

Abstract Title:

Environmental monitoring in the 21st century: a story of WWTPs, CECs, and Great Lakes AOCs.

Presenter:

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Abstract:

Throughout much of the 20th century, environmental monitoring of contaminants in fresh water ecosystems, like the Great Lakes, focused on measuring concentrations of persistent, bioaccumulative, and toxic chemicals whose biological hazards were well established. However, in recent years attention has expanded beyond “legacy” contaminants to include a broad diversity of chemicals often termed CECs (contaminants of emerging concern). These include pharmaceuticals, personal care products, and many types of industrial chemicals found in commercial products. Given their role as convergence points for human and industrial waste streams, waste water treatment plants (WWTPs) are common sources of CECs in aquatic environments. Our research team has been using novel and integrated approaches to characterize biological impacts of CECs associated with waste water treatment plant (WWTP) discharges in Great Lakes Areas of Concern (AOCs). The strategy employs analytical quantification of over 150 CECs in surface water and sediment samples along with a combination of *in situ* exposures with fathead minnows (*Pimephales promelas*) and *in vitro* bioassay screening. Endpoints examined include targeted molecular and biochemical measurements anchored to established adverse outcome pathways, as well as more open-ended transcriptomic and metabolomic analyses intended to provide broad surveillance of other contaminant impacts. The overall strategy will be illustrated using results from the Saint Louis River Estuary of Lake Superior which identified reproductive endocrine impacts of a WWTP effluent discharge and examined the relationship between effluent composition and the severity of biological effects.