Survey of potential lake trout (Salvelinus namaycush) spawning sites in Otsego Lake

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Abstract

Though native to Otsego Lake, lake trout (Salvelinus namaycush) have not been observed to spawn there in recent years (Harman, 1998), although lake trout lacking fin clips and smaller than those stocked by the New York State Department of Environmental Conservation (DEC) have been caught by fishermen (Thayer, 1999; Cornwell, 2000). This survey employed SCUBA divers to access the breeding possibilities of various sites in Otsego Lake for lake trout spawning. Two potentially useful sites were identified and two sites that might be useful with remediation were identified. Additional surveys are recommended for 2000.

INTRODUCTION

Twentieth century changes in Otsego Lake and its watershed have led to the siltation of previously rocky and gravelly bottom areas (personal observation; probably associated with increased algal productivity [Harman et al., 1997]). Lake trout have not been observed breeding in traditional shallow water locations (Sanford, 1984), possibly because native strains have been replaced by those stocked (Harman et al., 1997). Nevertheless, local fishermen continue to catch lake trout smaller than those known to be stocked by DEC (Thayer, 1999; Cornwell, 2000). These fish do not have the clipped fins consistently used since 1994 to identify hatchery-raised lake trout (Thayer, 1999; Cornwell, 2000; McBride, 2000). Sanford (1984) reported that lake trout from Finger Lake, Adirondack and native strains all attained sexual maturity in Otsego Lake even while “the traditional shallow water spawning has not been documented in the lake since 1954”. Peck (1986), working on other lakes, notes “reproduction by hatchery lake trout has ... been documented on man made structures...”

Successful lake trout spawning appears to require areas “relatively clean of silt or detritus” (Marsden et al., 1988) with “angular or round rock 5-50 cm in diameter with interstitial spaces 30 or more cm deep” at depths of 1 to 42 m (Edsall et al., 1992) where ice scouring is not a problem (Edwards et al., 1990). The interstitial spaces protect the eggs and fry from predation while the lack of silt facilitates oxygen exchange (Marsden et al., 1988). Lake trout spawn “between September and early December, the exact time varying from lake to lake” (Smith, 1985). The purpose of this survey was to employ BFS volunteer divers to identify such locations existing in Otsego Lake.

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METHODS

A review was made of the Otsego Lake bathymetric map and the lake's geology (Harman et al., 1997) to identify sites where the constricted flow of subsurface currents and/or wave action and slope might keep bottom rocks, rubble and gravel free of silt. Subsequent Self Contained Underwater Breathing Apparatus (SCUBA) dives were planned and executed on 20 of these locations, including the traditional "Bissell's" spawning site (Thayer, 1999). Bathymetric data were used in planning dives and search patterns were designed appropriate to the bottom contours and visibility at the time of the dives. Divers surveyed to depths where bottom silts and deeper depth contours precluded silt free spawning possibilities. Specific locations with relatively clean rocks or cobbles were marked with Pelican Float™ marker recovery devices. Subsequently, I returned to these sites and measured their interstitial depths.

Sites were identified by names used on the Otsego Lake bathymetric map and, when a location was not identified on the map, by local name. Latitude and longitude were obtained, where needed, by use of a Garmin™ GPS II+™ device. Initial coordinates were refined using Delorme®'s 3-D TopoQuads™ for New York (Region 3).

Observations suggested that rockpiles off of Three Mile Point were particularly promising. Therefore, additional efforts were taken to evaluate the suitability of the site. Oxygen concentration and temperature of the water just above the substrate was determined on 21 October using a BFS Hydrolab Surveyor II™ multiparameter water quality monitoring instrument which was calibrated, per manufacturers instructions, immediately prior to use. Rocks were collected and photos taken of the interstitial spaces. Additionally, to facilitate locating the site, ½ inch tubular nylon webbing (U.S. military specification MIL-W5625; stock no. 27-W-700015) was strung along the bottom from a depth of 5m at a point just north of the exposed piling off of Three Mile Point to the southern most rockpile. Finally, a benthos survey conducted at Three Mile Point (Lord, in prep) in the autumn of 1999 provided an opportunity to check for lake trout eggs inasmuch as the collection devices (buckets buried flush with the substrate and filled with rock rubble from the site) allowed. These devices were similar in construction to those used by Peck for his spawning surveys (1986, after Stauffer, 1981). Fourteen buckets were planted in October 1999 with seven (average diameter of opening: 23.5 cm) recovered in January 2000. The remaining buckets will be retrieved in spring 2000.

RESULTS

Based on the criteria extracted from the literature, two potential lake trout sites of limited size were identified from the 20 sites surveyed. Those sites were in the vicinity of Pegg's Point and Three Mile Point. Location and specific bottom characteristics for each site surveyed (ordered in south to north sequence) are contained in Table 1. No trout eggs were collected in the benthos traps at Three Mile Point.
Table 1. Characteristics of Otsego Lake Sites Surveyed for Lake Trout Spawning Potential.

