IRONDEQUOIT BAY MONITORING SUMMARY 2016-17

Monroe County Department of Environmental Services

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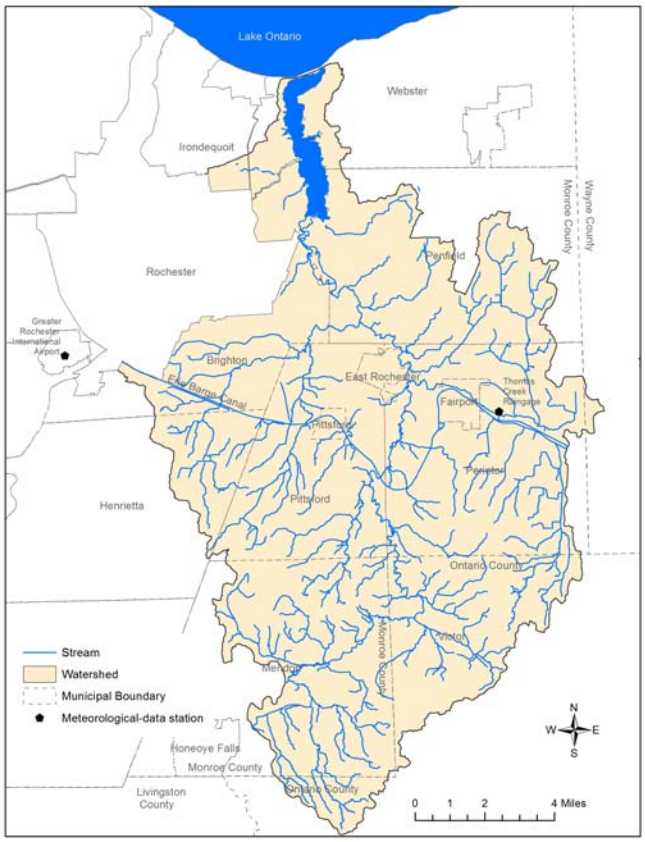
County Executive

Monitoring Highlights

- *Annual monitoring is conducted from March through November each year*
- *Phosphorus levels remain below long term average*
- *Chloride levels are slightly above average*

ANNUAL MONITORING PROGRAM

Irondequoit Bay has 31 years of monitoring records dating back to 1984. The frequency of monitoring has varied over this period ranging from daily, weekly, bi-weekly, monthly and bi-monthly during winter ice cover. For example, in 1993 the bay was monitored on 25 different days at 11 locations. Over time, it was determined that less frequent monitoring was required due to the knowledge gained in previous years. In 2016, staff visited the bay on 17 days and in 2017 monitoring was conducted on 14 days at Station 1, which is located slightly more than a half mile north of the Bay bridge. Current monitoring can be thought of as "strategic monitoring," where staff and resources are utilized to continue the decades long effort to provide the specific data required to determine the health of the bay. This data is also used to help develop effective management strategies for nutrient pollutant reduction in the watershed.



The Irondequoit Bay Watershed

THE IRONDEQUOIT BAY WATERSHED

The Irondequoit Bay watershed covers an area of 169 square miles of which 151 square miles is drained by Irondequoit Creek, which flows into the south end of Irondequoit Bay. Approximately 59 percent of the watershed is urban or suburban, and about 26 percent is agricultural or vacant land. The upstream (southern) part of the basin is dominated by forest and agricultural areas but is becoming increasingly developed. The watershed has been the subject of numerous water-quality studies in response to public concern over the sediment and nutrient loads of phosphorus and nitrogen entering Irondequoit Bay. It is estimated that 15 to 20 tons of phosphorus enters the bay each year from various sources. 50 to 70 percent of the annual phosphorus load enters the bay during the period that includes the major seasonal snowmelt and spring rain.

