



# Otsego Lake Water Quality Data

August - December 2010



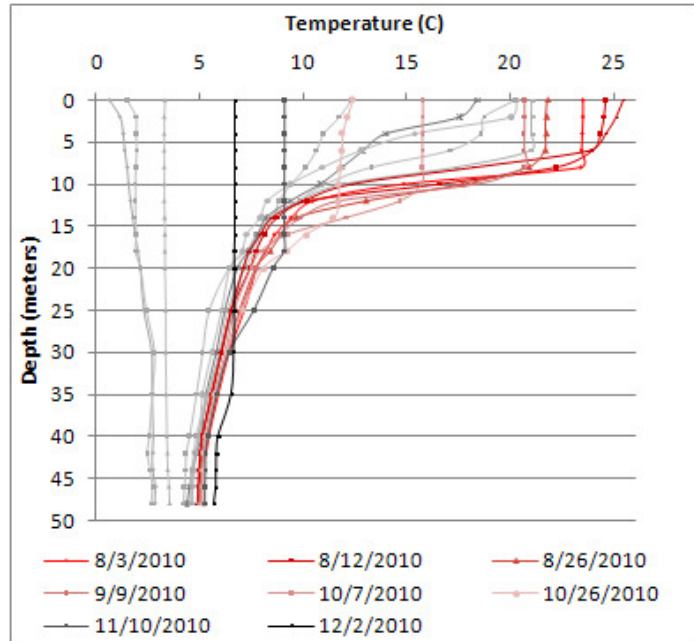
## TEMPERATURE & DISSOLVED OXYGEN PROFILES

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 over-night air temperatures drop and daylight periods decrease, the surface waters begin to cool, as seen from 10/7 through the 12/2 profile, and the thermocline occurs at greater depth. Full turnover will occur when the lake is isothermic, or the temperature is the same throughout the water column. This typically occurs when the water reaches about 4° C (39°F).

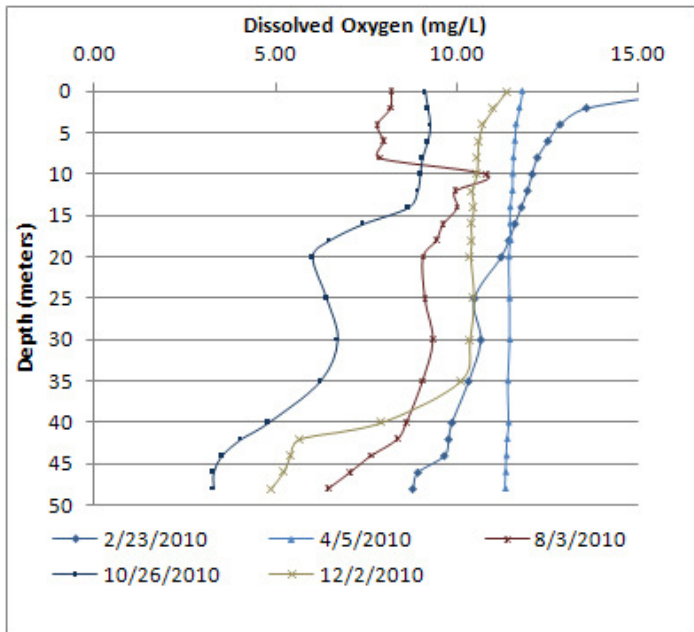
Dissolved oxygen concentrations also follow a predictable progression throughout the year. During spring and fall turnover, when temperatures are constant from the surface to bottom, oxygen is distributed throughout the water column. Once thermal stratification is in place, oxygen in the bottom waters cannot be replenished via atmospheric interactions. In late summer and through fall, as temperatures begin to drop in the epilimnion, oxygen concentrations in this layer increase because water can "hold" more oxygen at colder temperatures.

As the seasons progress from the productive growing season through fall, deep-water 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.

