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Braddock Bay Monroe County, New York

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Braddock Bay, located just west of Rochester, NY, is one of Lake Ontario's larger embayments. The bay is open to wave action from Lake Ontario, differentiating it from several other embayments such as Port and Sodus Bays. Braddock Bay is located in the 2,500-acre Braddock Bay Fish and Wildlife Management Area; is a major waterfowl and migratory bird nesting, resting, and feeding habitat; has 541 boat slips; and is a major access point to the lake from the southern shore.



Braddock Bay, Lake Ontario

The Braddock Bay watershed contains a mix of residential development, state park, and protected wildlife areas. Nuisance algae, bacterial abundance, and algal mat development along the southern shoreline of Lake Ontario are major causes of beach closings, fouling the nearshore waters and limiting water recreation. This short report provides a synopsis of data collected monthly from May through September (2003 to 2009) on the water quality of Braddock Bay and the lakeside (swimmable depth) of Lake Ontario east of the entrance to Braddock Bay.

Phosphorus is of concern as it stimulates the growth of plants, causing blooms of algae such as *Cladophora*. Both total phosphorus (TP) and soluble reactive phosphorus (SRP) concentrations in the Bay and at the lakeside site exceeded the NYSDEC ambient guideline of 20 $\mu\text{g P/L}$. Total phosphorus levels in the lakeside waters ($129.6 \pm 36.6 \mu\text{g P/L}$) were generally higher than in the bay water ($77.5 \pm 6.6 \mu\text{g P/L}$, Fig. 1a); however, SRP levels were generally higher in the bay ($30.8 \pm 5.3 \mu\text{g P/L}$) than in lakeside waters ($4.8 \pm 1.1 \mu\text{g P/L}$, Fig.

1b). Compared to TP concentrations in other Lake Ontario bays ($129.7 \pm 59.6 \mu\text{g P/L}$) (Table 1), average TP concentrations in Braddock Bay ($77.5 \pm 6.6 \mu\text{g P/L}$) were lower (Table 1). As might be expected, the bay and lakeside water phosphorus concentrations were much higher than those in open ($9.5 \pm 0.7 \mu\text{g P/L}$) offshore waters of Lake Ontario. No obvious annual trends in lakeside or bay TP (Fig. 1a), SRP (Fig. 1b), algae levels (indicated by *chlorophyll a*, Fig. 1c), nitrate (Fig. 1f), or total Kjeldahl nitrogen (TKN, Fig. 1g) were observed over the study period. Levels of

phycocyanin (Fig. 1d), an indicator of the nuisance species of blue-green algae, and suspended sediment (TSS, Fig. 1e) had elevated levels from 2004 to 2006 in lakeside waters. Seasonally, lakeside TP levels peaked in June and July, while SRP levels increased from May to September (Figs. 2a, b). Lakeside chlorophyll concentrations peaked in July, mimicking TP levels (Fig. 2c). Phycocyanin, TSS, and TKN values showed a similar pattern of low May values, with a spike in June and decreasing levels through August (Fig. 2). Seasonally within Braddock Bay, SRP (Fig. 3b) concentrations increased from May to late summer. No other seasonal trends were observed in the bay (Fig. 3)

References

- Buttner, J.K., J.C. Makarewicz, and T.W. Lewis. 1995. Concentration of selected priority organic contaminants in fish maintained on formulated diets in Lake Ontario waters. *Prog. Fish Cult.* 57:141-146.
- Makarewicz, J.C. 2000. New York's North Coast: A Troubled Coastline. Lake Ontario Embayment Initiative. SUNY Brockport. Available from the Center for Environmental Information. Rochester, NY.

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, 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. Braddock Bay watershed is shown in the insert.

