### Title: Dataset relating a wetland fish multimetric index to variation in agricultural stress among Laurentian Great Lakes coastal wetlands.

### Authors:

Corresponding Author: Jabed Tomal, PhD  
Affiliation: Department of Mathematics and Statistics, Thompson Rivers University (GRID [grid.265014.4](https://grid.ac/institutes/grid.265014.4), ISNI [0000000099452031](http://isni.org/isni/0000000099452031), Wikidata [Q3551501](https://www.wikidata.org/wiki/Q3551501))  
Address: 805 TRU Way, Kamloops, British Columbia, Canada V2C 0C8  
Email: jtomal@tru.ca

Second Author: Jan JH Ciborowski, PhD  
Affiliation: Department of Biological Sciences, University of Calgary (GRID [grid.22072.35](https://grid.ac/institutes/grid.22072.35), ISNI [0000000419367697](http://isni.org/isni/0000000419367697), Crossref Funder ID [100008459](https://api.crossref.org/funders/100008459), Wikidata [Q1067471](https://www.wikidata.org/wiki/Q1067471))  
Address: 507 Campus Drive N.W., 2500 University Drive NW, Calgary, Alberta, Canada T2N 1N4

Email: jan.ciborowski@ucalgary.ca

### Abstract:

The first dataset relates to estimating threshold effects of a measure of agricultural activity in watersheds draining into the Laurentian Great Lakes on scores of a multimetric index of community composition of fishes in bordering coastal wetlands (Bhagat et al., 2007). Run-off associated with agriculture is a major source of human induced disturbance affecting natural habitat loss for fishes. Danz et al. (2005) derived a composite agricultural stress index (AG) to characterize the risk of degradation of natural habitat using GIS based data. The measure of biological condition is a wetland fish multimetric index (MMI), a measure representing the inferred health of the fish assemblage in an ecoregion or watershed. Uzarski et al. (2005) developed and Bhagat et al. (2007) validated the fish multimetric index by assessing fish assemblages in stands of bulrush (*Schoenoplectus, spp*) in 30 coastal wetlands distributed across the US Great Lakes coast. MMI scores vary from 0 to 100, with larger scores representing greater ecological health of the fish assemblage. Traditionally, MMI scores falling in the lowest and highest quintiles are classified as “degraded” and “excellent” conditions, respectively. Bhagat et al. (2007) observed a statistically significant negative linear association between fish MMI and AG scores, but suggested the presence of threshold responses. They did not quantitatively test for the presence of breakpoints. Tomal and Ciborowski (2020) derived ecological models to test for the presence of two environmental breakpoints. Dr. Jan Ciborowski provided the dataset (the top panel of Figure 3 - Bhagat et al., 2007) who was one of the coauthors and the principal investigator. Tomal and Ciborowski (2020) rescaled the AG (a PCA score) to a 0 to 1 range with larger numbers reflecting more extensive agricultural activities.

1. Bhagat, Y., J. Ciborowski, L. Johnson, D. Uzarski, T. Burton, S. Timmermans, and M. Cooper (2007). Testing a fish index of biotic integrity for responses to different stressors in great lakes coastal wetlands. *Journal of Great Lakes Research* 33, 224-235.
2. Danz, N., R. Regal, G. Niemi, V. Brady, T. Hollenhorst, L. Johnson, G. Host, J. Hanowski, C. Johnston, T. Brown, J. Kingston, J. Kelly (2005). Environmentally stratified sampling design for the development of Great Lakes environmental indicators. Environmental Monitoring and Assessment 102 (1), 41-65.
3. Tomal, J., and Ciborowski, J. (2020). Ecological models for estimating breakpoints and prediction intervals. *Ecology and Evolution*, In press.
4. Uzarski, D., T. Burton, M. Cooper, J. Ingram, and S. Timmermans (2005). Fish habitat use within and across wetland classes in coastal wetlands of the five great lakes: Development of a fish-based index of biotic integrity. *Journal of Great Lakes Research* 31, 171-187.

### File list

DataS1.csv

DataS1.R

**Description**

DataS1.csv – This dataset contains three variables: (1) Fish\_MMI - Fish multimetric index of community health; (2) AG - Agricultural stress; and (3) Type - U: Uzarski & GLEI: Great Lakes environmental indicators.

DataS1.R – This file contains the R codes for reading the data.