St. Clair/Detroit River

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St. Clair – Detroit Corridor

St. Clair River	
Maximum Depth	25 feet 7.6 meters
Land Drainage Area	6,520 sq. mi. 16,886.7 sq. km.
Shoreline Length	55.92 miles 89.9 km
Retention Time	21 hours

Lake St. Clair	
Maximum Depth	27 feet 8.2 meters
Land Drainage Area	4,890 sq. mi. 12,665 sq. km.
Shoreline Length	130 miles 209.2 km
Retention Time	9 days

Detroit River	
Maximum Depth	50 feet 15.24 meters
Land Drainage Area	807 sq. mi. 2,090.1 sq. km.
Shoreline Length	58.35 miles 93.9 km
Retention Time	20 hours

Contaminants

St. Clair River Sediment Cleanup


Detroit WSD CSO Basin

Turkey Creek Sediment Cleanup

Biotic Communities


St. Clair Delta


Phragmites in Lake St. Clair


Soft Shoreline, Detroit River


Sturgeon Reef Construction, Detroit River

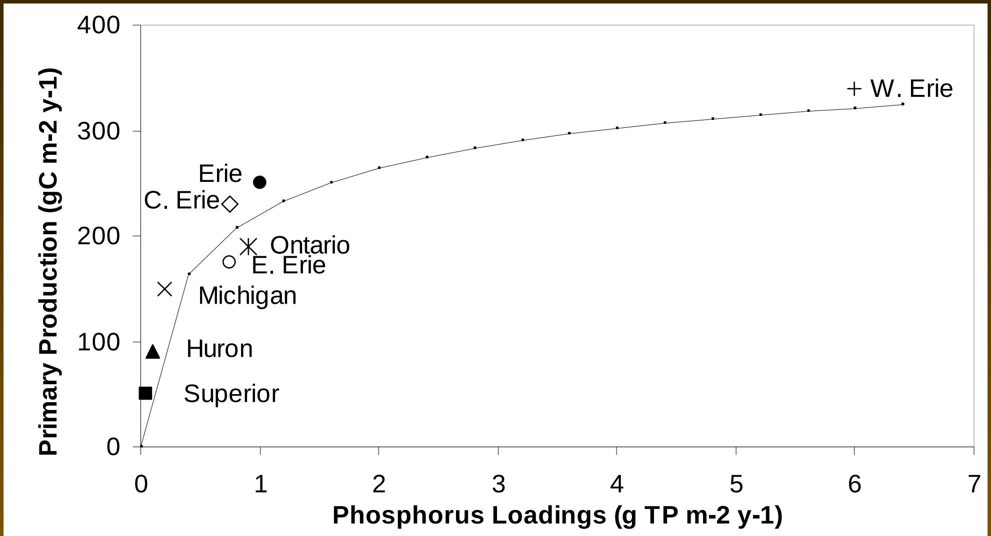
Human Health and Land Use

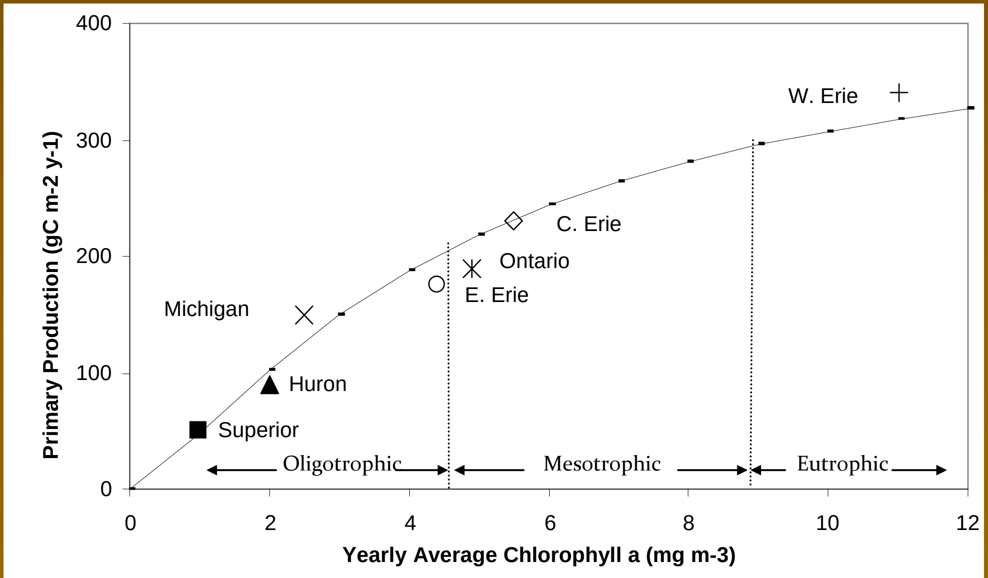
Photo: Lynn Betts, NRCS

Huron-Erie Corridor and Eutrophication

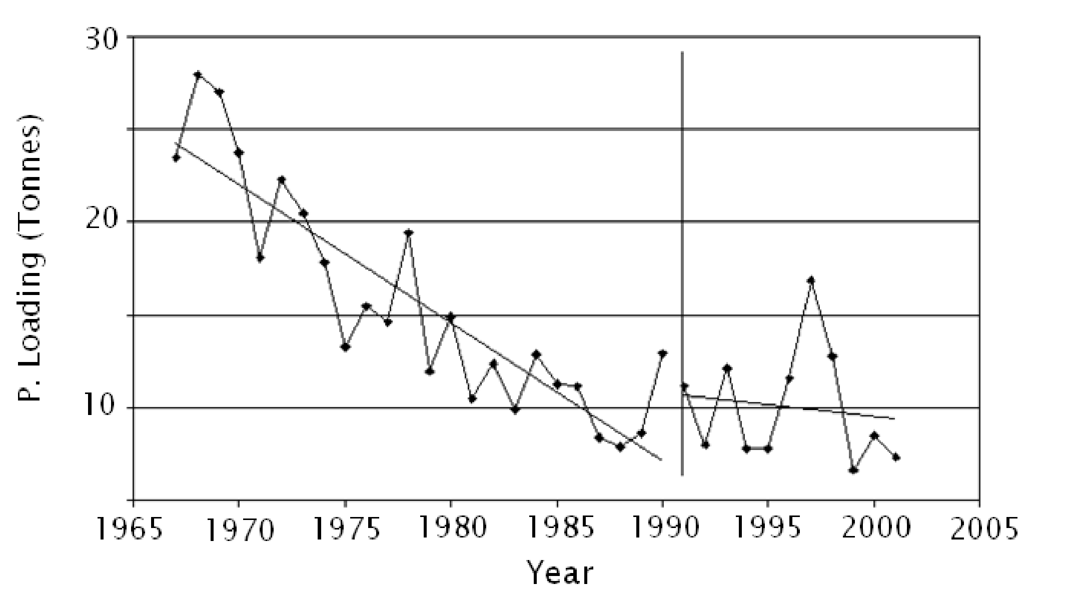
- Lake Erie “Dead” from eutrophication and P identified as the limiting nutrient.
- Detroit River is the largest single P source to Lake Erie.
- Lake Erie target load set at 11 tonnes/year based on Vollenweider model.
- Model predicts primary production and algal biomass will decline to mesotrophic conditions with decreased P loads.

