Impact of Oil Spill Removal on a Freshwater Wetland

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Fifth Biennial Freshwater Spills Symposium 2004
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The wilderness core of the NJ Highlands, and its largest unprotected forest tract, holds enormous biological value and is home to hundreds of bear, native trout, bobcat and rare interior forest bird species.

Much of the watershed has been held by the City of Newark since the early 20th century to safeguard its water supply.

Highlands forests supply and protect clean drinking water for over 15 million people, including over half of New Jersey’s population, and protect major water supply watersheds for New York City.
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Relict Pumping Station at Unionville, New York similar to Newfoundland Pumping Station

+ Eleven stations, 28 miles apart, over a 315 mile distance with 4 six inch diameter pipelines
+ Maximum capacity of 50K barrels a day (2.1 million gallons).
+ Operation period: 1881-1920.
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February 1996 Initial Response
Interceptor Trench installed before soil removal
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July 1998
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\[ PSS1 = \text{Palustrine Scrub Shrub Broad leaved Deciduous e.g. Red Maple swamp} \]
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April 1999 Earth Day at Green Pond Oil Spill Site
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## Impact of Oil Spill Removal on a Freshwater Wetland

<table>
<thead>
<tr>
<th>Species</th>
<th>Number Live</th>
<th>1999</th>
<th>2002</th>
<th>Differential</th>
</tr>
</thead>
<tbody>
<tr>
<td>V. dentatum</td>
<td></td>
<td>21</td>
<td>12</td>
<td>-9</td>
</tr>
<tr>
<td>Aronia</td>
<td></td>
<td>55</td>
<td>21</td>
<td>-34</td>
</tr>
<tr>
<td>Alnus</td>
<td></td>
<td>59</td>
<td>52</td>
<td>-7</td>
</tr>
<tr>
<td>Cornus sericea</td>
<td></td>
<td>15</td>
<td>46</td>
<td>+31</td>
</tr>
<tr>
<td>Cornus amomum</td>
<td></td>
<td>69</td>
<td>93</td>
<td>+24</td>
</tr>
<tr>
<td>Sambucus</td>
<td></td>
<td>26</td>
<td>18</td>
<td>-8</td>
</tr>
<tr>
<td>Ilex</td>
<td></td>
<td>18</td>
<td>21</td>
<td>-3</td>
</tr>
<tr>
<td>Salix discolor</td>
<td></td>
<td>52</td>
<td>37</td>
<td>-15</td>
</tr>
<tr>
<td>Salix nigra</td>
<td></td>
<td>19</td>
<td>17</td>
<td>-2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>334</strong></td>
<td><strong>311</strong></td>
<td><strong>Net -23</strong></td>
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</tbody>
</table>
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# Impact of Oil Spill Removal on a Freshwater Wetland

## TABLE 1. Total Petroleum Hydrocarbon (TPH) levels in Wetland Soils at Green Pond Oil Spill Site

<table>
<thead>
<tr>
<th>Location</th>
<th>Apr-99</th>
<th>Location</th>
<th>May-00</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW1-A</td>
<td>630</td>
<td>RW1-C</td>
<td>40</td>
</tr>
<tr>
<td>RW1-C</td>
<td>ND</td>
<td>Close to RW1-C</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Near &quot;Spooge&quot;</td>
<td>1800</td>
</tr>
<tr>
<td>RW2-B</td>
<td>83J</td>
<td>Close to RW2-B</td>
<td>2100</td>
</tr>
<tr>
<td>RW3-B</td>
<td>1500</td>
<td>Close to Above</td>
<td>1300</td>
</tr>
<tr>
<td>RW5-A</td>
<td>870</td>
<td>Close to RW5-A</td>
<td>200</td>
</tr>
<tr>
<td>RW6-C</td>
<td>210J</td>
<td>Close to RW6-C</td>
<td>230</td>
</tr>
<tr>
<td>RW7-B</td>
<td>300J</td>
<td>Close to RW7-B</td>
<td>300</td>
</tr>
<tr>
<td>Across River -A</td>
<td>440</td>
<td>Across River -B</td>
<td>260J</td>
</tr>
<tr>
<td>Across River -C</td>
<td>180J</td>
<td>Across River -C</td>
<td>180J</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>Jun-01</th>
<th>Location</th>
<th>Jun-02</th>
<th>Location</th>
<th>May-03</th>
</tr>
</thead>
<tbody>
<tr>
<td>RW1-A</td>
<td>220</td>
<td>RW1-C</td>
<td>110</td>
<td>RW1-C</td>
<td>120</td>
</tr>
<tr>
<td>RW2-B</td>
<td>2300</td>
<td>RW2-B</td>
<td>560</td>
<td>RW2-B</td>
<td>520</td>
</tr>
<tr>
<td>RW3-B</td>
<td>1300</td>
<td>RW3-B</td>
<td>1500</td>
<td>RW3-B</td>
<td>110</td>
</tr>
<tr>
<td>RW5-A</td>
<td>960</td>
<td>RW5-A</td>
<td>200</td>
<td>RW5-A</td>
<td>4400</td>
</tr>
<tr>
<td>RW6-C</td>
<td>1300</td>
<td>RW6-C</td>
<td>230</td>
<td>RW6-C</td>
<td>550</td>
</tr>
<tr>
<td>RW7-B</td>
<td>300</td>
<td>RW7-B</td>
<td>300</td>
<td>RW7-B</td>
<td>550</td>
</tr>
<tr>
<td>Across River -A</td>
<td>440</td>
<td>Across River -B</td>
<td>260J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Across River -C</td>
<td>180J</td>
<td>Across River -C</td>
<td>180J</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

