

# ASSESSING THE IMPACTS ON AQUATIC ORGANISMS EXPOSED TO EMERGING CONTAMINANTS IN WASTEWATER DISCHARGES

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## KEY MESSAGES FOR DECISION MAKERS

- Pharmaceuticals, hormones and chemicals added to personal care products (e.g., toothpaste and deodorant) were detected downstream from wastewater treatment plants in three Canadian rivers.
- Evidence demonstrates that these 'contaminants of emerging concern' (CECs) disrupt normal biological functions in fish and freshwater mussels caged in the wastewater plume.
- It was found that fish populations recovered after synthetic estrogen dosing was stopped.
- Removal of CECs from wastewater discharge through improved treatment will protect aquatic organisms.
- Future regulations may require municipalities to assess whether their wastewater discharges are negatively impacting aquatic ecosystems.



## WHO IS THIS INFORMATION RELEVANT FOR?

- Municipal, provincial and federal government agencies
- Wastewater engineers
- Source water protection managers
- Community-based groups and non-governmental organizations
- Commercial and leisure fishermen
- Environmental scientists

## WHAT WAS THE RESEARCH FOCUS?

To improve our understanding of how CECs in wastewater affect biological functions in aquatic organisms and to develop effective monitoring methods.

Project objectives:

- Determine whether CECs are causing changes in biological functions in aquatic organisms exposed to wastewater plumes in Canadian rivers.
- Develop sensitive techniques to assess changes in biological functions.
- Contribute scientific evidence to the regulatory process of developing guidelines to protect aquatic life from wastewater discharges.

## WHAT WAS THE RESEARCH METHOD?

- Measurement of adverse biological effects in wild and caged fish and freshwater mussels, including change in body functions.
- Study of population recoveries.
- Monitoring of CECs.

## WHAT WERE THE RESEARCH RESULTS?

- At locations downstream of wastewater discharges in the Grand River (Ontario), a high proportion of male rainbow darter fish had eggs in the testis. Populations of freshwater mussels were absent.
- A lake was experimentally dosed with the synthetic estrogen used in birth control pills, with the result that fathead minnows almost disappeared due to poor reproductive success. Populations recovered within 3 years after dosing stopped.
- Several biological responses in fish and mussels can be used as biomarkers to identify changes in biological function due to exposure to CECs.

## WHAT ARE THE IMPLICATIONS FOR DECISION MAKERS?

1. CECs in wastewater plumes are causing biological responses in aquatic organisms downstream of wastewater treatment plants. There are methods available to detect these impacts.
2. Improvements in wastewater treatment technologies can reduce adverse impacts. Aquatic organisms have the ability to recover if investments are made to improve wastewater treatment.