

Irondequoit Bay Monroe County, New York

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January 2010

Irondequoit Bay is approximately 4.2 miles long and 0.6 miles wide and is separated from Lake Ontario by a small barrier beach. Irondequoit Bay had been historically considered hypereutrophic when several sewage plants discharged directly into the bay; however, aggressive restoration by Monroe County has improved the eutrophic state of the bay. Restoration efforts



included sealing the bottom sediments with alum, reducing both point and non-point sources of phosphorus, and the pumping of air into the hypolimnion to reduce phosphorus movement from the sediments into the water. Currently no direct sewage plant discharge is received, and phosphorus levels are approaching goals set by the county. Irondequoit Bay is located within the Rochester embayment, an indentation of the shoreline stretching from Bogus Point to Nine Mile Point. Much of the southern shore of Lake Ontario, the Bay, and the

shoreline of Lake Ontario experience nuisance algae, bacteria, and algal mat development which foul the nearshore waters and limit water recreation. This short report provides a synopsis of data collected monthly from May through September (2003 to 2009) on the water quality of Irondequoit Bay and the lakeside (swimmable depth) of Lake Ontario near the mouth of the bay.

Phosphorus is of concern as it stimulates the growth of plants, causing blooms of algae such as *Cladophora*. Average total phosphorus (TP) ($30.7 \pm 6.3 \mu\text{g P/L}$) and soluble reactive phosphorus (SRP) levels ($4.7 \pm 0.7 \mu\text{g P/L}$, Figs. 1a, b) in the lakeside waters were generally lower than in Irondequoit Bay ($64.5 \pm 8.9 \mu\text{g P/L}$ and $19.6 \pm 7.2 \mu\text{g P/L}$, respectively) (Fig. 1a). Both lakeside and creek TP levels exceeded the NYSDEC ambient guideline of $20 \mu\text{g P/L}$ for phosphorus concentration. Compared to TP concentrations ($129.7 \pm 59.6 \mu\text{g P/L}$) in other Lake Ontario bays and lakeside sites ($62.0 \pm 7.4 \mu\text{g P/L}$) (Table 1), average TP concentrations in Irondequoit Bay ($64.5 \pm 8.9 \mu\text{g P/L}$) and at the Irondequoit lakeside site ($30.7 \pm 6.3 \mu\text{g P/L}$) were lower, while bay and lakeside water TP concentrations were much higher than those of the open ($9.5 \pm 0.7 \mu\text{g P/L}$) offshore waters of Lake Ontario. Both bay and lakeside algae levels (indicated by *chlorophyll a*, Fig. 1c) were dramatically higher in 2009 than in previous years. Levels of phycocyanin (Fig. 1d), an indicator of the nuisance species of blue-green algae, had no clear trends through the study period nor did suspended sediment (TSS, Fig. 1e) nor nitrate (Fig. 1f). Total Kjeldahl nitrogen (TKN) (Fig. 1g) values were consistently higher within Irondequoit Bay than in lakeside waters. Phosphorus levels, however, had no clear annual trends in terms of increase or decrease in the bay or at the lakeside site (Figs. 2a, b). Seasonal bay TP, SRP, and chlorophyll concentrations peaked in July (Figs. 3a, b, c). Bay total suspended solids (sediments) and nitrate

(Figs. 3e, f) decreased during the summer while phycocyanin levels peaked in late September (Fig. 3d).

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Table 1. Average concentrations (2003 to 2009, May through September) and standard errors (S.E.) of total phosphorus (TP), soluble reactive phosphorus (SRP), nitrate, chlorophyll a (Chl a), phycocyanin, total suspended solids (TSS), total Kjeldahl nitrogen (TKN), sodium, and silica.