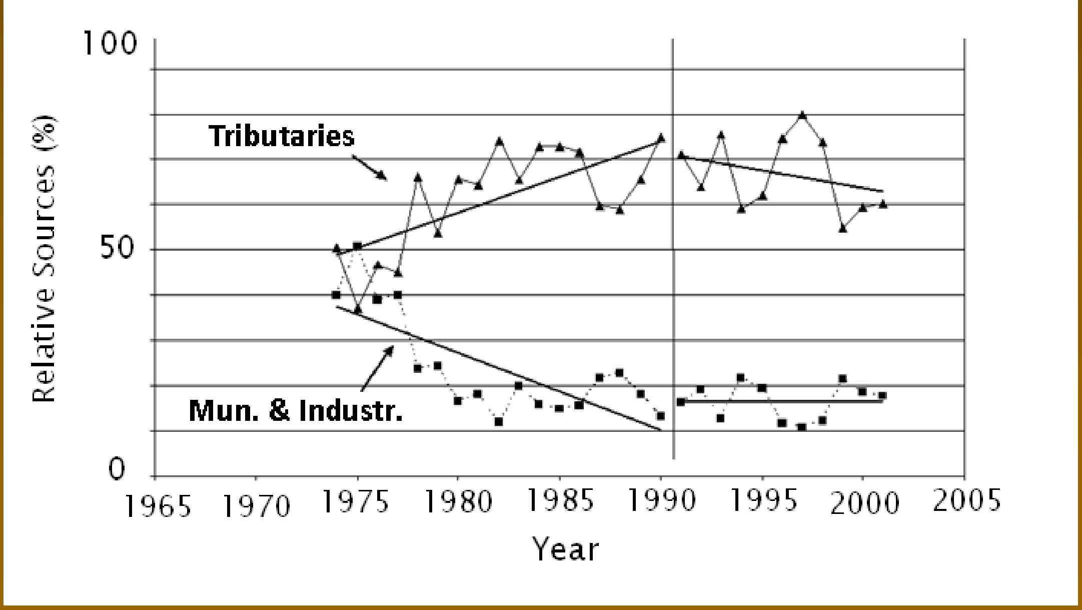
Eutrophication Models Vollenweider, Munawar and Stadelmann (1974)



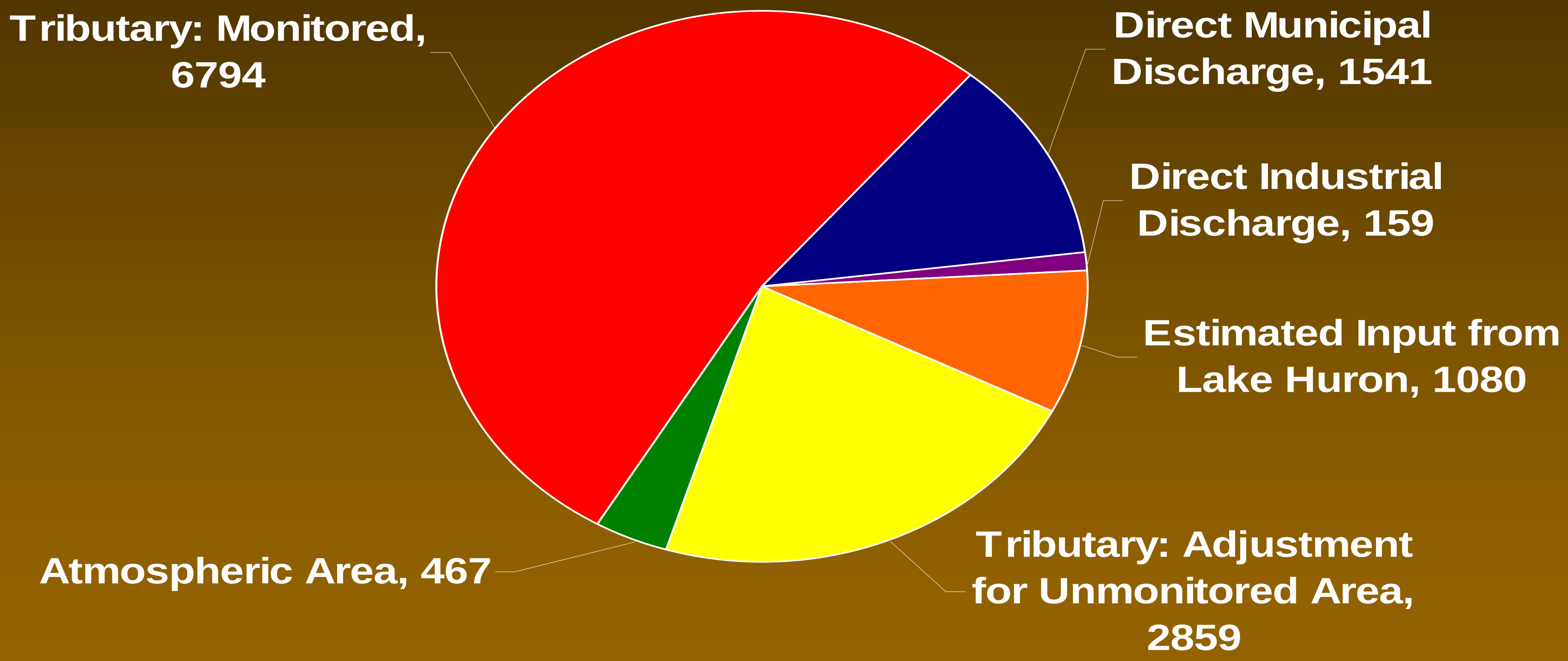


Dolan and McGunagle (2005)