J = estimated value below the detection limit
MDL = Method Detection Limit
**Wetland Plant Species Indicator Categories**

**OBL = Obligate Wetland**

Occur almost always (>99% Probability) under natural conditions in wetlands.

**FACW = Facultative Wetland**

Usually occur in wetlands (67–99% Probability), but occasionally found in non-wetlands.

**FAC = Facultative**

Equally likely to occur in wetlands or non-wetlands (34-66% Probability).

**FACU = Facultative Upland**

Usually occurs in non-wetland (67-99% Probability). But occasionally found in wetlands (1-33% Probability).

*National list of Plant Species that occur in Wetlands: Northeast Region (Region 1)*

USF&W Biological Report 88(26.1) MAY 1988
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**CHANGE IN GREEN POND WETLAND CHARACTER**

- **FACUpland**
- **FACultative**
- **FACWetland**
- **OBLigate Wetland**
- **Not Listed**

**YEAR**
- 1999
- 2000
- 2001
- 2002
- 2003

**NUMBER OF SPECIES**
- 0
- 5
- 10
- 15
- 20
- 25
- 30

**YEAR**
- 1999
- 2000
- 2001
- 2002
- 2003

**NUMBER OF SPECIES**
- 0
- 5
- 10
- 15
- 20
- 25
- 30
**Explanation of Habitat Symbols**

- **P**=perennial (comes back every year)
- **I**=introduced (not native, would include invasives)
- **N**=native (indiginous to Northeast US)
- **G**=grass(like those found along roads and lawns)
- **Gl**=grasslike(rushes, sedges)
- **F**=forb( flowering non-woody like goldenrods,etc)
- **B**=biennial(two year growing cycle)
- **S**=shrub(woody plants usually < 20 ft in height)
- **A**=annual(one growing season, that’s it)
- **E**=emergent (grows out of water e.g. cattails)
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Change in Wetland Plant Community

- Perennial Native Forb
- Perennial Native Grass/Grasslike
- Perennial Native Emergent Forb
- Perennial Introduced Forb
- Annuals

Year

Number of Species

1999  2000  2001  2002  2003
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Notice Invasive Purple Loosestrife in left center of picture
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Invasive Species Management for Purple Loosestrife 2000
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Invasive Species Management for Purple Loosestrife 2001, 2002 & 2003

Biological Control with Galerucella beetles
Invasive Species Management for Purple Loosestrife 2001, 2002 & 2003 Galerucella spp. (calmariensis and pusilla)

Life Stages: Eggs laid in May, June, August and hatch in ten days. Larvae feed on young buds, leaves and stems up to 14 days. Pupation occurs in soil lasting about seven days.

Adults over winter and emerge in May and June. First generation adults emerge in July and August and relocate to new areas (hopefully).
Invasive Species Management for Purple Loosestrife 2002 & 2003 also included:

- End of season whole Plant extrication
- Seed head clipping in Spring.
- Clipping Flowering structures in late summer before seed maturation

A single Loosestrife seed head with tiny seeds in lower left hand corner. One plant can produce 2 million or more seeds.
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Cropped vs Uncropped Stem Count Means

Mean

Uncropped-S. discolor
Cropped-S. discolor
Uncropped-Salix nigra
Cropped-Salix nigra
Uncropped-Alnus serrulata
Cropped-Alnus serrulata

± Standard error
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Spring 2002

Fall 2002
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Shrub Height (cms) Means for 1999, 2000 & 2002
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Herbivory Issues Winter 2002
• What have we learned so far..
  • The herbaceous plant community in a wet meadow stripped of surface soil (4-6 inches) will recover providing root systems remain intact.
  • Low level soil TPH levels do not adversely affect potted shrub survival.
  • Occasional oil “spooges” do not affect the plant community as a whole.
  • Although the number of plant species has decreased the plant community has maintained its wet meadow characteristics with sedges, rushes and forbs.
  • Invasive species management is a “must do” activity in a revegetation/restoration project.

• WATCH OUT FOR THE BEAVERS AND BEARS, OH MY!
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