Population Change in the Hudson Valley Region


Scientists tested each animal group to see how many ticks on each animal were infected with Lyme disease. Of the ticks found on mice, close to 90% of the ticks were infected, while less than 10% of ticks on raccoons were infected. LoGuidici et al, 2003.
In years of low chipmunk amounts, tick numbers on mice were variable. But, in years of high chipmunk density, tick burdens on mice were always low. This suggests that when there are lots of alternative hosts (including chipmunks, rats, moles, voles) for the ticks, it reduced the rates of encounter between the ticks and the white-footed mice. White-footed mice are the most common and competent reservoir for the Lyme disease bacterium. Consequently, the more diverse the population of animals in the forest, the lower the rate of Lyme disease infected mice. Keesing, et al 2006. Group 1
The Fishkill watershed is in the Hudson Valley. It drains most of Fishkill, East Fishkill, Beekman, Pleasant Valley, and a few others like Wappinger, Pleasant Valley, Stantondville, Millbrook, helping to form a large portion of the Hudson. The Fishkill Valley is also in the Hudson watershed.

The Wappinger watershed is also in the Hudson Valley. It drains a large portion of Dutchess County, including Wappinger, parts of the town of the town of Wappinger, parts of the town of Poughkeepsie, and a few others like Millbrook, Pleasant Valley, Stanfordville, and a few others like East Fishkill, Pleasant Valley, and Wappinger.
“The Hudson River is home to the only anadromous member of the family Gadidae [tomcod] on the North American Atlantic Coast. A population of Atlantic tomcod is largely contained in the lower tidal portions of the river, surrounding bays of the lower estuary, and in the outer bay and coastal habitats. Historically, tomcod was reported as far south as Virginia (Bigelow and Schroeder 1953), but there are no recent reports of spawning in any drainage south of the Hudson River (Stewart and Auster 1987). The fact that Hudson River tomcod are at the southernmost boundary of the species’ spawning distribution may foretell future reductions in its population with warming climate.”

Nitrogen is a form of pollution that comes from sewage, animal wastes, and fertilizer runoff. Laws starting in 1972 helped reduce some of this pollution.

Dissolved oxygen is an important measure of the health of an aquatic ecosystem, because organisms need oxygen in order to survive. Dissolved oxygen levels can decline as a result of pollution, overuse by organisms (including decomposers), or stagnation of the water, among other causes.

Data are annual averages from the Longitudinal River Survey and the Fall Juvenile Survey, 2005 Year Class Report, prepared by ASA Analysis & Communication for Dynegy Roseton L.L.C.

Group 2
Researchers James Gibbs and Alvin Breisch looked at six species, synthesizing information from three different studies to compare ‘first-calling dates’ from 1900-1912 and 1990-1999. First calling dates are used often because it is easier to hear the amphibians than see them, and after they start calling, they start breeding. Therefore, calling tells us that reproduction is occurring.
Upper Temperature Tolerance Limits for Common Hudson Estuary Fish

<table>
<thead>
<tr>
<th>Species</th>
<th>Latin Name</th>
<th>Upper tolerance limit, °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carp</td>
<td>Cyprinus carpio</td>
<td>31-34</td>
</tr>
<tr>
<td>Alewife</td>
<td>Alosa pseudoharengus</td>
<td>23</td>
</tr>
<tr>
<td>Rainbow Smelt</td>
<td>Osmerus mordax</td>
<td>21</td>
</tr>
<tr>
<td>Tomcod</td>
<td>Microgadus tomcod (juveniles)</td>
<td>19-20.9</td>
</tr>
<tr>
<td>Striped bass</td>
<td>Morone saxatilis (yolk sac)</td>
<td>26</td>
</tr>
</tbody>
</table>


Reduction in Juvenile Fish Populations from Cooling Water Intakes

Cooling water intake pipes are used by electric power plants to cool down the equipment. Water is taken in from the Hudson River, and fish, especially juveniles and eggs, are killed in the process. There are two estimates, one that is higher, which assumes that no fish survive the process, and the second, lower estimate, which assumes that some percentage survive and return to the river with the discharged, heated water.