1990 Estimated Phosphorus Loading Data from Lake Erie

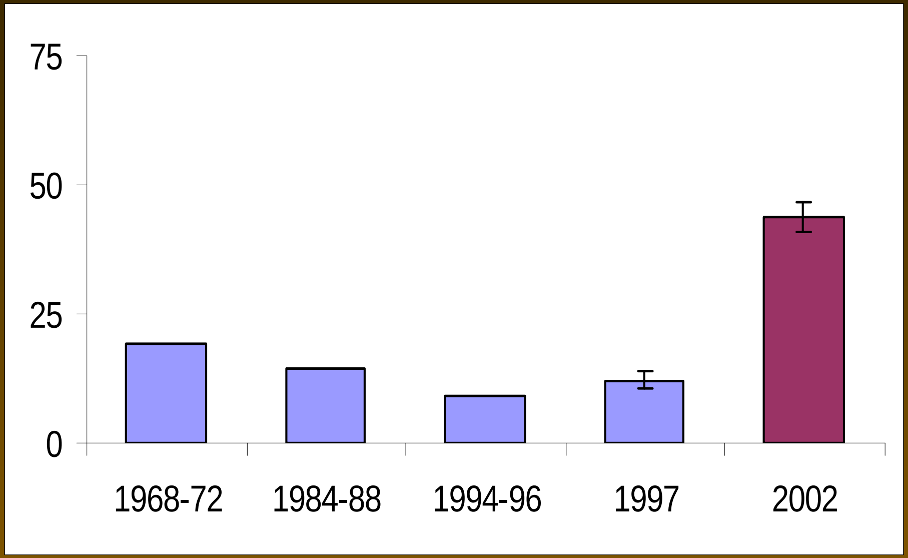


Total: 12899
Target Load: 11000
(Annex 3, 1978 GLWQA)

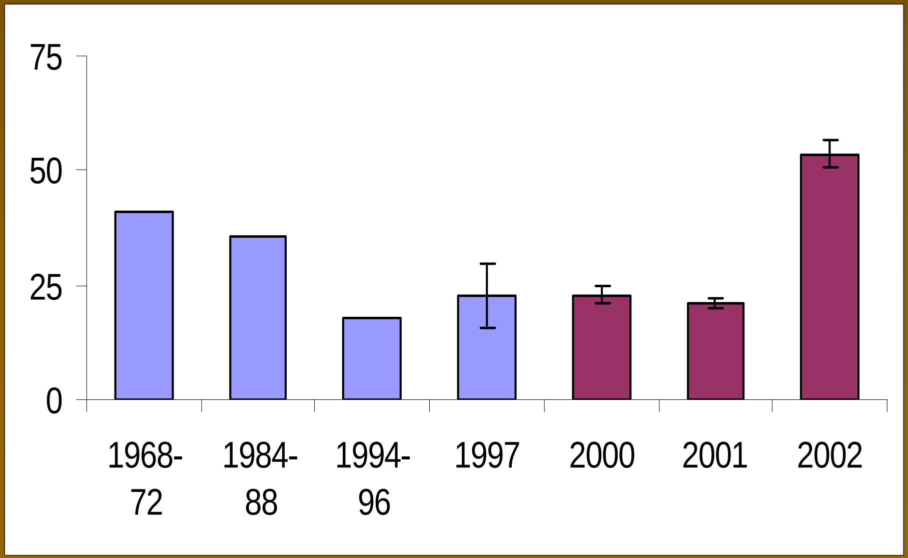
From Dolan, 1993. J. Great Lakes Res.

Mean Total Phosphorus (µg l^{-1}) June to September

Central



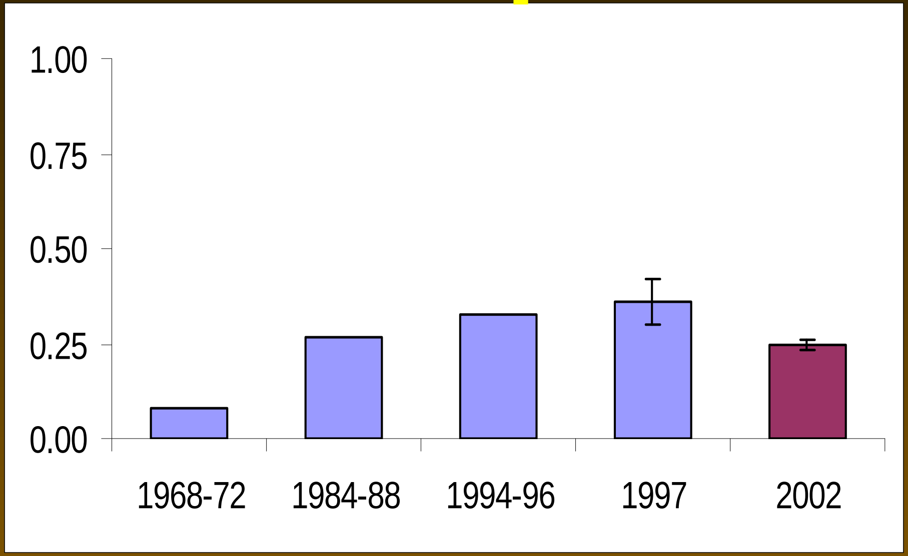
West



Sources: 1968-1997 from Charlton et al. (1999); 2000-2001 from Fitzpatrick (2003)

