2005

A Comparison of Divergent Sites on the Farm River: Wetlands vs. Industry

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A Comparison of Divergent Sites on the Farm River:
Wetlands vs. Industry

Braintree High School, Braintree
The Farm River
Braintree, Massachusetts

- Part of the Fore River Watershed
- Begins in the Blue Hills, Milton, MA
- Flows in a southwest direction
- Joins the Monatiquot River in Braintree
- Empties into the Fore River Basin, Braintree/Weymouth line
Hypothesis

If a river flows through an industrial area, its macroinvertebrate population will be deleteriously affected due to reduced water quality.
Methods

- Timed sweeps at each site – 3 minutes
  - Two upstream
    - One fast current, one slow current
  - Two downstream
    - One fast current, one slow current
- Sweeps combined at each site for total macroinvertebrate count
Biotic index calculation based on total grids needed to obtain 100 organisms from samples

Macroinvertebrates were identified using A Guide to Common Freshwater Invertebrates of North America

Macroinvertebrates were categorized and tallied by the Braintree High School Environmental Club
Site Selection

- Wetlands:
  - River is adjacent to wetlands/open space on northeast side, which is uphill in watershed
  - River has stretch of industry on southwest side, which is downhill in watershed
  - Conditions to access river further upstream, prior to any industry, proved dangerous
Farm River before industry
Site Selection

Industry:

- River passed between an industrial park and a shopping plaza for approximately 0.5 km
- River passed under heavily traveled Granite Street
- Traffic includes commercial vehicles using industrial park
Farm River after industry
<table>
<thead>
<tr>
<th></th>
<th>Wetlands</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Organism Density</td>
<td>648</td>
<td>360</td>
</tr>
<tr>
<td>Biotic Index</td>
<td>5.2</td>
<td>5.5</td>
</tr>
<tr>
<td>Water Quality Rating</td>
<td>Fair</td>
<td>Fair</td>
</tr>
</tbody>
</table>
## Table 2

### Macroinvertebrate Comparison in the Farm River, Braintree, MA Wetland (W) and Industry (I) Sites

Collected October 2, 2005

Sorted by Order

<table>
<thead>
<tr>
<th>Major Group</th>
<th>Average Count W</th>
<th>Average Organism Density W</th>
<th>%Composition of Five Dominant Families W</th>
<th>Major Group Biotic Index</th>
<th>Number of Tolerant W</th>
<th>Number of Intolerant W</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ephemeroptera</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>Plecoptera</td>
<td>3</td>
<td>0</td>
<td>18</td>
<td></td>
<td>X</td>
<td>X</td>
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<tr>
<td>Trichoptera</td>
<td>30</td>
<td>19</td>
<td>180</td>
<td>68</td>
<td>28</td>
<td>19</td>
</tr>
<tr>
<td>Diptera: Other</td>
<td>5</td>
<td>3</td>
<td>30</td>
<td>11</td>
<td>5</td>
<td>X X</td>
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<tr>
<td>Diptera: Odonata</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Coleoptera:</td>
<td>0</td>
<td>18</td>
<td>0</td>
<td>65</td>
<td>18</td>
<td>X</td>
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<tr>
<td>Adult</td>
<td>7</td>
<td>26</td>
<td></td>
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<tr>
<td>Amphipoda</td>
<td>10</td>
<td>0</td>
<td>60</td>
<td>0</td>
<td>9</td>
<td>X</td>
</tr>
<tr>
<td>Isopoda</td>
<td>4</td>
<td>0</td>
<td>24</td>
<td>0</td>
<td>X</td>
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</tr>
<tr>
<td>Decapoda</td>
<td>45</td>
<td>24</td>
<td>270</td>
<td>86</td>
<td>42</td>
<td>24</td>
</tr>
<tr>
<td>Gastropoda</td>
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<td>8</td>
<td>66</td>
<td>29</td>
<td>10</td>
<td>8</td>
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<tr>
<td>Oligochaeta</td>
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<td>17</td>
<td>0</td>
<td>61</td>
<td>17</td>
<td>X</td>
</tr>
<tr>
<td>Hirudinea</td>
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<td>1</td>
<td>0</td>
<td>4</td>
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<td>X</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>108</strong></td>
<td><strong>100</strong></td>
<td><strong>648</strong></td>
<td><strong>360</strong></td>
<td><strong>94</strong></td>
<td><strong>86</strong></td>
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<tr>
<td>Taxon</td>
<td>Density</td>
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<td>---------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gastropoda</td>
<td>8%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plecoptera</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tricoptera</td>
<td>19%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diptera: Other</td>
<td>3%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Odonata</td>
<td>1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coleoptera</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amphipoda</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isopoda</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decapoda</td>
<td>24%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>17%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3
Macroinvertebrate Density
Farm River Wetlands Site
10/2/05

- Coleoptera, 25%
- Diptera: Odonata, 1%
- Ephemenoptera, 2%
- Hirudinea, 1%
- Oligochaeta, 17%
- Decapoda, 24%
- Isopoda, 0%
- Amphipoda, 0%
- Plecoptera, 0%
- Tricoptera, 19%
Discussion

- Environmental comparisons:
  - Minor differences in site canopy and vegetative borders immediately adjacent to each
  - Wetlands site was slightly narrower and deeper
  - Wetlands had large amount of vegetative growth under the water, rock and silt substrate
  - Substrate was mostly sand and rock at industry site
- Large area of imperviousness at Industrial site
- Wetlands site bordered on one side by impervious area
- 200 ft buffer zone does not exist along length of Farm River studied
Conclusion

- The water quality decreased after passing through the industrial area which supports our hypothesis.
- However, significant differences in water quality between the Wetland and Industrial sites did not prove true.
- Both sites had fair water quality ratings.
- This may be due to our inability to sample a site away from industry.
- Further study is needed.
Concerns

- The Fore River Watershed supplies our town with its drinking water from Great Pond
- The Farm River feeds Great Pond
- We are concerned that the Farm River has a FAIR water quality rating
Extensions

- Chemical analysis
- Temperature analysis
- Substrate analysis
- Macroinvertebrate study over time
- Access Farm River further upstream away from industry for comparison study
- Consult with the Water Department and Conservation Committee
Acknowledgements

Thank you Bridgewater State College and the Watershed Team for providing us with the opportunity to learn more about our environment.