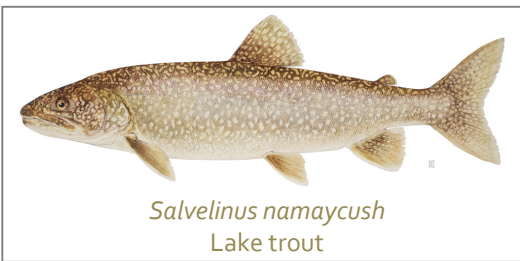
The dissolved oxygen profile seen at this point in the year can vary greatly from year to year, as differences in the timing and severity of algal blooms largely determine oxygen consumption in the hypolimnion. Dissolved oxygen concentrations above 30 meters and below 35 m have reached stressful levels for sensitive species.



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



## LAKE TROUT OF OTSEGO LAKE



*Salvelinus namaycush*  
Lake trout

Image Credit:

NYS Department of Environmental Conservation

Otsego Lake's lake trout population is comprised of both wild and stocked strains of fish. Members of the species generally inhabit the cold deep water of well-oxygenated lakes. In Otsego Lake, lake trout are opportunistic feeders, but most generally consume alewife and chironomid midges. Prior to the introduction of alewife to Otsego, the diet of lake trout was more varied, with research indicating the consumption of yellow perch, sculpins, cisco, and Chironomids. Occasionally trout have been found with other food items in their guts, including largemouth bass and creek chub. More information related to lake trout of Otsego Lake is available in the [BFS's Occasional Paper No.42 by W.T. Tibbitts](#).



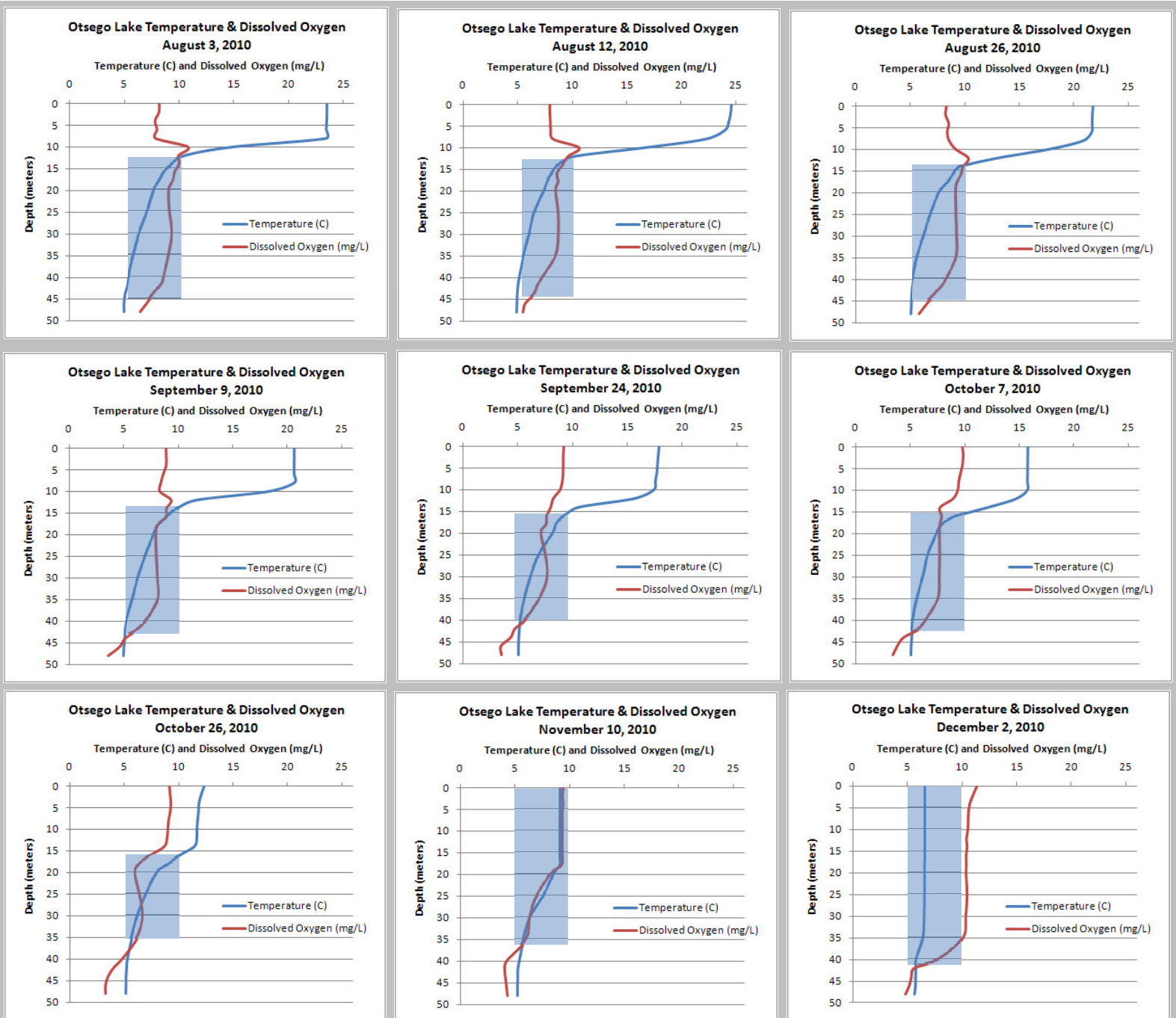
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## Progression of Thermal Stratification from 3 August to 2 December