<table>
<thead>
<tr>
<th>Location</th>
<th>Coordinates</th>
<th>Depths (m)</th>
<th>Sand</th>
<th>Silt</th>
<th>Clay</th>
<th>Bed - Rock</th>
<th>Other Rocks</th>
<th>Gravel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Front Hotel Docks</td>
<td>N 42° 42.186' W 74° 55.262'</td>
<td>0.9 - 4.0</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Otsega Lakefront</td>
<td>N 42° 42.365' W 74° 55.479'</td>
<td>5.5 - 12.2</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Country Club Mooring</td>
<td>N 42° 42.642' W 74° 55.385'</td>
<td>2.0 - 5.0</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>South of Fairy Springs</td>
<td>N 42° 42.352' W 74° 55.929'</td>
<td>5.2 - 9.1</td>
<td>x</td>
<td></td>
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<tr>
<td>Rat Cove</td>
<td>N 42° 42.107' W 74° 55.451'</td>
<td>0.9 - 13.0</td>
<td>x</td>
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<tr>
<td>E. Shore just S. of Brockwood Pt.</td>
<td>N 42° 43.470' W 74° 54.509'</td>
<td>5.2 - 12.2</td>
<td>x</td>
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<tr>
<td>Point Judith</td>
<td>N 42° 43.697' W 74° 54.393'</td>
<td>0.9 - 8.2</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Point Florence</td>
<td>N 42° 44.088' W 74° 53.948'</td>
<td>0.9 - 25.0</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Three Mile Point</td>
<td>N 42° 44.477' W 74° 54.410'</td>
<td>0.9 - 12.2</td>
<td>x</td>
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<tr>
<td>Busch's Fill</td>
<td>N 42° 44.732' W 74° 54.347'</td>
<td>0.9 - 9.8</td>
<td>x</td>
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<td>Bissell's Point</td>
<td>N 42° 44.432' W 74° 54.119'</td>
<td>0.9 - 15.5</td>
<td>x</td>
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<tr>
<td>Five Mile Point</td>
<td>N 42° 45.926' W 74° 53.895'</td>
<td>0.9 - 30.2</td>
<td>x</td>
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<td>Gravelly Point</td>
<td>N 42° 46.251' W 74° 52.993'</td>
<td>0.9 - 24.4</td>
<td>x</td>
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<td>Pegg's Point</td>
<td>N 42° 46.699' W 74° 52.769'</td>
<td>0.9 - 30.2</td>
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<td>Clark Point</td>
<td>N 42° 47.484' W 74° 52.874'</td>
<td>0.9 - 15.8</td>
<td>x</td>
<td>x</td>
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<tr>
<td>SE Sunken Island</td>
<td>N 42° 47.595' W 74° 53.548'</td>
<td>0.9 - 12.2</td>
<td>x</td>
<td>x</td>
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<tr>
<td>NE Sunken Island</td>
<td>N 42° 47.837' W 74° 53.491'</td>
<td>4.6 - 15.8</td>
<td>x</td>
<td>x</td>
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<tr>
<td>NE Otsego Lake Trench</td>
<td>N 42° 47.912' W 74° 53.053'</td>
<td>5.2 - 14.3</td>
<td>x</td>
<td></td>
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<tr>
<td>North Center Lake Site #1</td>
<td>N 42° 48.513' W 74° 53.371'</td>
<td>3.0 - 5.5</td>
<td>x</td>
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<tr>
<td>North Center Lake Site #2</td>
<td>N 42° 48.467' W 74° 53.390'</td>
<td>3.0 - 5.5</td>
<td>x</td>
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</tbody>
</table>

Notes providing details on various sites are contained in Appendix A.
DISCUSSION

Two rockpile sites (Three Mile Point and Peggs Point) appear to exhibit known requirements for lake trout spawning. However, we cannot state that spawning takes place at either site. Winter dives on the Three Mile Point rockpiles revealed that some silt was deposited on that site at times. The absence of lake trout eggs in the benthos collection buckets does not support a hypothesis that Three Mile Point is a spawning area. However, the Three Mile Point benthos collection buckets were not planted until October. Therefore the possibility of lake trout spawning at this location prior to the planting of the buckets cannot be discounted (Smith, 1985). The buckets did contain a number of slimy sculpins (*Cottus cognatus*) which are a known lake trout food (Edwards *et al.*, 1990) and which are also reputed to prey on trout eggs “...not covered during the spawning process” (Smith, 1985). The Pegg’s Point rockpiles are shallow enough that the possibility of ice scouring at this site cannot be discounted.

At least two sites exhibited potential for lake trout spawning with remediation of some sort. At the Bissell’s location, which is a traditional spawning site, and at the Point Florence site, hosing of silt and sand from shallower depths to deeper ones might be feasible given the slope of the bottom and the shallow depth of overlying materials.

