tr>
<tr>
<td>10:45</td>
<td>6.3</td>
</tr>
<tr>
<td>11:15</td>
<td>2</td>
</tr>
</tbody>
</table>

Immeasurable after this (we did not have a long enough tide stick!)

Learning about the Saw Kill watershed and the Hudson River watershed.

Photo Credit: Tom O’Dowd.