Shining Light on *Cladophora* in the Great Lakes

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Unsightly Problems

- Clogged water intakes
- Beach fouling
- Habitat for pathogens

Investigating Light

The resurgence in *Cladophora* beach fouling is due to an increase in colonizable “real estate” through improved light conditions at locations where phosphorus (P) is provided.

Invaders of the 1990s:
Filter feeding dreissenid mussels remove light-disturbing particulate from the water column.

Investigating Phosphorus

- Apart from favorable light conditions, *Cladophora* requires phosphorus to grow.

- The Golden Horseshoe region along the northwestern shore of Lake Ontario is heavily impacted by urban discharges.
- Stored P in algae samples taken along the Ajax, ON nearshore reveal that algae growing in close proximity to a wastewater treatment plant outfall have an elevated stored P content, which indicates an increased production potential.

Nearshore Management Approach

**Great Lakes Water Quality Protocol (2012)**

We cannot manage light, but we can manage phosphorus.

1) To achieve the Lake Ecosystem Objective of “[maintaining] the levels of algal biomass below the level constituting a nuisance condition,” we must define nuisance conditions.

2) To avoid nuisance conditions, the Protocol demands development of “Substance Objectives for phosphorus concentrations for nearshore waters [...].”

We propose development of a phosphorus standard based on stored P, representing growth potential due to phosphorus availability, which can be related to soluble reactive phosphorus concentrations in nearshore waters using the Great Lakes *Cladophora* Model (Tomlinson et al. 2010).


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