Abbott Run Annual Study 2008

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Abbott Run
Annual Study
2008

North Attleboro High School

10/31/07 to 11/1/07

Bridgewater State College
Purpose Of Study

• The purpose of our study is to research any physical, chemical or biological changes that may have occurred.

• Abbott Run is a Class A river and a public water supply source for Pawtucket, RI.

• We checked the pH, dissolved oxygen, the river flow, specific conductivity, temperature, precipitation levels, benthic macro-invertebrates, and depth to see if the river meets Massachusetts standards
History of Abbott Run

- Abbott Run has been the water-source for Cumberland, RI and Pawtucket, RI for centuries.
- It helped Cumberland begin an early industrial growth along with the Blackstone River
  - One of the first manufacturing sites in Cumberland was called Robin Hollow and it was located on Abbott Run
- On the west side of Abbott Run, during the 1660s, a furnace was erected near Robin Hollow and it was called the Iron Rust
  - During the Revolution, canons were made in this furnace
- A woolen factory built in 1840 by two men named Rawson and Crowningshield was named Abbott’s after the river
  - A New York and New England Railroad has a station that is also named Abbott’s
Site A: Cushman Road

Site A

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Image MassGIS, Commonwealth of Massachusetts EOEA
Site B: Shady Pines
# Average Stream Width, Average Depth, and Bottom Composition

<table>
<thead>
<tr>
<th></th>
<th>Site A Cushman Road</th>
<th>Site B Shady Pines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Width</strong></td>
<td>39 feet</td>
<td>20 feet</td>
</tr>
<tr>
<td><strong>Average Depth</strong></td>
<td>1.47 feet</td>
<td>1.2 feet</td>
</tr>
<tr>
<td><strong>Bottom Composition</strong></td>
<td>The bottom is solid and rocky</td>
<td>The bottom is sandy</td>
</tr>
</tbody>
</table>
## Average Flow, Total Discharge, Concentration of Nitrogen Concentration of Phosphorous

### Site A Cushman Road

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Flow</td>
<td>0.41 ft/sec</td>
</tr>
<tr>
<td>Total Discharge</td>
<td>22.39 CFS</td>
</tr>
<tr>
<td></td>
<td>633.98 L/s</td>
</tr>
<tr>
<td>Concentration of N mg/L</td>
<td>0.24 mg/L</td>
</tr>
<tr>
<td>N load g/day</td>
<td>13,146.12 g/day</td>
</tr>
<tr>
<td>Concentration of P mg/L</td>
<td>0.009 mg/L</td>
</tr>
<tr>
<td>P load g/day</td>
<td>492.98 g/day</td>
</tr>
</tbody>
</table>

### Site B Shady Pines

<table>
<thead>
<tr>
<th>Metric</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Flow</td>
<td>1.33 ft/sec</td>
</tr>
<tr>
<td>Total Discharge</td>
<td>31.91 CFS</td>
</tr>
<tr>
<td></td>
<td>903.79 L/s</td>
</tr>
<tr>
<td>Concentration of N mg/L</td>
<td>0.23 mg/L</td>
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<tr>
<td>N load g/day</td>
<td>17,960.15 g/day</td>
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<tr>
<td>Concentration of P mg/L</td>
<td>0.005 mg/L</td>
</tr>
<tr>
<td>P load g/day</td>
<td>390.44 g/day</td>
</tr>
</tbody>
</table>
October 2007 Precipitation for North Attleboro

Day we went to the sites.
Stream Profile of Cushman Rd., Site A

<table>
<thead>
<tr>
<th>Width (Feet)</th>
<th>Depth (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-1.8</td>
</tr>
<tr>
<td>2</td>
<td>-1.6</td>
</tr>
<tr>
<td>3</td>
<td>-1.4</td>
</tr>
<tr>
<td>4</td>
<td>-1.2</td>
</tr>
<tr>
<td>5</td>
<td>-1</td>
</tr>
<tr>
<td>6</td>
<td>-0.8</td>
</tr>
<tr>
<td>7</td>
<td>-0.6</td>
</tr>
<tr>
<td>8</td>
<td>-0.4</td>
</tr>
<tr>
<td>9</td>
<td>-0.2</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>11</td>
<td>0.2</td>
</tr>
<tr>
<td>12</td>
<td>0.4</td>
</tr>
<tr>
<td>13</td>
<td>0.6</td>
</tr>
<tr>
<td>14</td>
<td>0.8</td>
</tr>
<tr>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>1.2</td>
</tr>
<tr>
<td>17</td>
<td>1.4</td>
</tr>
<tr>
<td>18</td>
<td>1.6</td>
</tr>
<tr>
<td>19</td>
<td>1.8</td>
</tr>
<tr>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>
Stream Profile for Shady Pines, Site B
pH Comparison Of Site A and Site B - Ryan Morrissey
October 31, 2007- November 1, 2007

