

Sandy Creek

Monroe/Orleans Counties, New York

Joseph C. Makarewicz and Matthew J. Nowak

The College at Brockport, State University of New York

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Sandy Creek is located in Monroe and Orleans Counties in New York State and drains 89 mi² of land. Surrounding land use is predominantly agriculture, though there are also residential influences. The Orleans County Soil and Water Conservation District through the Water Quality Coordinating Committee (WQCC) has monitored nutrient loss from the watershed through continuous automated monitoring and event sampling. Sandy Creek was identified as



Sandy Creek Plume

moderately polluted, not as pristine as forested watersheds but not as polluted as streams receiving partially treated sewage. Soil loss was highest (75% of total) during precipitation events suggesting that agricultural runoff may play a large role in cultural eutrophication of the creek (Makarewicz 2000). Nuisance algae and algal mat development foul the nearshore waters along the southern shoreline of Lake Ontario and are major causes of beach closings and limited water recreation. This short report

provides a synopsis of data collected monthly from May through September (2003 to 2009) on the water quality of Sandy Creek and the lakeside (swimmable depth) of Lake Ontario near the mouth of the creek.

Phosphorus is of concern as it stimulates the growth of plants, causing blooms of algae such as *Cladophora*. Both lakeside and creek total phosphorus (TP) levels exceeded the NYSDEC ambient guideline of 20 µg P/L for phosphorus concentration. Total phosphorus (27.5±3.8 µg P/L) and soluble reactive phosphorus (SRP) (7.0±1.1 µg P/L) concentrations in the lakeside waters were much lower than Sandy Creek concentrations (TP=116.4±22.8 µg P/L, SRP=65.5±8.0 µg P/L) (Fig. 1a, b) suggesting dilution of creek waters and perhaps uptake by algae. Despite this dilution effect, Sandy Creek is impacting the nearshore waters of Lake Ontario. Sandy Creek deposits approximately 39.7 pounds of phosphorus per day and 436.5 pounds of nitrate per day into Lake Ontario (Makarewicz and Lewis 1999). Compared to TP concentrations in other Lake Ontario streams (83.8±7.0 µg P/L), average TP concentrations in Sandy Creek (116.4±22.8 µg P/L) were much higher, while the nearby lakeside waters (27.5±3.8 µg P/L) had concentrations lower than the average Lake Ontario lakeside site (62.0±7.4) (Table 1). Lakeside and creek concentrations were higher than in the open (9.5±0.7 µg P/L) offshore waters of Lake Ontario. Total phosphorus levels (Fig. 1a) show no clear annual trends; however, SRP (Fig. 1b) appeared to be decreasing within Sandy Creek since 2003. Levels of algae (indicated by *chlorophyll a*, Fig. 1c), phycocyanin, (Fig. 1d), an indicator of the nuisance species of blue-green algae, and suspended sediment (TSS, Fig. 1e) were significantly higher in 2006 than in other years, suggesting the possibility that a rain event biased the data. Annual nitrate levels (Fig. 1f) appeared to be decreasing within Sandy Creek, while total Kjeldahl nitrogen (TKN, Fig. 1g) had no trends through the study period. Seasonally, lakeside phosphorus (Figs.

2a, b), chlorophyll, phycocyanin, TSS, and nitrate (Figs. 2c, d, e, f) levels were elevated in the month of July. Total Kjeldahl nitrogen levels appeared to increase from May through September (Fig. 2g). Seasonally, Sandy Creek phosphorus (Figs. 3a, b), phycocyanin, and nitrate (Figs. 3d, f) levels were elevated in the month of July with a secondary peak in September. A peak in total suspended solids occurred in September.

References

- 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.
- Makarewicz, J.C., and T.W. Lewis. 1998. Nutrient and sediment loss from watersheds of Orleans County. Orleans County Soil and Water Conservation District. Available from Drake Memorial Library, SUNY Brockport, Brockport, NY.
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- Makarewicz, J.C., T.W. Lewis, and R. Burton. 1990. Chemical analysis and nutrient loading of Salmon Creek, Otis Creek, Black Creek, Spencerport Sewage Treatment Plant, and Precipitation Falling in Western Monroe County. Available from Drake Memorial Library, SUNY Brockport. Brockport, 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 (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. Sandy Creek watershed is shown in the insert.