Mean Nitrate (mg l^{-1}) June to September

Central



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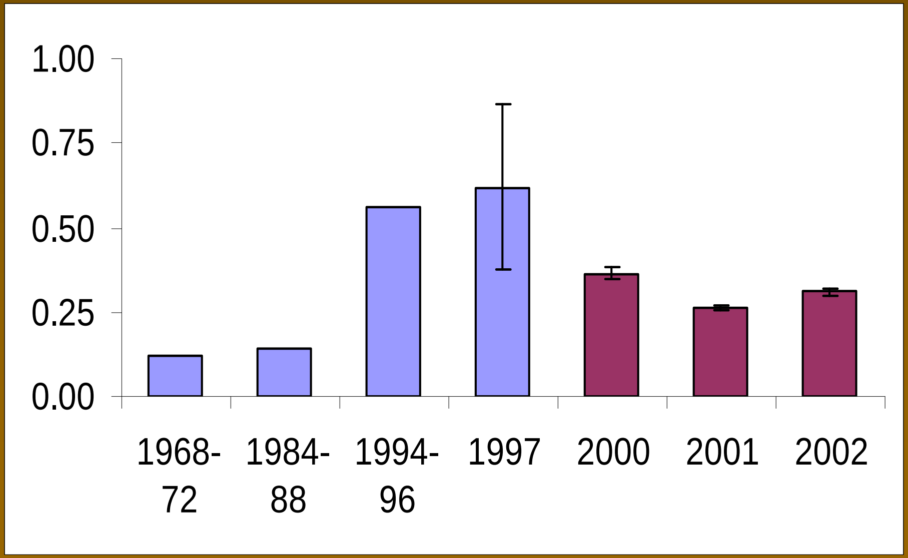
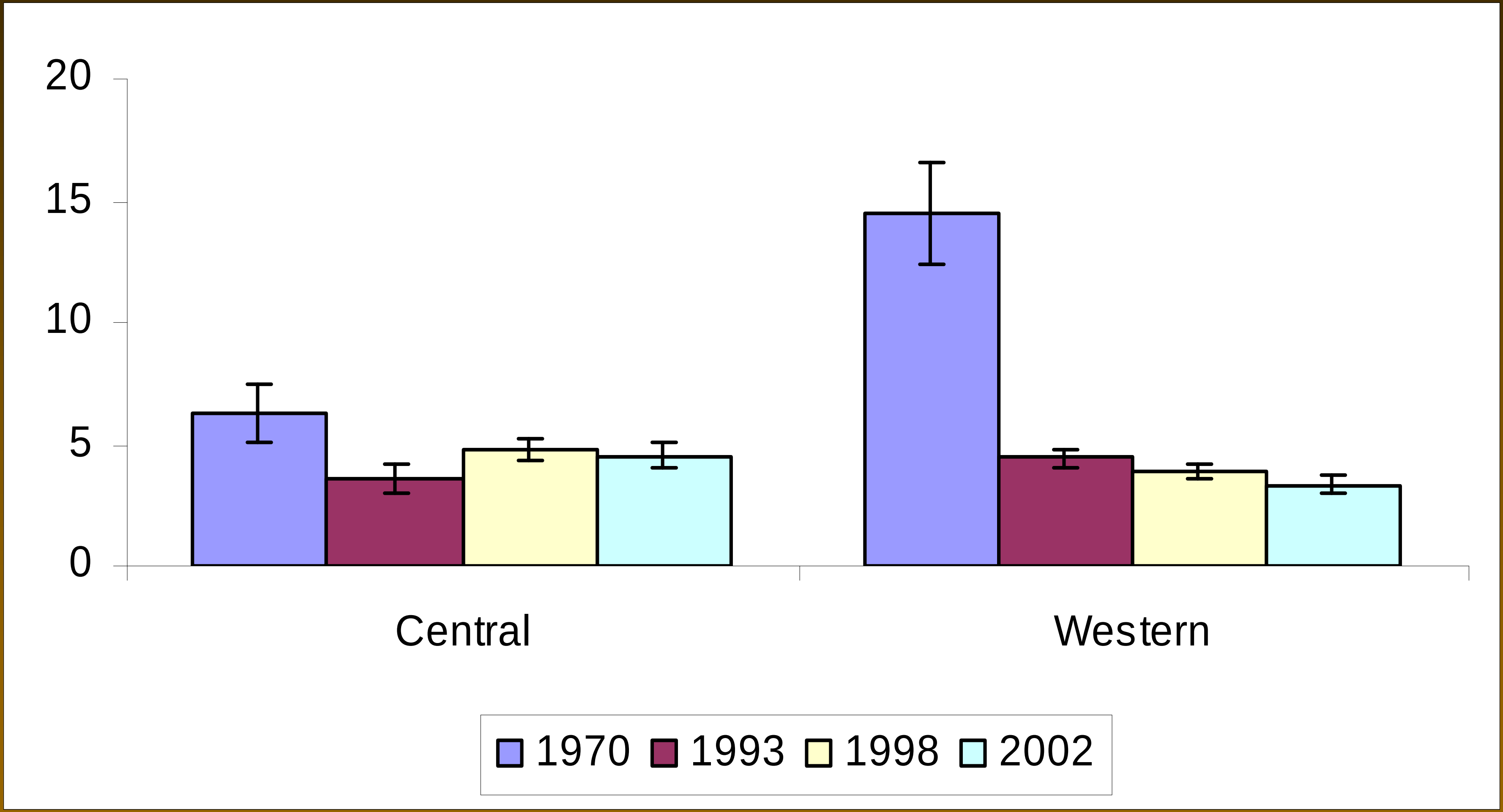


Sources: 1968-1997 from Charlton et al. (1999); 2000-2001 from Fitzpatrick (2003)

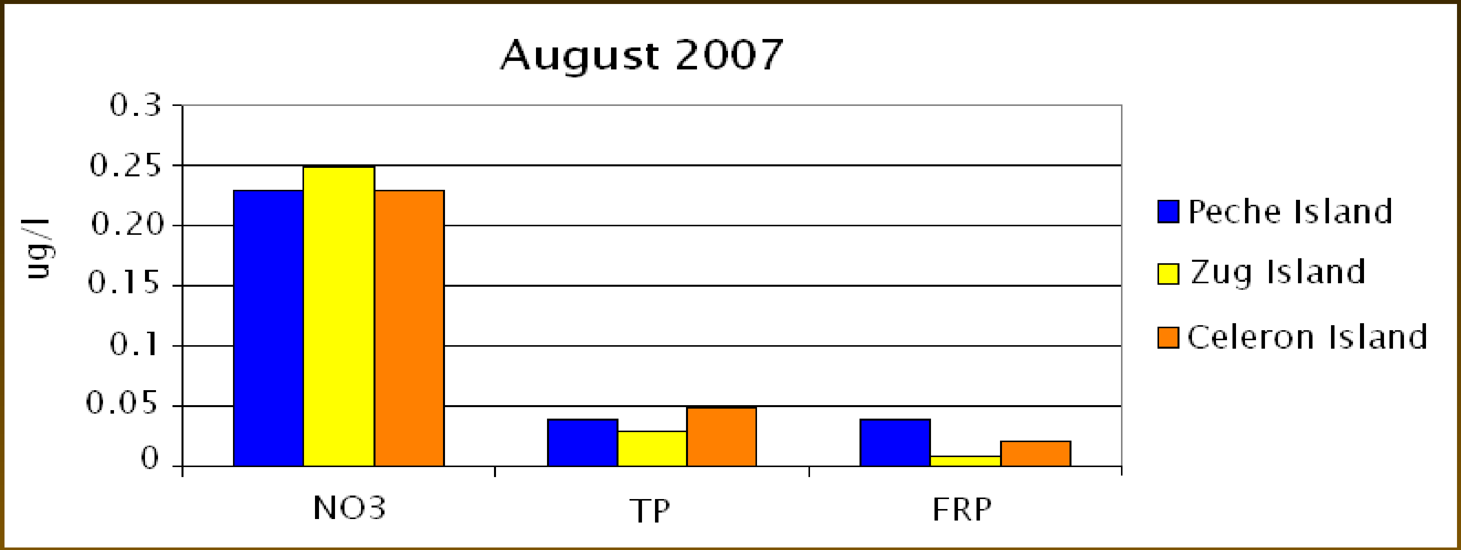
Mean Chlorophyll *a* (mg m^{-3}) June to September