	TP ($\mu\text{g P/L}$)		SRP ($\mu\text{g P/L}$)		Nitrate (mg/L)		Chlorophyll ($\mu\text{g/L}$)		Phycocyanin ($\mu\text{g/L}$)		TSS (mg/L)		TKN ($\mu\text{g/L}$)		Sodium (mg/L)		Silica (mg/L)	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Lakeside	62.0	7.4	7.0	0.9	0.27	0.01	19.1	4.1	17.8	2.2	33.5	4.8	795	96	13.78	0.19	0.56	0.06
Rivers	83.8	7.0	44.8	5.4	0.57	0.03	6.5	0.8	13.2	3.0	10.5	1.9	559	25	26.65	1.28	1.42	0.15
Embayments	129.7	59.6	15.5	2.0	0.14	0.01	20.0	2.4	237.5	207.6	17.0	5.70	923	70	27.47	1.49	1.29	0.11
Lake Ontario 30m	9.9	0.7	3.1	0.5	0.31	0.02	2.0	0.17	5.5	1.2	0.7	0.14	253.3	21.0	11.46	0.23	0.35	0.05
Lake Ontario 100m	9.5	0.7	5.2	2.1	0.31	0.01	2.6	0.26	6.1	1.3	0.8	0.12	343.4	50.9	11.45	0.24	0.40	0.07

Map of the “North Coast” of New York showing sampling locations for the Lake Ontario Coastal Initiative. Irondequoit Bay watershed is shown in the insert.