What's Inside

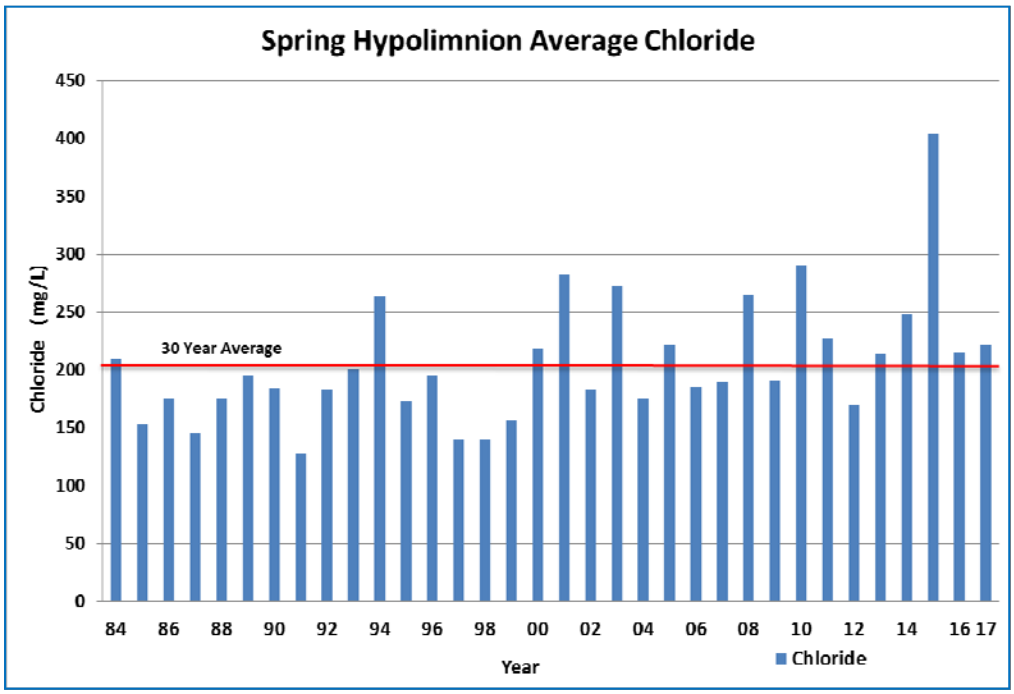
HOW MONITORING IS DONE

The primary tool for bay monitoring is the Hach Surveyor 4a Hydrolab. The hydrolab is a multi-parameter probe that is lowered into the water to take readings at various depths to create a "profile." Every monitoring visit to the bay includes a hydrolab profile along with station observations. Physical observations are recorded each trip that include air temperature, wind direction, cloud cover and water clarity (secchi disk).
During the hydrolab profile, the probe is lowered into the water and the readings for the various parameters are recorded. Water samples are also collected at increasing depths during the profile for chemical analysis. The samples are taken to the Monroe County Environmental Lab. The lab is a NY State certified laboratory for environmental samples and wastewater.

County staff launching the boat in Irondequoit for monitoring during 2017 high water period

CHLORIDES

Monroe County winters demand an effective and affordable means of de-icing roadways. The primary agent used for this purpose is sodium chloride (road salt), which is composed of 40 percent sodium ions (Na+) and 60 percent chloride ions (Cl-). The annual average hypolimnion chlorides from 1984 – 2017 are shown below. Levels in 2015 eclipsed previous highs by a wide margin. On April 7, 2015 a sample measured 591 mg/L. This was the highest concentration recorded since 1984. The winter of 2015 was unique in that the months of December through March had below average temperatures and no snow melt until early April, which may have been a factor in the high chloride levels. Spring chloride levels in 2016 and 2017 were slightly above the long term average of 205 mg/L.



"Spring chloride levels in 2016 and 2017 were slightly above the long term average"

PHOSPHORUS LEVELS

Definitions:

Epilimnion-
Depth of water from the surface to 6meters

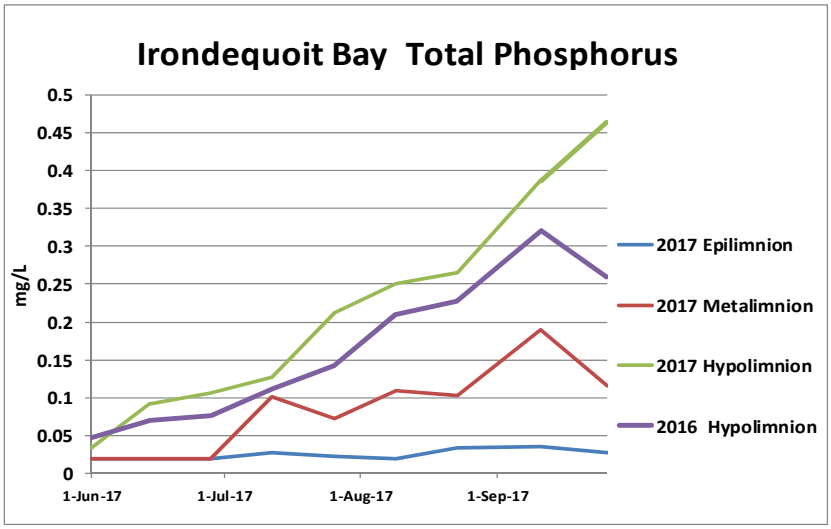
Metalimnion-
Depth of water from 6 to 12 meters

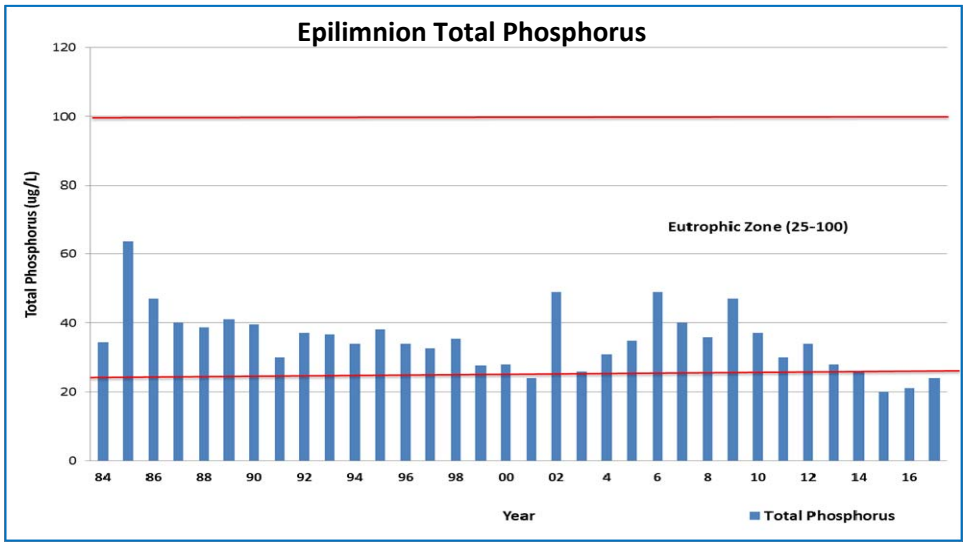
Hypolimnion-
Depth of water from 12 to 23 meters (bottom)

Eutrophication-
The enrichment of bodies of water by inorganic plant nutrients that causes oxygen depletion

During the 2016 and 2017 monitoring seasons, the bay was sampled for total phosphorus and soluble reactive phosphorus from April through November. Hypolimnion phosphorus levels showed a marked increase as the summer season progressed. The target range established by the 1984 Water Quality Management Plan is for epilimnion total phosphorus concentrations between 10-30 ug/L. As the bay begins mixing in the fall, epilimnion phosphorus begins to increase as hypolimnetic dissolved phosphorus makes its way to the surface. Long term trends show lower levels of phosphorus in the epilimnion for the past four years. Determining the amount of phosphorus is important as high levels can result in excessive algae growth known as eutrophication. Management strategies in the watershed are largely focused on reducing the amount of phosphorus entering the bay.

Phosphorus levels in the hypolimnion were elevated in the late summer and fall months of 2017 as compared to 2016