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 in decline as oxygen is consumed by decomposition of dead algal cells. Compared to profiles collected early in the growing season, available habitat decreased through late October, as would be expected in a normal seasonal fluctuation. Oxygen levels will continue to decline in the deepest waters until fall overturn, usually occurring in December. The profiles collected 10 November and 2 December illustrate an inversion of typical habitat locations; with surface water temperature below 10°C, cold water fish are able to roam in shallower water. As of 2 Dec, the lake is not completely mixing yet. Blue shading indicates suitable habitat available to cold water species.





# Otsego Lake Water Clarity

May – September 2010

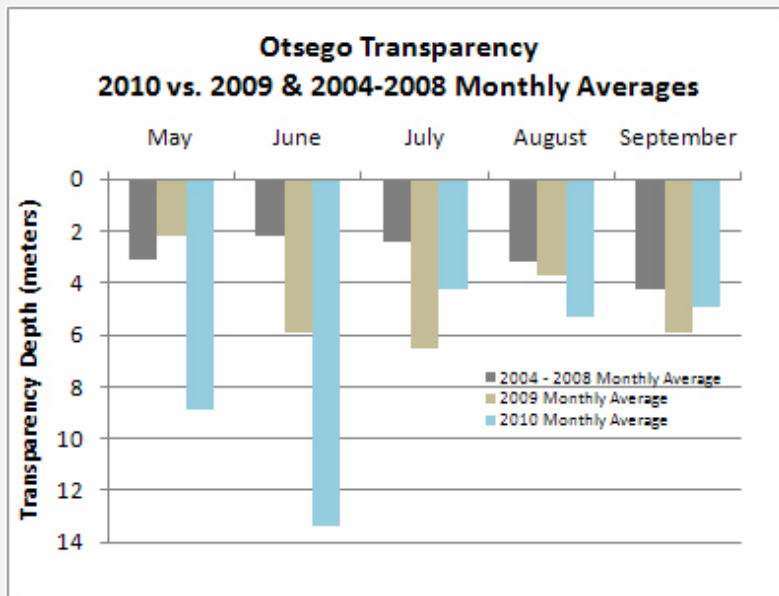


## WATER TRANSPARENCY & ALGAL POPULATIONS

**Secchi Disk Transparency** is a measure of water clarity based on the depth to which one can see a 12-inch black and white disk.

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 can 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.

Average water clarity for the 2010 growing season was greater than observed since 1984. May and June were exceptionally clear months, which drastically influenced the growing season average, as presented in the graph below. In terms of monthly averages, July and September transparencies were lower than 2009, owing to the variability of the system between years.



Year