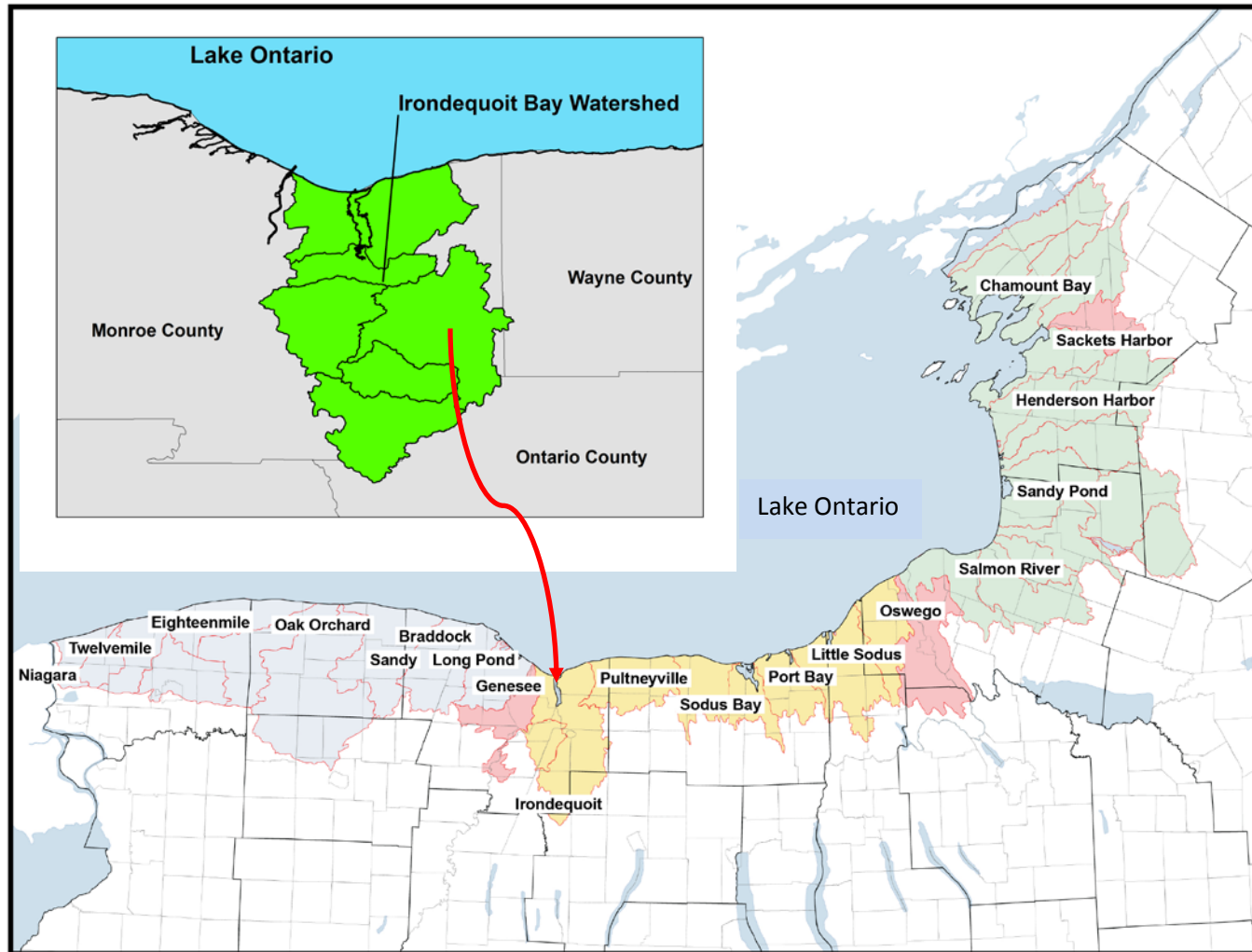


Figure 1. Average (\pm S.E) summer total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen concentrations at the lakeside of Lake Ontario near Irondequoit Bay and at Irondequoit Bay. Surface water samples were taken monthly (May-September) at a 1-meter depth.

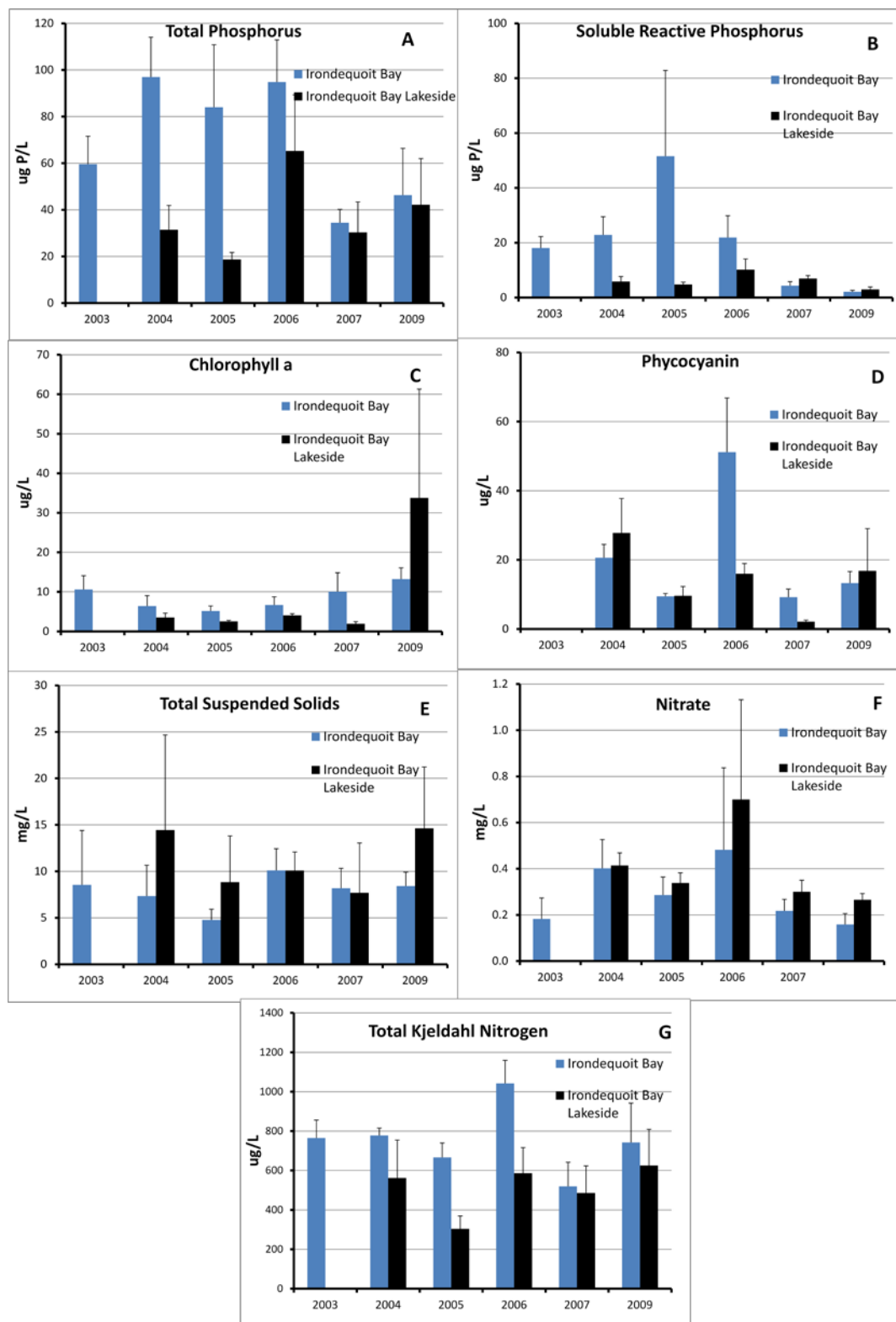


Figure 2. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen at the lakeside of Lake Ontario near Irondequoit Bay.

