Long-Term Impacts of Acidic Deposition on Brook Trout in Honnedaga Lake, New York

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USGS

RPI – Keck Lab

NYS DEC
Honnedaga Lake

Surface Area: 312 ha (770 acres)
Max Depth: 56 m (183 feet)
Elevation: 701 m (2300 feet)
**Historical Honnedaga Lake Fish Community Composition**

<table>
<thead>
<tr>
<th>Prior to 1890</th>
<th>1930 to 1955</th>
<th>1955 to Present</th>
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<tbody>
<tr>
<td>Brook Trout</td>
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<tr>
<td>Lake Trout (I)</td>
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<tr>
<td>Round Whitefish (I)</td>
<td></td>
<td>(I) - Introduced</td>
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<tr>
<td>White Sucker (I)</td>
<td></td>
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<tr>
<td>Creek Chub (I)</td>
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</tbody>
</table>

*(I) - Introduced*

*Source: Webster 1961*
Historical Honnedaga Lake
Fish Community & Acidic Deposition

ESTIMATED WET DEPOSITION AT HUNTINGTON FOREST

Kg S or N per hectare-year

Sulfate
Nitrate

Water Chemistry Surveys
Historical Honnedaga Lake Fish Community & Lake Surface pH
Honnedaga Lake

Inorganic Monomeric Aluminum

LETHAL

NON-LETHAL
Honnedaga Lake Tributaries
pH in Honnedaga Lake Tributaries – Summer (2009)

- Mean pH < 5.0
- Mean pH > 5.0
Fall Trapnet Surveys:
Lake Assessments
Fall Trapnet CPUE of Brook Trout
Brook Trout Redd Surveys and Spawning Habitat Measurements
Documented Brook Trout Spawning Sites (since 2000)

- **Mean pH < 5.0**
- **Mean pH > 5.0**

Legend:
- Lake Shoal
- Tributary
- Mean pH < 5.0
- Mean pH > 5.0
Annual Brook Trout Redd Counts

![Bar chart showing annual brook trout redd counts from 2001 to 2008. The highest count is in 2004, with significantly lower counts in 2003 and 2005.]

- 2001: 50
- 2003: 20
- 2004: 80
- 2005: 10
- 2006: 60
- 2007: 50
- 2008: 60
pH Measurements within Redds and Adjacent Lake & Tributaries
Stream Electro-fishing Surveys:
Lake Assessments
Young-of-Year Brook Trout and Al$_{im}$ in Tributaries

Presence / Absence

P < 0.05
$R^2 = 0.65$

Density

YOY Brook Trout CPUE (number / m$^2$)
Summary

Since 1990 Amendments to the Clean Air Act

A modest chemical and brook trout population recovery within Honnedaga Lake

Continued chronic acidification of numerous groundwater influenced tributaries within the watershed

The acid impaired state of tributaries likely limits young-of-year and consequently adult brook trout abundance