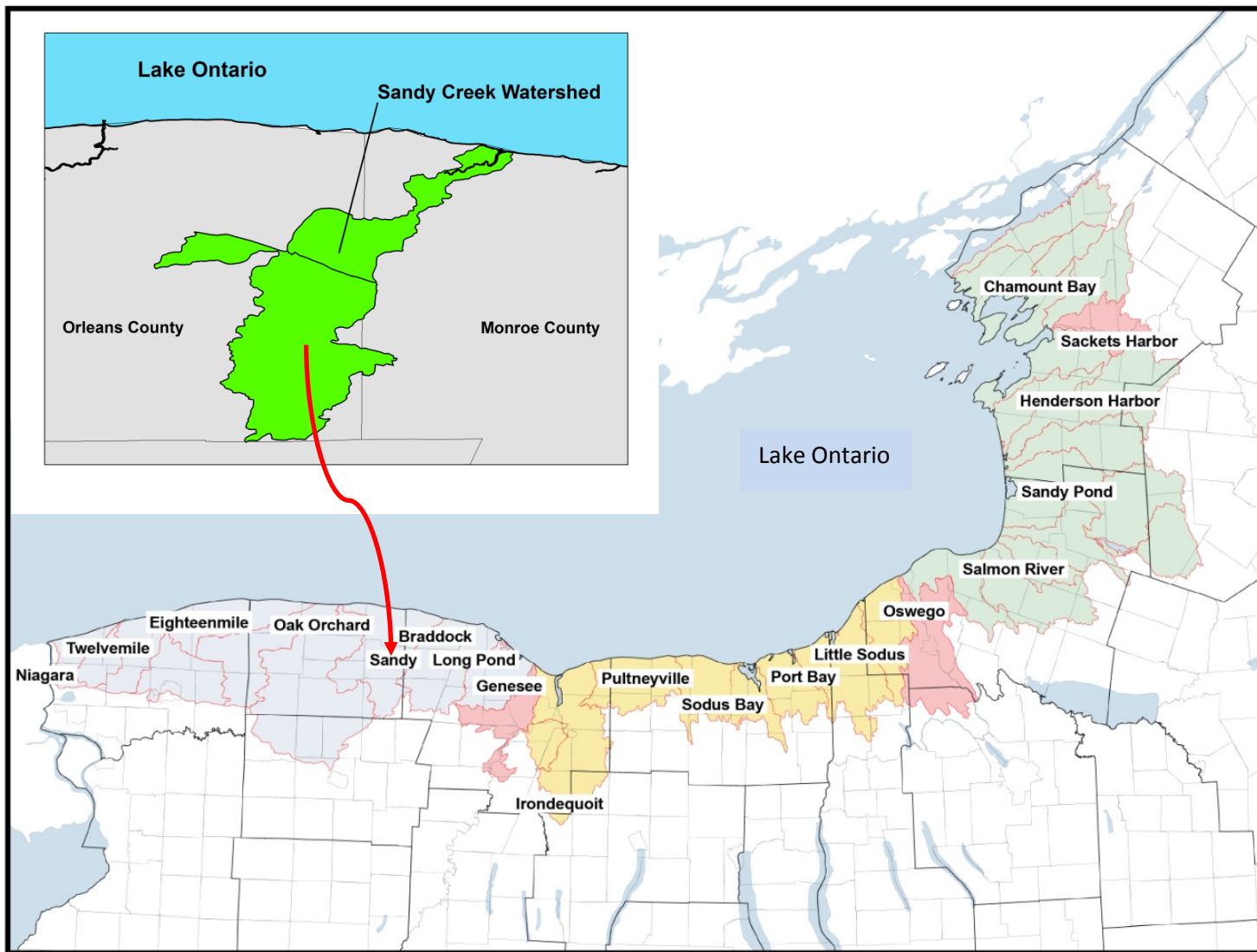


Figure 1. Average (\pm S.E) summer total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen concentrations at the lakeside of Lake Ontario near Sandy Creek and Sandy Creek. Surface water samples were taken monthly (May through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

