

Oswego River Oswego County, New York

Joseph C. Makarewicz and Matthew J. Nowak
The College at Brockport, State University of New York
January 2010

The Oswego River is the second largest river flowing into Lake Ontario, draining 5,100 square miles of land. The watershed includes all of Seneca County, most of Onondaga, Cayuga, Tompkins, Schuyler, Yates and Ontario Counties, and large portions of Oswego, Oneida, Madison and Wayne Counties in New York State. Most of the New York Finger Lakes are in



Oswego Harbor, NY

the drainage basin of the Oswego River, and land use ranges from heavy agriculture in the Finger Lakes region to urban development in Oswego. The Oswego River Harbor is the largest Oswego County embayment and is vital to the shipping industry due to its connection to the Erie Canal through the Oswego River Canal. New York State's Coastal Zone Management Program has also designated Oswego Harbor and the segment of the river behind the Varick Dam as significant Coastal Fish and Wildlife

Habitat. Major water quality concerns include legacy industrial discharges in the Syracuse and Onondaga Lake area, sewer overflows in Syracuse, and nonpoint source pollution sources primarily from agricultural runoff (NYSDEC 2009). This short report provides a synopsis of data collected monthly from May through September (2003 to 2009) on the water quality of the Oswego River and the lakeside (swimmable depth) of Lake Ontario near the river.

Phosphorus is of concern as it stimulates the growth of plants, causing blooms of algae such as *Cladophora*. The Oswego River total phosphorus (TP) concentrations (49.5 ± 4.5 $\mu\text{g P/L}$) exceeded the NYSDEC ambient guideline of 20 $\mu\text{g P/L}$ for phosphorus concentration, while the lakeside site (18.0 ± 3.7 $\mu\text{g P/L}$) was slightly below this level (Fig. 1). River TP concentrations (49.5 ± 4.5 $\mu\text{g P/L}$) were lower than average TP concentrations in other Lake Ontario rivers and creeks (83.8 ± 7.0 $\mu\text{g P/L}$) and lakeside sites (62.0 ± 7.4 $\mu\text{g P/L}$) but higher than concentrations at the offshore (9.5 ± 0.7 $\mu\text{g P/L}$) waters (Table 1). Oswego River soluble reactive phosphorus (SRP) levels (25.8 ± 3.9 $\mu\text{g P/L}$) were significantly higher than at the lakeside site near Oswego (2.8 ± 0.7 $\mu\text{g P/L}$). Concentrations of algae (indicated by *chlorophyll a*, Fig. 1c), phycocyanin (Fig. 1d), an indicator of the nuisance species of blue-green algae, and nitrate (Fig. 1f) were consistently higher in Oswego River waters than in lakeside waters near Oswego. Within the Oswego River, annual summer chlorophyll levels appeared to have increased from 2005 through 2009 (Fig. 1c), while TP and nitrate levels decreased (Figs. 1a, f). No clear trends were observed for suspended sediment (TSS, Fig. 1e) nor for total Kjeldahl nitrogen (TKN, Fig. 1g). Seasonally, lakeside TP (Fig. 2a), chlorophyll levels (Fig. 2c), phycocyanin (Fig. 2d), and TSS (Fig. 2e) appeared to increase from May through September, while nitrate levels (Fig. 2f)

decreased. In the Oswego River, TP and SRP concentrations peaked in July (Figs. 3a, b), while chlorophyll and TKN concentrations increased from May through September (Figs. 3c, g). Nitrate concentrations were lower in the latter half of the summer than in the early summer (Fig. 3f).

References:

- Lassman, D. 2001. Oswego Harbor Image. The Post-Standard.
- 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.
- New York State Department of Environmental Conservation. The Oswego River Remedial Action Plan: Past, Present and Future. Albany, NY.
- New York State Department of Environmental Conservation. Oswego River/Finger Lakes Watershed. 2009. Available at: <http://www.dec.ny.gov/lands/48023.html>.
- United States Geological Survey. Managing the Water Resources of the Oswego River Basin in Central New York. 2002. Available at: <http://ny.water.usgs.gov/pubs/fs/fs18099/fs180-99.pdf>.

