Otsego Lake Water Quality Data

May 26, 2010

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Data were collected using a HydroLab Scout II Multi-probe.

TEMPERATURE & DISSOLVED OXYGEN PROFILES

Depth		Temp		Dissolved Oxygen mg/L
m	ft	ºC	ºF	
0	0	18.39	65.1	10.28
2	6.5	17.57	63.6	10.17
4	13.1	13.99	57.2	11.04
6	19.7	12.90	55.2	11.12
8	26.2	11.88	53.4	11.16
10	32.8	10.82	51.5	11.18
12	39.4	9.37	48.9	11.18
14	45.9	8.20	46.8	11.11
16	52.5	7.82	46.1	11.09
18	59	7.36	45.2	11.03
20	65.6	6.82	44.3	10.98
25	82	6.21	43.2	10.83
30	98.4	5.80	42.4	10.80
35	114.8	5.31	41.6	10.79
40	131.2	5.07	41.1	10.64
42	137.8	4.86	40.7	10.64
44	144.4	4.65	40.4	10.52
46	150.9	4.50	40.1	10.31
48	157.5	4.39	39.9	9.96

Epilimnion

- *"upper" or "outer" layer*
- *Warm water*
- *Oxygen is continually replenished via atmosphere & produced via photosynthesis in daylight hours*

Thermocline

This zone of rapid temperature change serves as the boundary between warm surface waters and the dense, cold water of the hypolimnion.

Hypolimnion

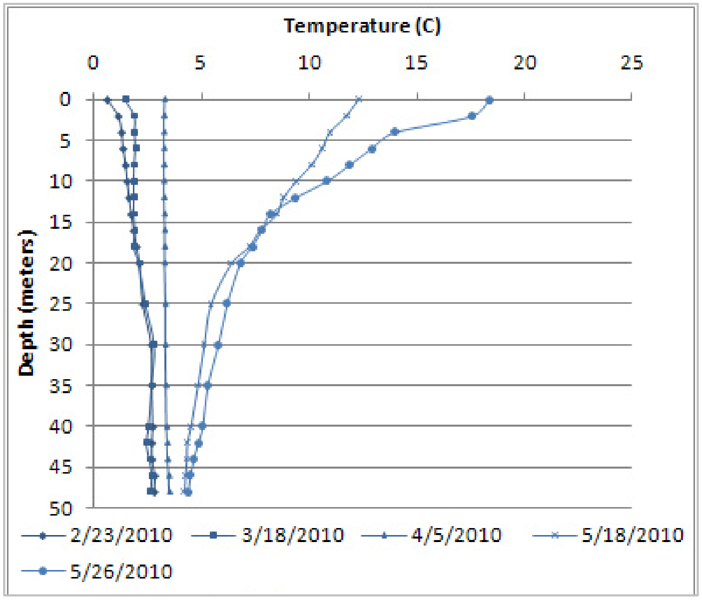
- *"below" lake layer*
- *Cold water*
- *Oxygen cannot be replenished while stratification is in place*

Dissolved oxygen concentrations also follow a predictable progression throughout the year. During spring and fall turnover, when temperatures are constant from the surface to bottom, oxygen is distributed throughout the water column, as seen during the April 5th profile. Once thermal stratification is in place, oxygen in the bottom waters cannot be replenished via atmospheric interactions.

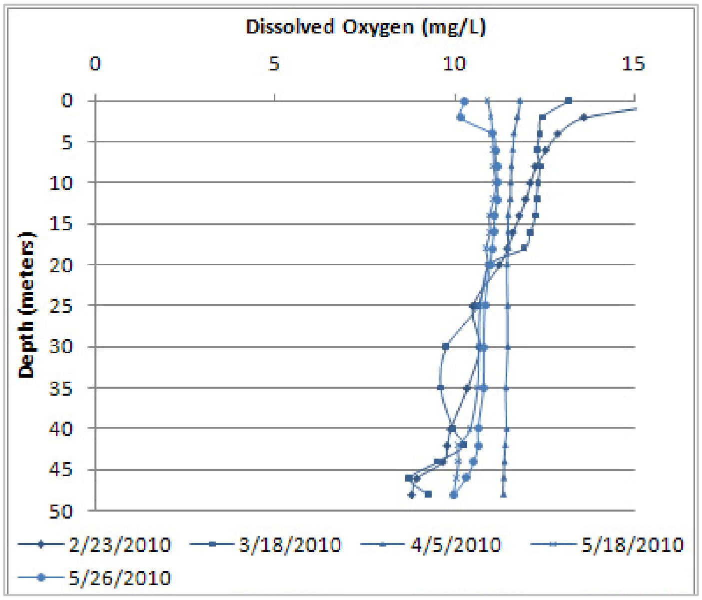
As the growing season progresses, oxygen is consumed primarily by bacterial decomposition of dead algal cells and to a small degree by organisms living in the bottom waters. When algal production is excessive, usually due to high phosphorus levels , oxygen can fall to levels approaching those needed by sensitive, cold water fish such as lake trout and salmon.

