

Gender-bending fish on the rise in southern Alberta

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Lee Jackson, professor in the Department of Biological Sciences at the University of Calgary, is measuring dissolved oxygen, which when low, may interact with environmental contaminants to affect fish endocrinology. Credit: Riley Brandt, University of Calgary

Chemicals present in two rivers in southern Alberta are likely the cause of the feminization of fish say researchers at the University of Calgary who have published results of their study in the journal *Environmental Toxicology and Chemistry*.

"What is unique about our study is the huge geographical area we covered. We found that chemicals - man-made and naturally occurring - that have the potential to harm fish were present along approximately 600 km of river," says paper co-author Lee Jackson, executive director of Advancing Canadian Wastewater Assets, a research facility that

develops and tests new approaches for treating wastewater which will be located at the City of Calgary's new Pine Creek Wastewater Treatment Centre. "The situation for [native fish](#) will likely get worse as the concentration of organic contaminants will become more concentrated as a response to climate change and the increase in human and [animal populations](#)," adds Jackson.

The study focused on two rivers in the South Saskatchewan River Basin: The [Red Deer](#) and Oldman rivers, located in southern Alberta, Canada. The water was analyzed for more than two dozen organic contaminants, many with hormone-like activity, commonly found in wastewater or rivers impacted by human and agricultural activity. Compounds detected in the water included synthetic estrogens ([birth control pill](#) compounds and hormone therapy drugs); bisphenol A, a chemical used in making plastics; and certain types of natural and synthetic steroids that are byproducts of agricultural run-off and cattle farming.

Researchers tested a native minnow, longnose dace (*Rhinichthys cataractae*), and found that at nearly every site, 14 out of 15 locations, males showed elevated levels of a protein, hepatic vitellogenin, which is normally only found in the blood of females and is used by females to produce eggs.

Co-author Hamid Habibi says the results downstream of two communities are striking.

"Most notably, we saw a significant increase in a specific protein marker for the presence of compounds with estrogen-like activity in areas downstream, south of Fort Macleod and Lethbridge. Our results showed females make up 85 per cent of the population of longnose dace. In the upstream locations, females comprise 55 per cent of the population," says Habibi, who is also the director of the newly established Institute of Environmental Toxicology at the University of Calgary.

This study is part of a larger research project by Habibi and Jackson, professors in the Department of Biological Sciences, who are studying the impact of environmental contaminants with hormone-like activity in Southern Alberta [rivers](#) and lakes.

More information: The paper 'Presence of Natural and Anthropogenic Organic Contaminants and Potential Fish Health Impacts Along Two River Gradients in Alberta, Canada' was written by Leland (Lee) J. Jackson and Hamid Habibi of the University of Calgary, Ken M. Jeffries of the University of British Columbia and Michael G. Ikonmou of the Institute of Ocean Sciences and will be published in the journal *Environmental Toxicology and Chemistry*. An early issue can be found online at www3.interscience.wiley.com/journal/122589500/issue

Provided by University of Calgary

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