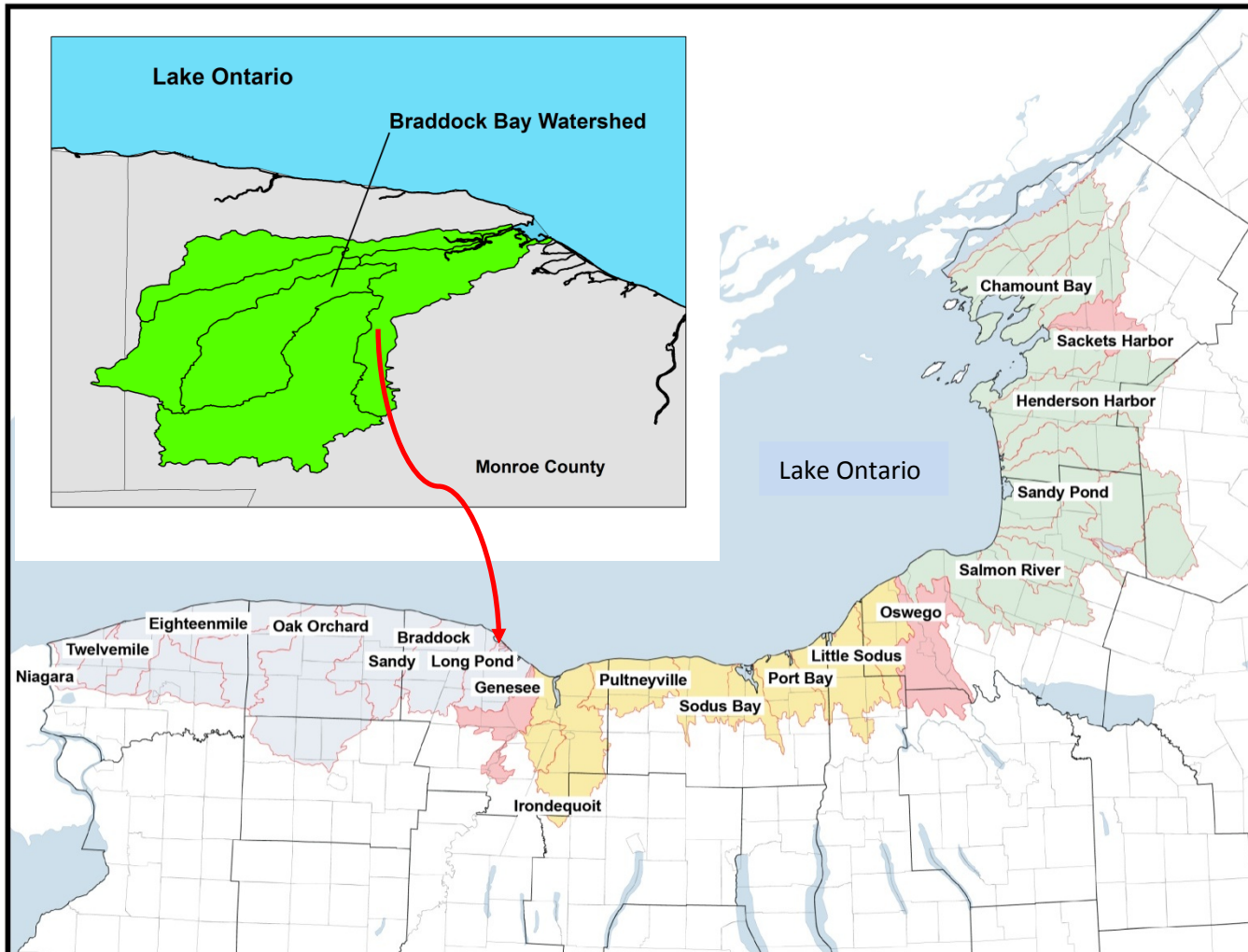


Figure 1. Average (\pm S.E) summer total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen concentrations at the lakeside of Lake Ontario near Braddock Bay and at Braddock Bay. Surface water samples were taken monthly (May-September)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