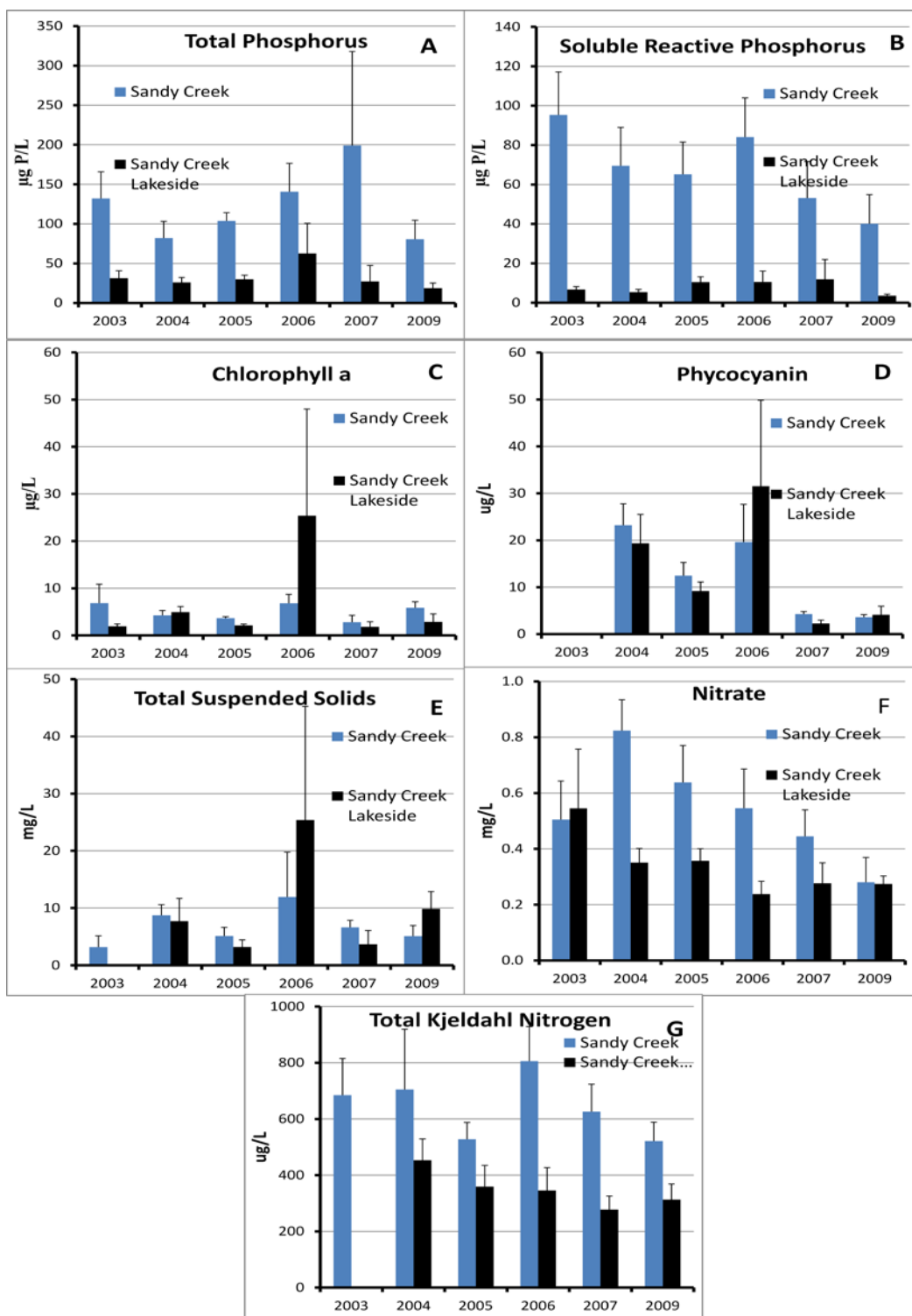


Figure 2. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen at the lakeside of Lake Ontario near Sandy Creek.