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

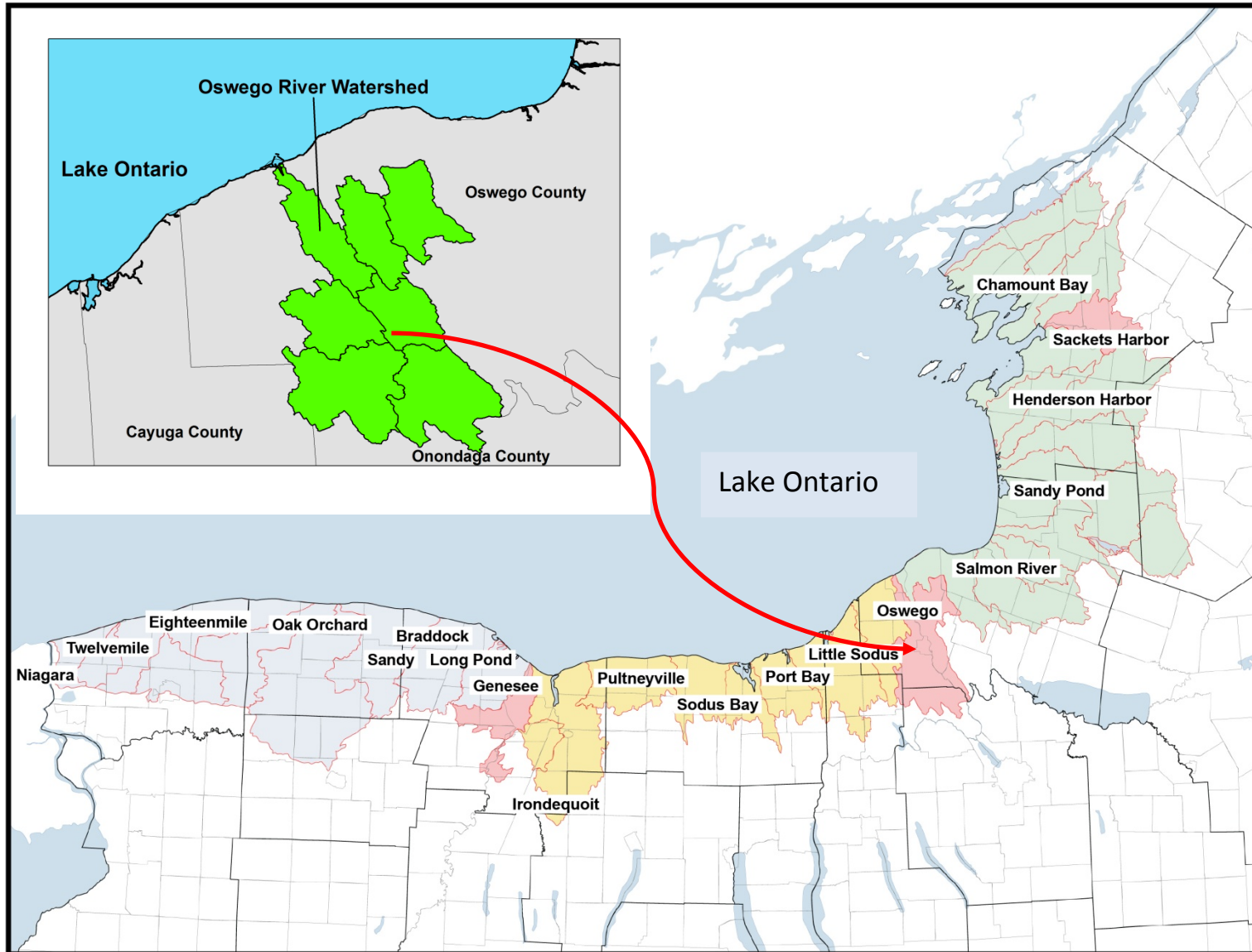


Table 1. Average concentrations (2003 to 2009, May through September) and standard errors (S.E.) of total phosphorus (TP), soluble reactive phosphorus (SRP), nitrate, Chlorophyll a (Chl a), phycocyanin, total suspended solids (TSS), total Kjeldahl nitrogen (TKN), sodium, and silica.