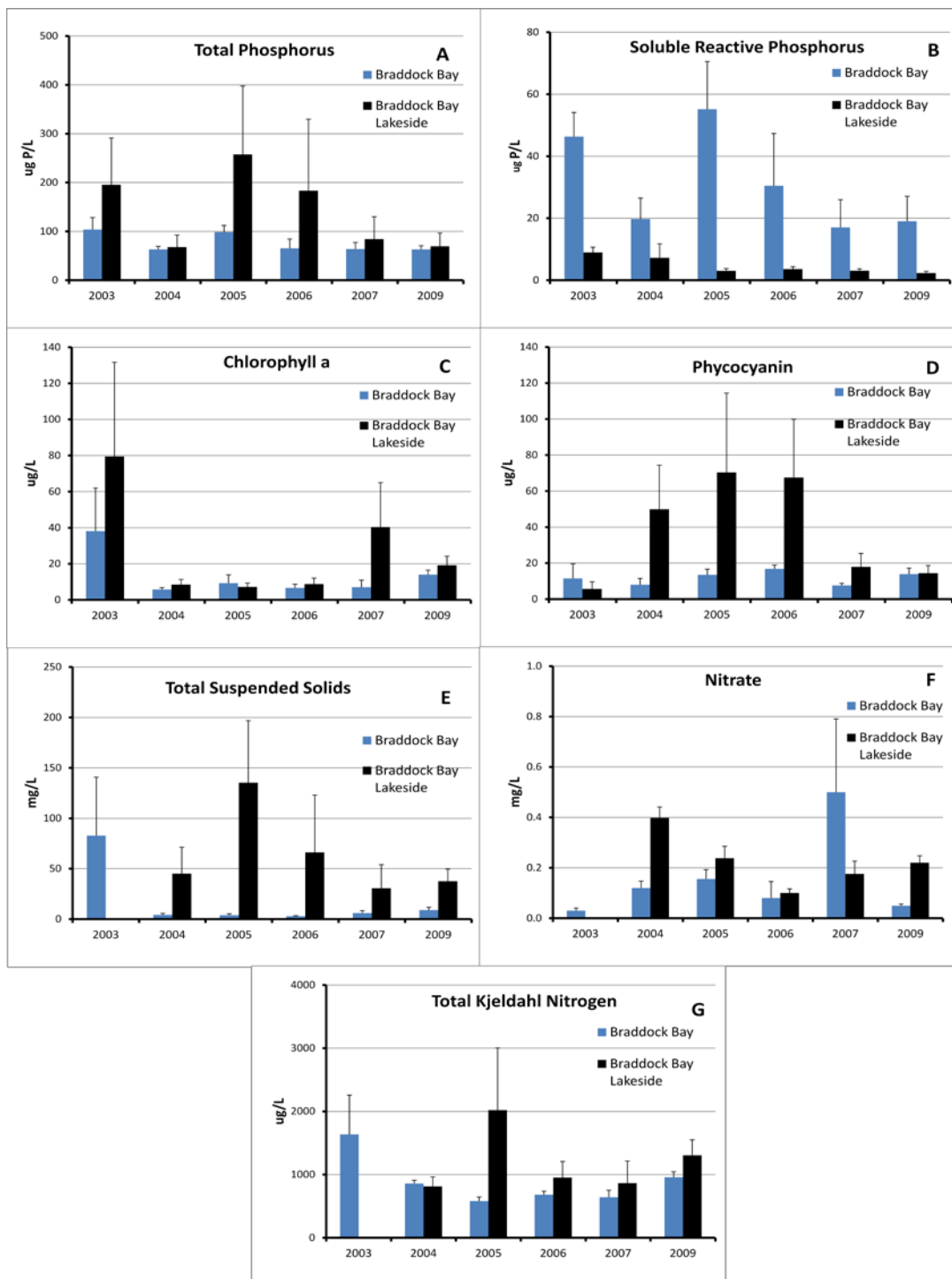


Figure 2. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen at the lakeside of Lake Ontario near Braddock Bay.