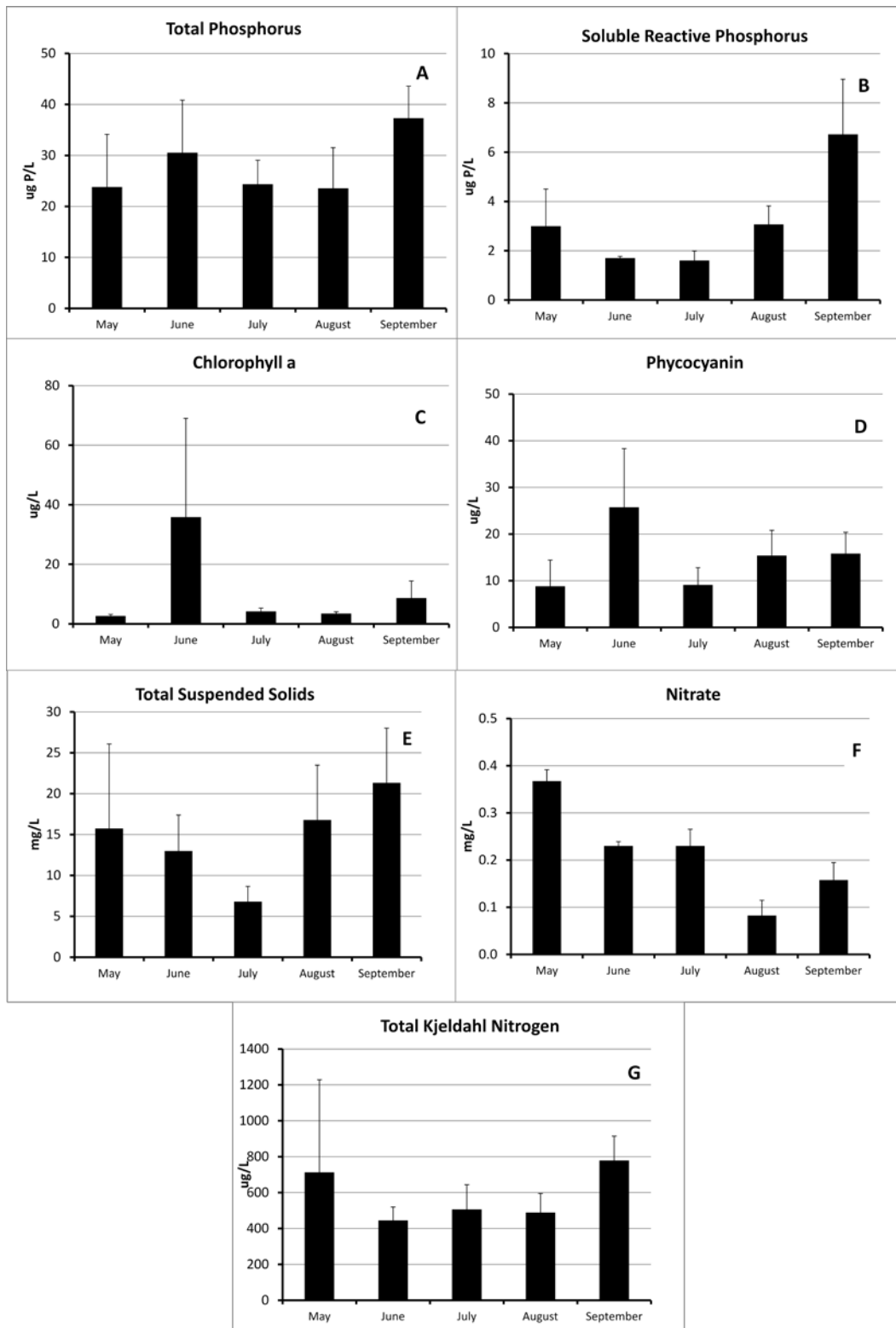


Figure 3. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen in Sandy Creek.