	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

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 the Oswego River and at the Oswego River. Surface water samples were taken monthly (May-September) at a 1-meter depth.

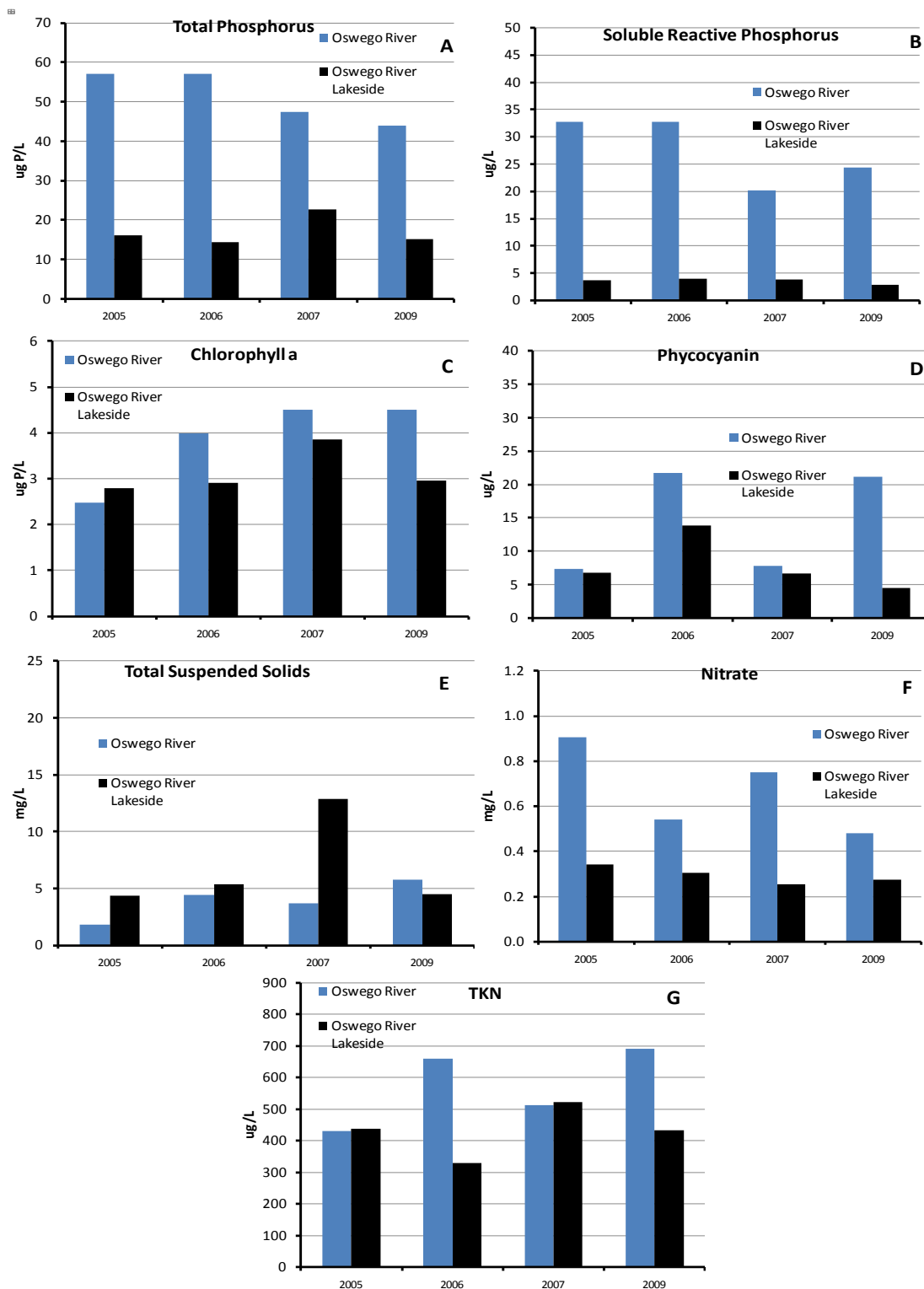


Figure 2. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen at the lakeside of Lake Ontario near the Oswego River.