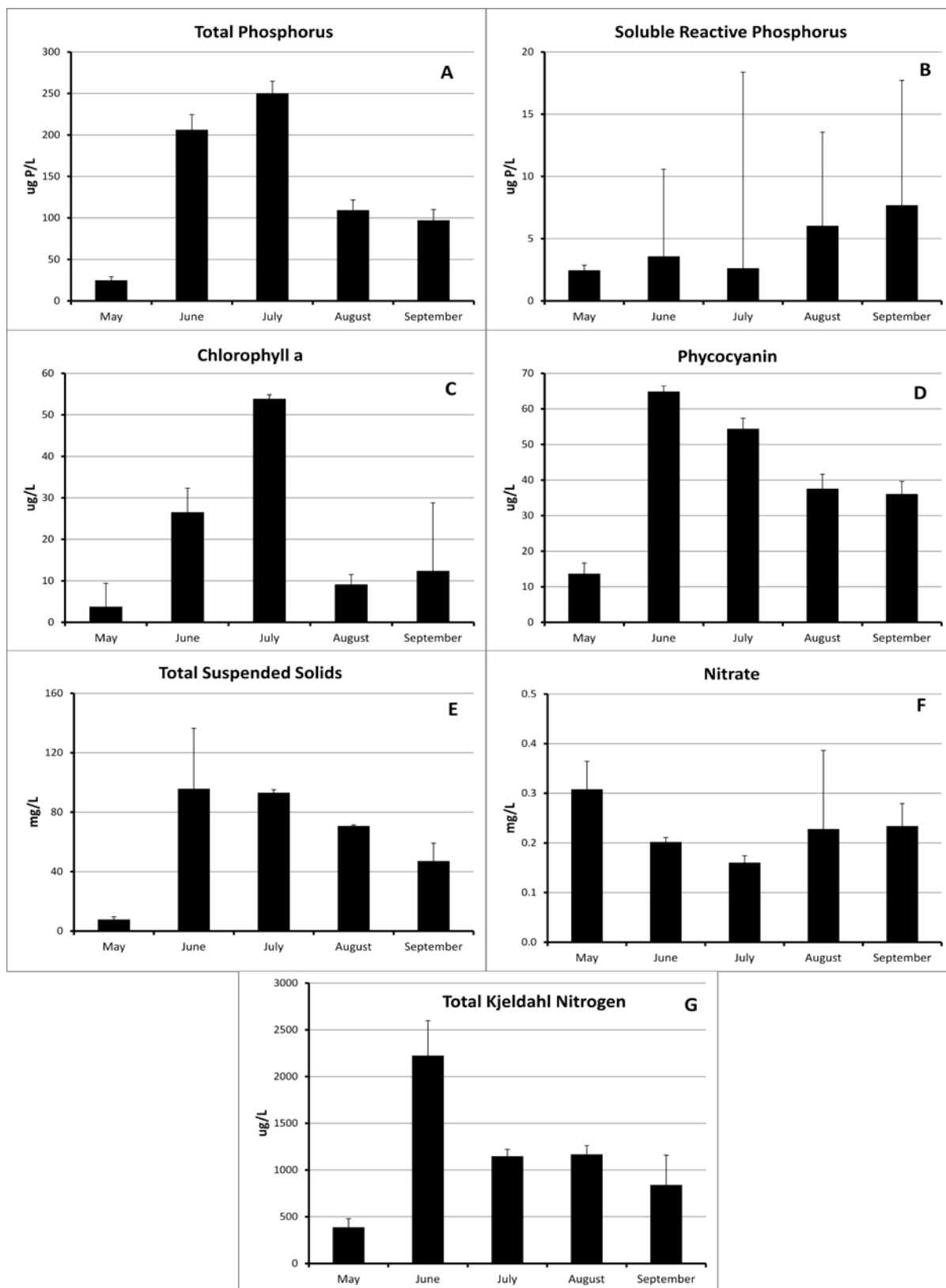


Figure 3. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen in Braddock Bay.