Class A Water Standard: pH between 6.5 and 8.3

Cushman Road

Shady Pines
pH Comparison from '05-'07 of Site A - Ryan Morrissey

Class A Water Standard: pH between 6.5 and 8.3 standard units

Time (hours) vs pH for Cushman Road '05, '06, and '07.
pH Comparison '05-'07 of Site B- Ryan Morrissey

Class A Water Standard: pH between 6.5 and 8.3 standard units
Dissolved Oxygen Comparison, October 31, 2007-November 1, 2007, Amanda Matte

Class A Water Standards: Dissolved Oxygen
- Not less than 6 mg/l unless background conditions are lower.
Class A Water Standards: Dissolved Oxygen is not less than 6 mg/l
Class A Water Standards: Dissolved Oxygen
is not less than 6 mg/l
%DO Comparison
October 31, 2007 - November 1, 2007 - Dave Zaniboni

Class A water standards: % dissolved oxygen = Levels shall be maintained no lower than 75% of saturation due to discharge.
% of Dissolved Oxygen of Cushman Road, Site A
October 2005, October 2006, and October-November 2007,
Rory MacEachern

Class A Water Standards: Dissolved
Oxygen is not less than 75%
Class A Water Standards: Dissolved Oxygen is not less than 75%
Temperature Comparison of Site A and Site B
October 31, 2007 - November 1, 2007
Jessica Lagasse

Class A Water Standards: Temperature
- Shall not exceed 28.3°C
Temperature Comparisons of Site A
2005-2007, Jessica Lagasse

Class A Water Standards: Temperature
- Shall not exceed 28.3°C
Temperature Comparisons of Site B
2005-2007, Jessica Lagasse

Class A Water Standards: Temperature
- SHALL not exceed 28.3°C
Cushman Road, Site A, Temperature to % Dissolved Oxygen
October 31, 2007 - November 1, 2007, Rory MacEachern

Temperature (°C)

Dissolved Oxygen % (Sat)
Shady Pines, Site B, Temperature to % Dissolved Oxygen
October 31, 2007 - November 1, 2007, David Zaniboni

Temperature (°C)

Dissolved Oxygen % (Sat)

Time (Hour)

2:00pm 3:00pm 4:00pm 5:00pm 6:00pm 7:00pm 8:00pm 9:00pm 10:00pm 11:00pm 12:00am 1:00am 2:00am 3:00am 4:00am 5:00am 6:00am 7:00am 8:00am 9:00am 10:00am
"... natural conductivity level without human influence would be around 0.05mS/cm or less." – Doug Heath, EPA
Nitrogen Nitrate (N-NO3) Comparison
October 31, 2007-November 1, 2007

Machine detection limit is .1 mg/L
Class A Water Standards: N-NO3 less than 1.0 mg/L
Soluble Reactive Phosphorus (SRP) October 31, 2007-November 1, 2007

Machine detection limit is .008 mg/L

Class A Water Standards: SRP less than .1 mg/L
Abbott Run Comparison of N-NO₃ and SRP Loads Using Lachat Data
Site A and Site B, David Zaniboni

N-NO₃ Load
SRP Load

Cushman Road
Shady Pines
Benthic Macro-Invertebrate
Site A - Cushman Road - 10/31/07

MGBI=3.4
Excellent
Benthic Macro-Invertebrates
Site B - Shady Pines - 10/31/07

MGBI=3.8
Very Good
Summary

- Site A and Site B met the Class A Standards.

- Both sites had high MGBI results, with Site A having an excellent value and Site B having a very good value according to the Hilsenhoff Biotic Index.

- Site B’s pH levels dropped back to normal from last year’s levels which did not meet the Class A Standards.
Presented By:

Elizabeth Clark
Peter Forte
Jessica Lagasse
Amanda Matte
Ryan Morrissey
David Zaniboni