This survey was not exhaustive. A review of the Otsego Lake bathymetric map (Harman *et al.*, 1997) reveals other sites where the constricted flow of subsurface currents and/or wave action and slope might keep bottom rubble or gravel free of silt. Those sites should be surveyed in 2000. Additional work using egg collection devices and fry capture devices (Peck, 1986, after Stauffer, 1981; Marsden *et al.*, 1988) should be initiated before September 2000 at the Three Mile Point and Pegg’s Point locations as well as any other potentially spawnable locations identified in year 2000 survey work. This has been discussed with DEC personnel (McBride, 2000) and has their approval and support.

REFERENCES

Cornwell, M. 2000. Personal communication. SUNY Cobleskill, Cobleskill, NY.


Lord, P. H. In prep. Subepilimnion rock benthos in Otsego Lake.


Smith, C. L. 1985. The inland fishes of New York State. New York State DEC, 50 Wolf Road, Albany, NY 12233.


Appendix A:
Miscellaneous Notes on Otsego Lake Sites Surveyed for Lake Trout Spawning Potential

- **Point Florence**
  - At 24.0 m there is a silt bottom. Bottom drops precipitously in large stepped cliffs from 7.5 – 23 m. Flat “tops” of the “steps” in this region are covered with ~4 cm of silt. Above this height, at depths of ~6.5 m, there are large boulders similarly covered in silt while at ~4.5 m there is gravel with a thin silt “frosting”.

- **Three Mile Point Rockpiles**
  - Compass headings: 310° to flagpole at Three Mile Point; 190° to Kingfisher Tower; 210° to the tallest church steeple in Cooperstown; and 30° to Five Mile Point.
  - 21 October Hydrolab® data from point just above substrate: 11.66° C; 9.02 mg/l O₂.
  - Bottom at 9.1 to 9.4 m around rockpiles is all silt. Tops of rockpiles at 7.9 m are clean of silt and composed of cobbles and rocks with interstitial spaces of between 20 and 30 cm. (Dives later in winter revealed some silt deposition [< 0.5 cm on the tops of rocks in the pile] that did not occlude interstitial spaces significantly.) Rockpiles are approximately 7 m in diameter and immediately adjacent to each other on a northeast-southwest axis. An area with a diameter of approximately 4 m on each rockpile has potentially useful interstitial spaces. Rocks (337) in benthos buckets averaged 8.50 cm along their longest axis.
  - Anecdotal reports of fishermen noted sizeable lake trout were regularly caught from the Three Mile Point shoreline in October and November.
  - Seven benthos buckets recovered in January 2000 contained no lake trout eggs, but did contain slimy sculpins (*Cottus cognatus*). No other exposed rockpiles, cobbles, or gravel were noted in the Three Mile Point area.

- **Bissell's**
  - Sand bottom and sand on boulders and cobbles at depths of 12.2 – 15.5 m. Rock ledges with sand “frosting” ~1 cm deep at depths of 9.1 – 12.2 m. At shallower depths silt ~2 – 7.5 cm covered ledges, boulders, and cobbles.

- **Five Mile Point**
  - Bottom consisted of loose gravel covered with large organic matter (i.e., logs, sticks, twigs, leaf debris) down to ~ 18 m. Deeper areas are all silt and silts with sand. A thin, easily breakable “crust” was noted over sediments at deepest depths with little silt on top of it.

- **Gravelly Point**
  - Bottom is all unstable (due to slope) loose cobbles and coarse sand.
  - Interstitial spaces were all 3 cm or less.
Pegg's Point
- Silt was deep at 20 m and deeper. Above 8 m the bottom is mostly covered with a thin layer of silt, but scoured in several places. Aquatic macrophytes grew on more protected slope faces above 5.5 m depth.
- Clean brick rubble possessing minimally useful interstitial spaces exists on the northeast side of point at ~ 2.9 m depth and a pile of rocks with similar interstitial spaces is present at the center of the point in somewhat shallower water. Brick rubble field is approximately 5 m long and 1.4 m wide while the rockpile is smaller.

Clark Point
- Bottom is silt and silts with sand until drop-off. Drop-off was all gray clay that gave way to more silt at deeper depths.

SE Sunken Island
- Bottom is silt covered (to a depth of ~5 cm) gray clay and rockpiles with some good sized cobbles in waters shallower than 3.7 m.
- Except in waters subject to ice scouring, no exposed rockpiles, cobbles, or gravel were noted.

NE Sunken Island
- Bottom is silt covered (to a depth of ~5 cm) gray clay and rockpiles with some good sized cobbles in vicinity of 13.5 m. At ~7.5 m, the bottom is gray clay with remnants of old shells but few rocks. At ~4.5m the bottom is clay and rock covered with Najas sp.

NE Otsego Lake Trench
- Trench is clay sided, with some areas well sculpted. Silt in depths of ~7.5 – 10.0 cm covered the bottom of the trench.

North Center Lake Sites:
- Bottom is clay, almost entirely covered with Najas sp., Myriophyllum spicatum, Ceratophyllum demersum and Potomogeton spp.