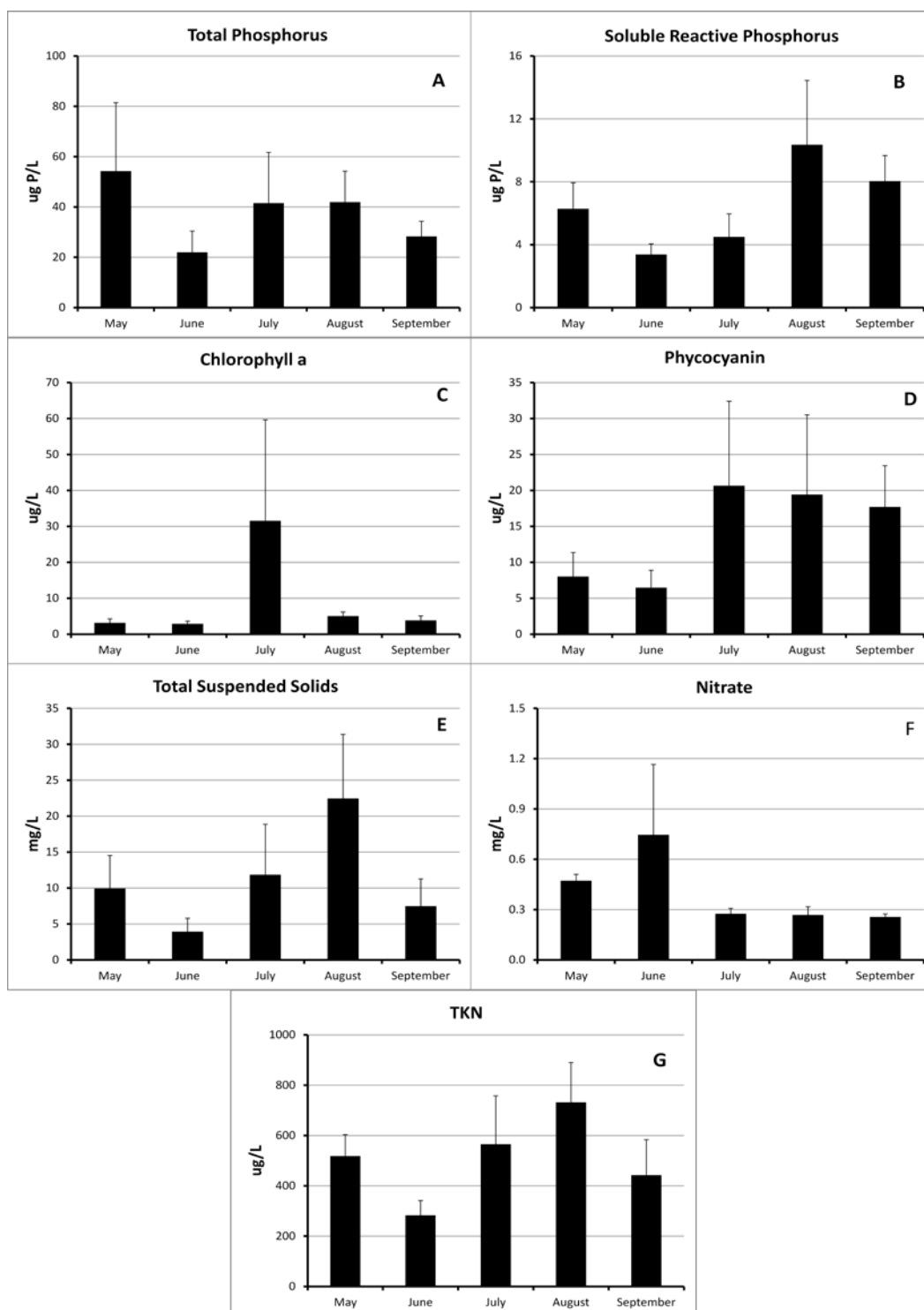


Figure 3. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen in Irondequoit Bay.