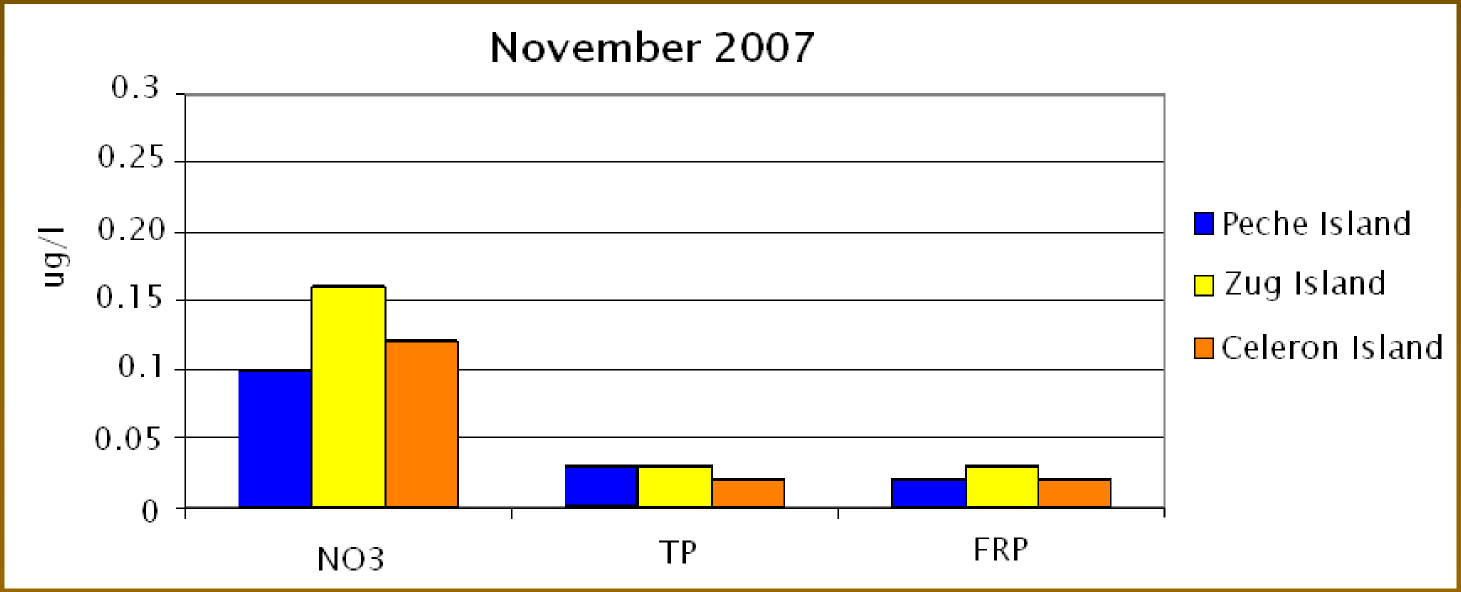


Sources: 1970 from M. Munawar (*pers. comm.*); 1993 from Dahl et al. (1995)