Patterns in dissolved oxygen profiles seen at this time of year reflect the relationship between water temperature and its capacity to "hold" oxygen in a dissolved state. Dissolved oxygen concentration in the surface waters decreases as the temperature continues to increase. Concentrations in the deeper cold water begin to decrease due to oxygen consumption, as described above.

Temperature profiles over the course of the year show transitions between seasonal thermal stratification regimes. Layers develop through the spring and summer as the surface waters are warmed and mixed by sun and wind, while the water below remains cold and therefore is more dense. These layers provide different habitat conditions in the open water (off-shore) areas of the lake. As of May 26, the initial stages of thermal stratification are underway, with the surface water warming in response to longer daylight hours and warmer air temperatures. The thermocline will become more pronounced in the coming weeks.



Dissolved oxygen: the concentration of oxygen dissolved in water. Colder water can dissolve a greater amount of oxygen than warm water.



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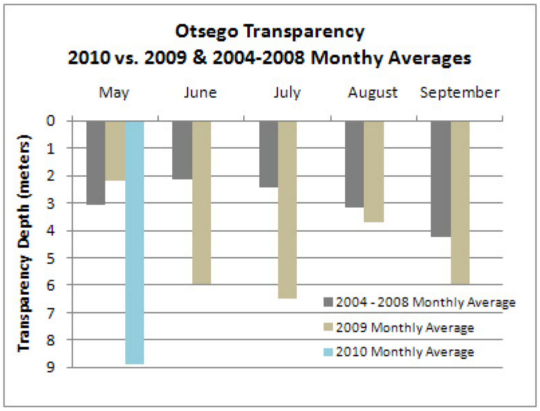
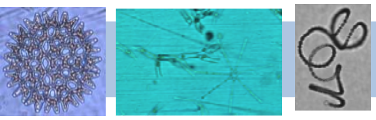
OTSEGO COUNTY CONSERVATION ASSOCIATION

ALGAE, TRANSPARENCY & THE FOOD WEB

Algae are primary producers, serving as the base of the lake food web. The amount of algae in a system determines the amount of energy available to the ecosystem, and thus the amount living mass that it will produce. The algal population is routinely assessed with 2 common methods: *transparency*, which is an indirect assessment of algal density based on water clarity, and *chlorophyll a* concentration, which is a pigment common to all plants. Chlorophyll *a* concentration can be used to estimate the amount of algae in a volume of water.

May 2010 transparency has increased markedly compared to the 2009 monthly average and those observed between 2004 and 2008; this increase likely results from the establishment of zebra mussels, which are efficient filter-feeders of algae.





ZOOPLANKTON COMMUNITY & ALEWIFE

Zooplankton are near-microscopic crustaceans, rotifers, and mussel larvae that graze upon algae in the open waters of aquatic environments. Zooplankton are a vital source of food for juvenile fish and planktivores such as Cisco, Alewife, and Lake Whitefish.

The zooplankton community is the main link in the food web between photosynthetic producers and the consuming fish populations, and thus changes in the zooplankton community can have cascading impacts on the rest of the food chain. Alewife are an invasive exotic (not native) fish that efficiently feeds on large-bodied zooplankton. Following the establishment of alewife in Otsego, populations of large zooplankton decreased substantially. Monitoring this important group of organisms will allow us to gauge the success of efforts to manage the alewife population with walleye predation.

From 2007 to the present, alewife abundance has decreased. In 2009 large-bodied zooplankton were more abundant and were larger than in the recent past. So far in 2010, this trend continues, with the abundance and size of these organisms greater than recently observed. This may indicate success of the walleye stocking efforts in reducing alewife populations and in turn, reducing the predatory pressure on the zooplankton community.

DETERMINING AVAILABLE FISH HABITAT

All cold-water organisms have both temperature and oxygen requirements; when considered together, they determine the available habitat, or volume of water, that is suitable for different species. For example, lake trout prefer temperatures up to 10°C (50° F) and may be stressed when dissolved oxygen is less than 6 mg/L. Current profiles for Otsego Lake show that oxygen levels in the cold bottom waters are still sufficient for lake trout populations (see graphs below). Compared to the profile collected in mid-May, available habitat has decreased slightly as surface temperatures have begun to increase. Blue shading indicates suitable habitat available to lake trout.

Though it may appear that lake management efforts target conditions specific to the lake trout population, ideal management programs consider the most sensitive organisms for end results and management goals.