Early Warning Program to Detect and Identify Contaminants of Emerging Concern and Their Effects to Fish and Wildlife

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The Great Lakes basin provides an opportunity to investigate impacts to fish and wildlife from various natural and anthropogenic influences, particularly within Areas of Concern (AOC). While AOC beneficial use impairments related to chemical pollution largely encompass legacy contaminants (metals, PAHs, PCBs), many AOCs also contend with contaminants of emerging concern (CEC), such as endocrine active compounds and pharmaceuticals, where little is known about concentrations or effects. Our study explores the current concentrations of over 150 select CECs within AOCs and the potential biotic impacts to resident fish populations, naïve laboratory fish caged in situ, and in vitro bioassays. Surface water, sediment and resident fish samples were collected at multiple sites within seven AOCs. Laboratory reared fathead minnows (*Pimephales* promelas) were exposed in situ at five of the AOCs. Water and sediment samples were analyzed for select pharmaceuticals, hormones, and other inorganic and organic wastewater indicators. Resident fish were weighed, measured, bled and necropsied in the field. A suite of bioindicators were assessed to evaluate general and reproductive fish health. Samples from caged fathead minnows were used to both evaluate targeted endpoints associated with reproductive endocrine adverse outcome pathways (AOPs) using several apical measurements and to conduct unsupervised transcriptomic and metabolomic assessments. In vitro assays were conducted concurrently with the wild fish collections and the caged fish studies. Results from all analyses will be interpreted based on a variety of factors, including: geographic differences in CEC concentrations and effects in fish, the relationship between the combination of CEC concentrations and effects in fish, and possible sources of contamination. Results will contribute to our understanding of how different landscapes influence varying concentrations and composition of CECs across the Great Lakes basin along with how exposure to these compounds may affect fish and wildlife.

STICs Field	Entry	
1 – Influence/profile	Not applicable	
2 – Clearance tracking no.	Assigned automatically	
3 – Principal Investigator / Project Officer	Gerald Ankley	
4- Product title	Copy and paste from abstract	
5 - Authors	See abstract	
6a- Product type	Presentations and technical summaries	
6b-Product subtype	Abstract	
6c – Records schedule	Not a senior official	
7a – Impact statement	n/a	
7b- Product description	Paste in abstract	
8 – Bibliographic citation	SETAC North America 33rd Annual Meeting, 11-15 November, Long Beach, CA, USA.	
9 - Access	Public	
10 – Tracking and Planning	2.1.2 2.1.2: AOP-based effects monitoring and exposure reconstruction	
Task		
10 – Tracking and Planning	(1) Case study on use of pathway-based effects data for exposure characterization: Using pathway-based effects in fish to characterize exposures associated with	
Product	waste-water treatment plant discharges and/or agricultural runoff.	
11 – Copyright permission	No	
12 - QA	not applicable	
13 – Policy implications	No	
14 - Keywords	Great Lakes	
	Effects-based monitoring	
	contaminants of emerging concern	
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