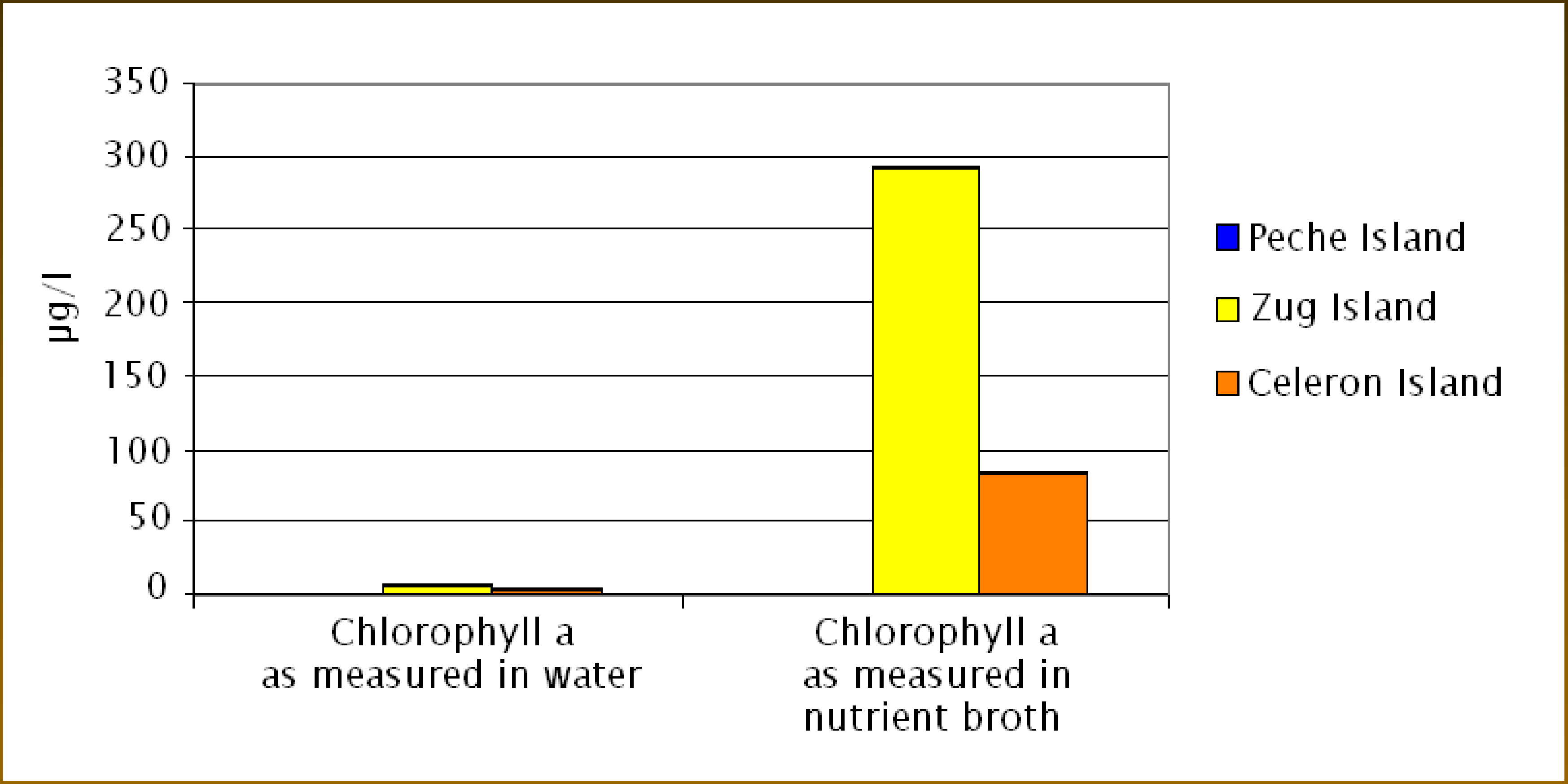
Detroit River Eutrophication Study 2007

Selected Nutrients in Detroit River 2007

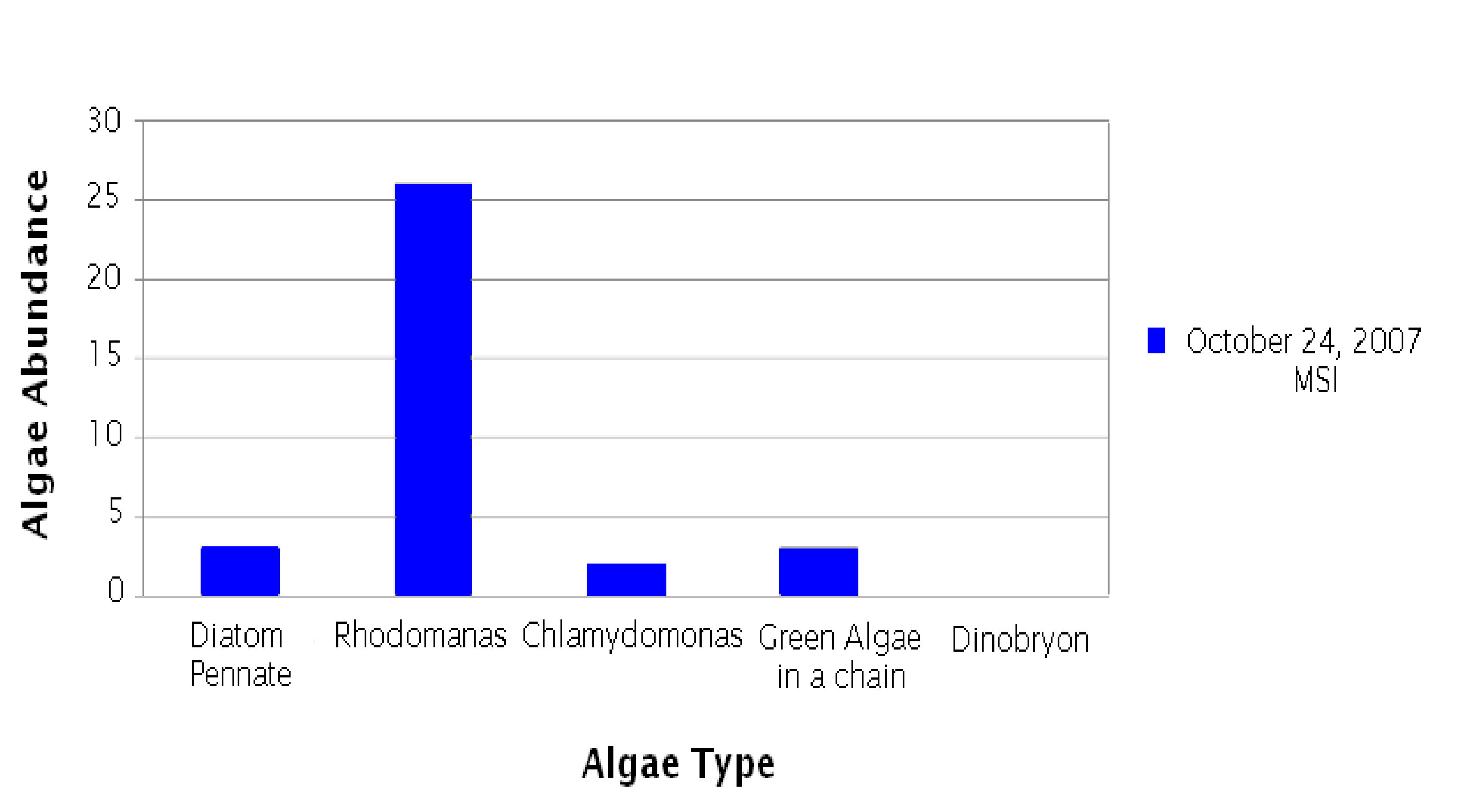




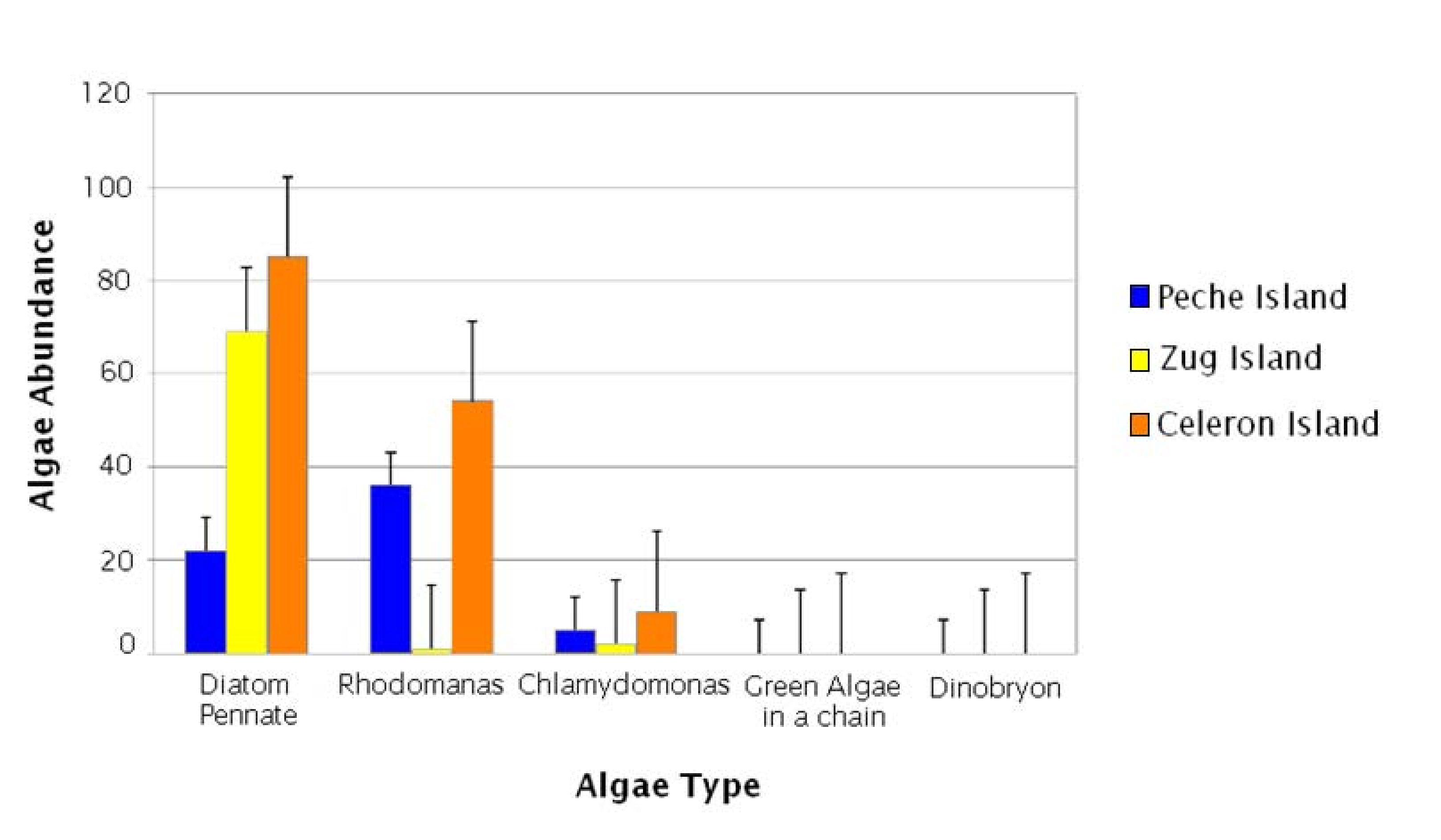
Algal Biomass and Growth Potential in the Detroit River