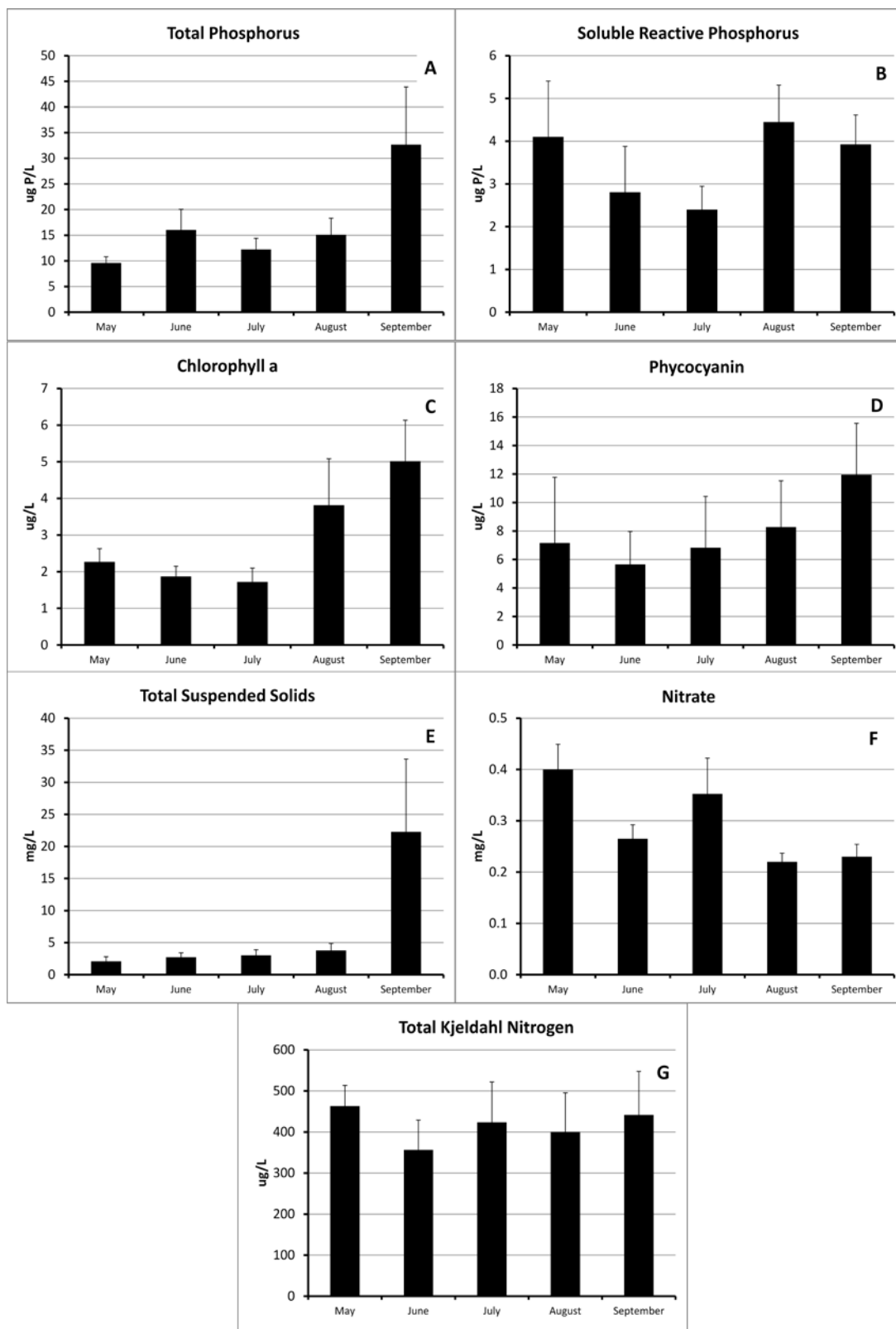


Figure 3. Average (\pm S.E) seasonal concentrations of total phosphorus, soluble reactive phosphorus, chlorophyll a, phycocyanin, total suspended solids, nitrate, and total Kjeldahl nitrogen in the Oswego River.