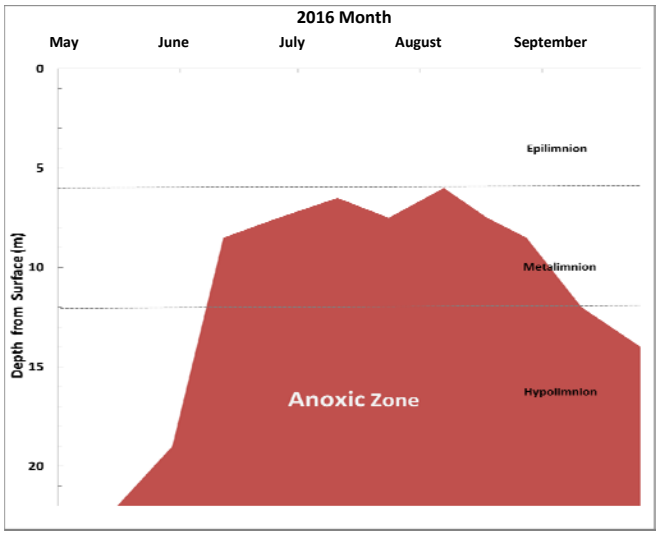


Epilimnion phosphorus levels plotted for over 30 years show the last three years as below the eutrophic zone level

OXYGEN LEVELS

Beginning in 1993 a program was initiated to supplement the deep waters of the bay with oxygen. The purpose of this project is to increase control of phosphorus by both biological and chemical processes leading to improved conditions in Irondequoit Bay.

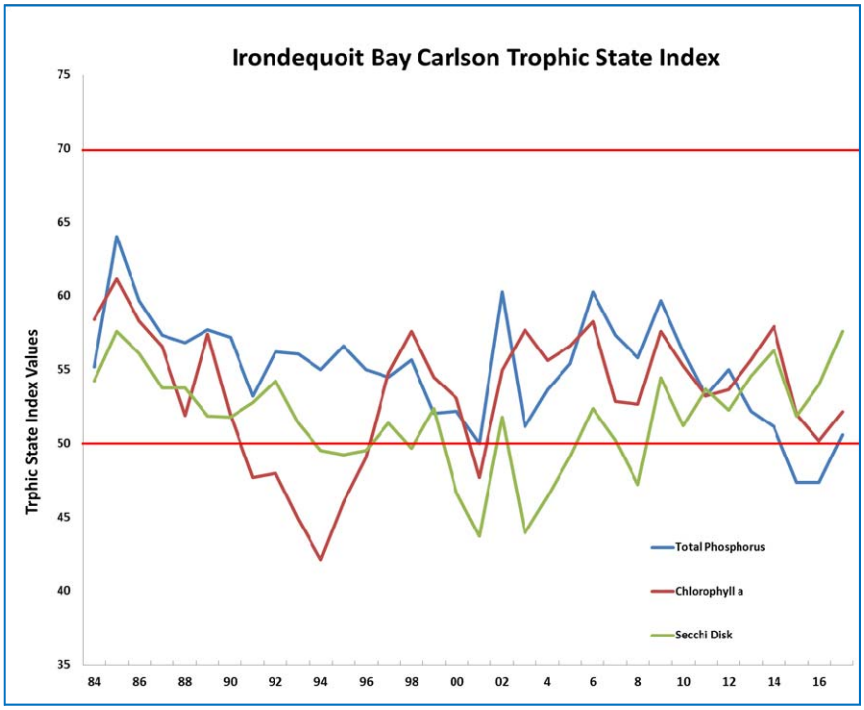
Oxygen supplementation is initiated in mid June when the median dissolved oxygen concentration in the metalimnion shows signs of anoxia (low measured dissolved oxygen, negative oxidation reduction potential), and ended in mid to late September, when nighttime temperature begins to decline enough to cause natural dissolution of atmospheric oxygen. For the months of July, August and September the deep water section is anoxic as shown on the accompanying graph.



2016 Anoxic (no oxygen) zone through the summer months . The Epilimnion surface layer always has oxygen, but the bottom and mixing zone becomes anoxic

TROPHIC STATE

A waterbodies trophic state classification is a reflection of the nutrients and weed growth occurring. The Carlson Trophic State Index (TSI), is a tool used by many, including the US Environmental Protection Agency, for lake trophic categorization. The TSI is based on a unitless scale from 0 to 100, with each 10 point increment representing a doubling of biomass. A TSI score over 50 would indicate eutrophic conditions. The figure shows the TSI scores for Irondequoit Bay for Total Phosphorus, Chlorophyll-a and Secchi Disk, from 1984 to 2017. Most years the bay can be considered eutrophic as the TSI is over 50.



FOR MORE INFORMATION CONTACT:

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