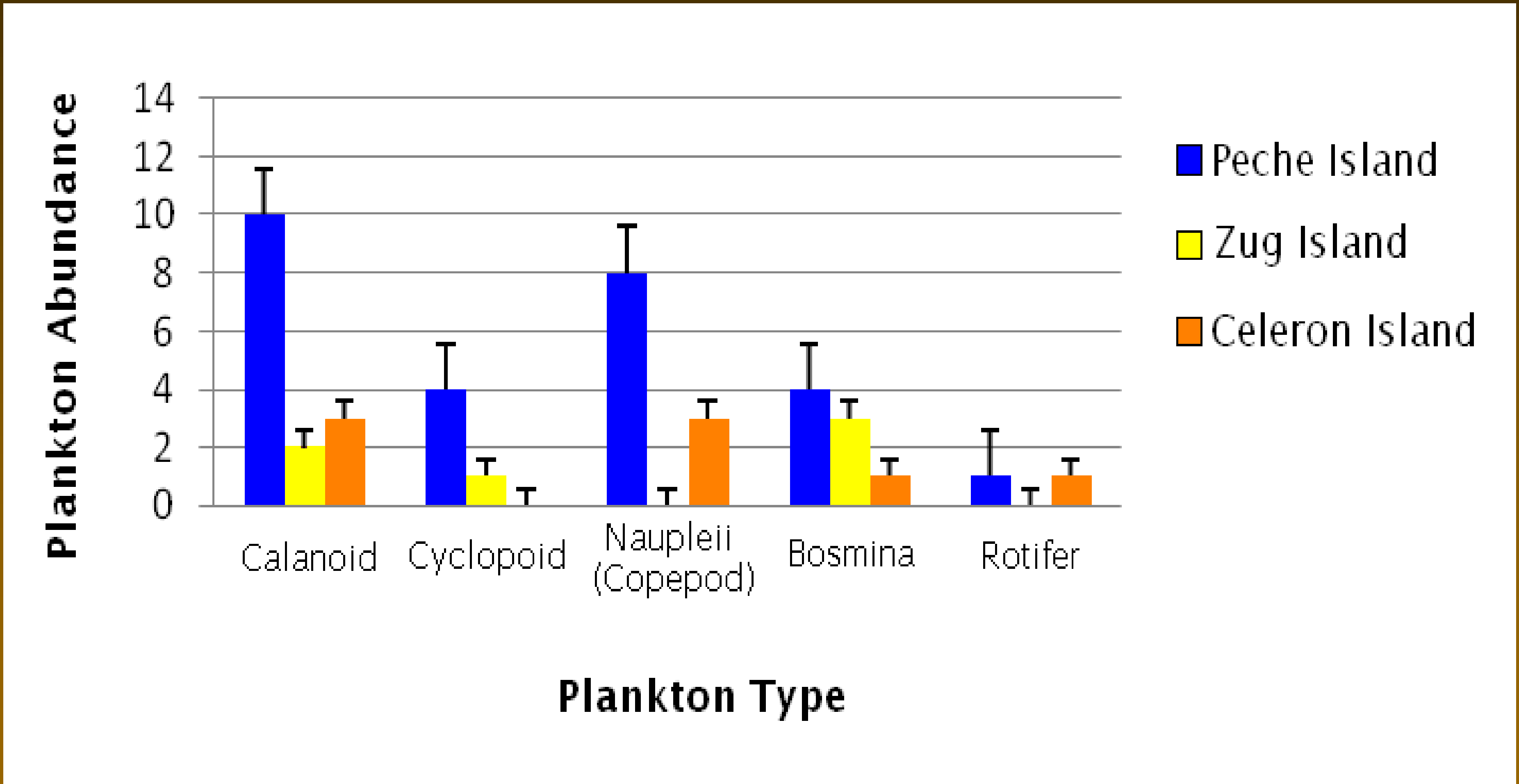
Relative Abundance of Algal Groups for Lake Erie October 2007



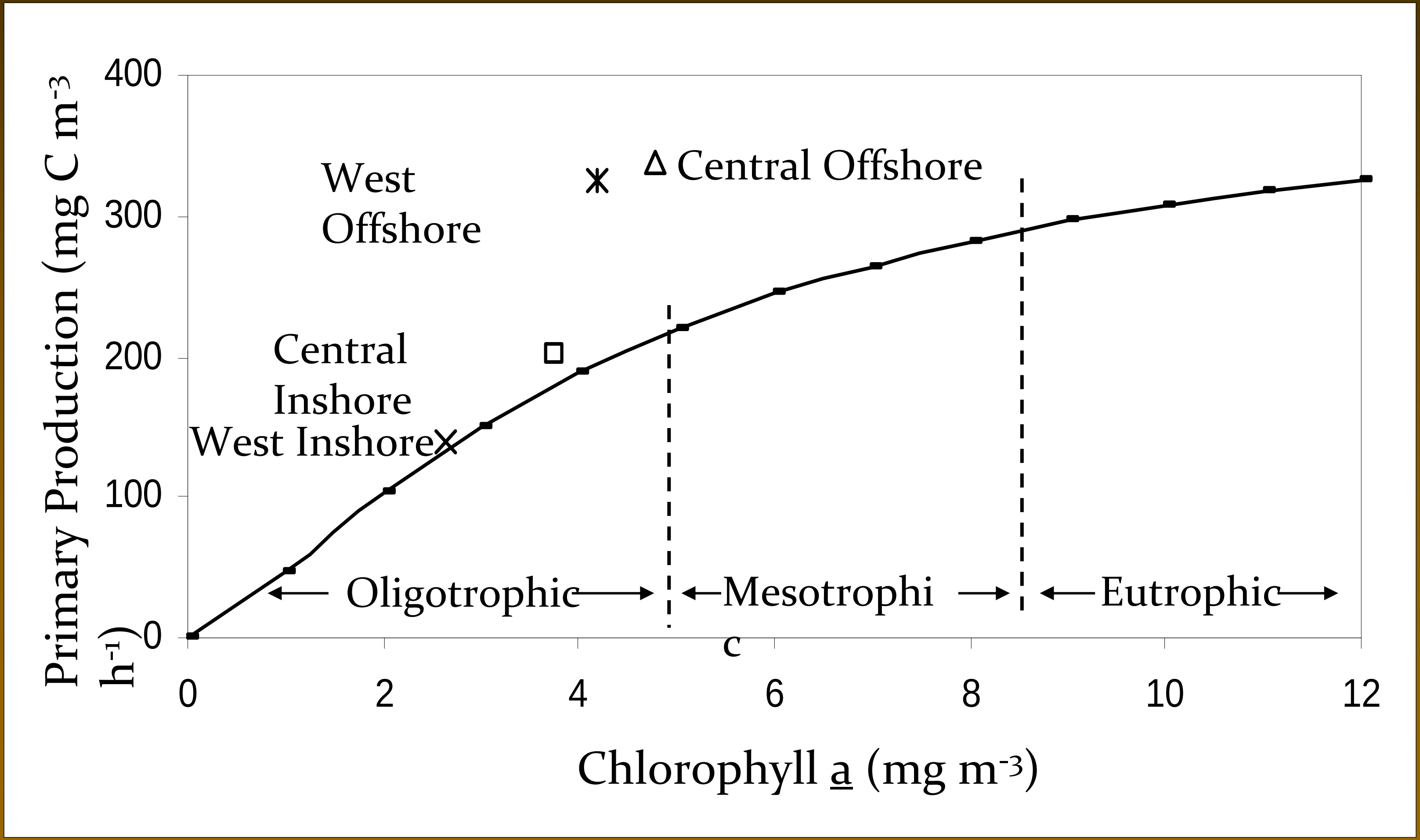
Relative Abundance of Algal Groups for Detroit October 2007