Atlantic Tomcod (*Microgadus tomcod*)

**Size:** Maximum length 12.5 inches.

**Feeding:** Eats small crustaceans, worms, small molluscs, squid, and small larval fish (depends on age of fish).

**Lifecycle:** Spawn in winter in shallow waters of estuaries or streams.

**Predators:** Striped bass, other large predatory fish

---

Rainbow Smelt (*Osmerus mordax*)

**Size:** 7-9 inches in length; 3 oz average weight

**Feeding:** Zooplankton, invertebrates, small larval fish (depends on age of fish).

**Lifecycle:** Spend summers in coastal waters; overwinter under the ice in estuaries. Spawn in the spring in small streams.

**Predators:** Trout, yellow perch, walleye.

The red line shows when the zebra mussels arrived in the Hudson River.

Group 3


The red line shows when the zebra mussels arrived in the Hudson River.

Group 3


The red line shows when the zebra mussels arrived in the Hudson River.

Group 3
Nitrogen is a form of pollution that comes from sewage, animal wastes, and fertilizer runoff. Laws starting in 1972 helped reduce some of this pollution.


Group 3
Dissolved oxygen is an important measure of the health of an aquatic ecosystem, because organisms need oxygen in order to survive. Dissolved oxygen levels can decline as a result of pollution, overuse by organisms (including decomposers), or stagnation of the water, among other causes.

Data are annual averages from the Longitudinal River Survey and the Fall Juvenile Survey, 2005 Year Class Report, prepared by ASA Analysis & Communication for Dynegy Roseton L.L.C.

Group 3

Dissolved oxygen is an important measure of the health of an aquatic ecosystem, because organisms need oxygen in order to survive. Dissolved oxygen levels can decline as a result of pollution, overuse by organisms (including decomposers), or stagnation of the water, among other causes.

Data are annual averages from Beach Seine Survey, 2005 Year Class Report, prepared by ASA Analysis & Communication for Dynegy Roseton L.L.C.

Group 3
Seekel and Pace, 2008.

POUGHKEEPSIE WATER TEMPERATURE

POUGHKEEPSIE AIR TEMPERATURE

United States Historical Climatology Network
Notice the change in *Phragmites australis*, or common reed, which is an invasive species. It is light pink on the map.

Slide courtesy of C. Nieder, NYS DEC.

<table>
<thead>
<tr>
<th>Plant Species</th>
<th>Iona Island</th>
<th>Constitution Marsh</th>
<th>Tivoli Bays</th>
<th>Stockport Flats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common reed</td>
<td>35.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Cattail</td>
<td>12.3</td>
<td>34.6</td>
<td>46.7</td>
<td>21.4</td>
</tr>
<tr>
<td>Purple loosestrife</td>
<td>0.1</td>
<td>0.3</td>
<td>2.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Green arrow arum</td>
<td>0.7</td>
<td>12.7</td>
<td>4.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Broadleaf arrowhead</td>
<td>0</td>
<td>0.4</td>
<td>0.8</td>
<td>0.4</td>
</tr>
<tr>
<td>River bulrush</td>
<td>0.1</td>
<td>0.4</td>
<td>1.0</td>
<td>4.1</td>
</tr>
</tbody>
</table>


Figure 9. Aerial spread of Phragmites australis at Iona Island from 1974 to 2005 ($r = 0.98, p = 0.0015$). Data compiled from Winograd (1997).


Dissolved oxygen is an important measure of the health of an aquatic ecosystem, because organisms need oxygen in order to survive. Dissolved oxygen levels can decline as a result of pollution, overuse by organisms (including decomposers), or stagnation of the water, among other causes.

Data are annual averages from the Longitudinal River Survey and the Fall Juvenile Survey, 2005 Year Class Report, prepared by ASA Analysis & Communication for Dynegy Roseton L.L.C.

from Baker et al., "Episodic acidification of small streams in the northeastern United States: Effects on fish populations," 1996. All graphs copyright 1996 Ecological Society of America via the Copyright Clearance Center.
Aluminum and pH. From Munson, Driscoll, and Gherini, “Phenomenological analysis of ALS c chemistry data,” in Baker et al., Adirondack Lakes Survey: An Interpretive Analysis of Fish Communities and Water Chemistry, 1984–1987, 1990. The ALS was the first large-scale survey to separate monomeric aluminum into organic and inorganic fractions. Inorganic aluminum reacts with proteins and so is toxic to fish and other aquatic animals. Both its total concentration and its importance relative to other forms of aluminum increase with decreasing pH. At pH 6.0, typical of a well-buffered lake, it is a relatively minor component, representing about a third of all monomeric aluminum. At pH 4.5, typical of a highly acidified lake, it is eight times more concentrated and represents three-quarters of all monomeric aluminum.