Detroit River Zooplankton October 2007

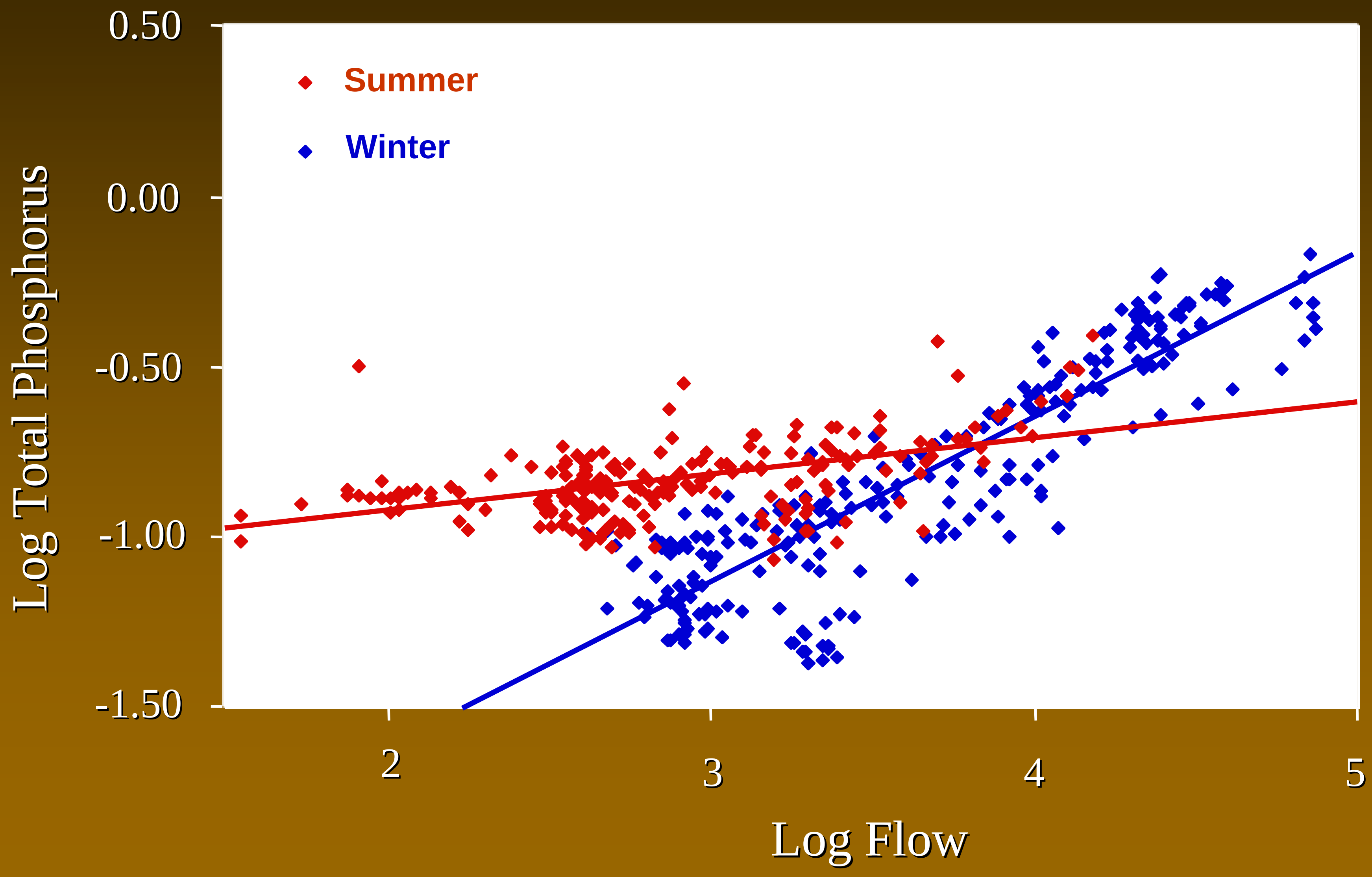


Eutrophication Model after Vollenweider et al. (1974)



Satellite Photo of Western Lake Erie Showing Algal Blooms in the Maumee Bay

Dolan & McGunagle 2002



Example Years of Fisheries and Primary Production

Year	Catch (10 000 kg)	Trophic Level	PPR (g C m^{-2})	% PPR
1950	1,657.20	4	67.7	27.1
1960	2,254.10	3.5	33.1	13.2
1970	1,774.70	3.6	28.7	11.5
1980	2,276.60	3.6	42.8	17.1
1990	2,094.00	3.6	40.4	16.2
2000	1,016.90	3.8	29.4	11.8

- 8% PPR Required for sustainable Fisheries
- 1950-2000 always greater than 8%

Eutrophication in the Huron-Erie Corridor

- Although an important single loading source to Lake Erie, the waters of the corridor maintain meso-trophic conditions in the Western Basin
- Questionable as to what factors regulate primary production and algal standing crops in the Western Basin of Lake Erie

Eutrophication and Primary Production

- Further P control (if required) should focus on agricultural runoff
- Any management effort that can reduce primary production in Lake Erie will need to consider impact on fisheries
- Eutrophication is not a concern to remedial action programs in the Huron-Erie corridor, but lake management plans must address the eutrophication/fish production relationship

Conclusion

- P and N concentrations in Detroit River dilute P and N in W. Basin of Lake Erie
- Do advective nutrient inputs maintain PP?
- Algal assemblage of DR effects composition in the Western Basin (advective inputs are ecologically very important)
- Nutrient control programs need to address agricultural run off