Great Lakes Fishery Commission Pulse on Science: Deliverables
2023 Vol. 1

This bi-annual newsletter lists titles, abstracts, and products for recently completed, Commission-funded research projects.

Questions about any of the research below? Contact research@glfc.org.

**Denotes project was supported by the Great Lakes Restoration Initiative*

Science Transfer Program:

Interactive tool for visualizing fish stocking events and recoveries in the Great Lakes
Cottrill, A. and T. Treska | *September 2022*
Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2019_COT_770140.pdf
Products:

- Great Lakes Fish Stocking Database web tool: http://fsis.glfc.org
- Reference Materials including "How To" documents
- Database entry values look-up tables
- GLFishStockR – R package for interacting with the Great Lakes Fish stocking database

Fishery Research Program:

Physical Processes and Fish Recruitment in Large Lakes

Moving toward ecosystem-based fisheries management: developing an integrated ecosystem assessment of Lake Erie as a case study
Ludsin, S. | *December 2022*
Abstract: http://glfc.org/pubs/pdfs/research/reports/2019_FRA_440800.pdf
Products:

- Fraker, M.E., J.S. Sinclair, K.T. Frank, J.M. Hood, and S.A. Ludsin. 2022. Temporal scope influences ecosystem driver-response relationships: A case study of Lake Erie with implications for ecosystem-based management. Science of the Total Environment 813:152473.
- Sinclair, J.S., M.E. Fraker, J.M. Hood, K.T. Frank, M.R. DuFour, A.M. Gorman, and S.A. Ludsin. 2021. Functional traits reveal the dominant drivers of long-term community change across a North American Great Lake. Global Change Biology 27:6232–6251.
- Fraker, M.E. 2020. Assessing environmental changes in the Lake Erie Ecosystem. CIGLR eNewsletter. https://ciglr.seas.umich.edu/winter-2020-e-newsletter/featured-research-lake-erie-ecosystem/

Human Dimensions

Economic Aspects of the Great Lakes Recreational Fisheries and Factors Driving Change
Cornicelli, L. | *September 2022*

Abstract: http://glfc.org/pubs/pdfs/research/reports/2020_ALL_440910.pdf

Stakeholder and resource manager responses to the Chinook salmon fishery collapse in Lake Huron: informing future decision-making
Lauber, B. | *August 2022*
Abstract: http://glfc.org/pubs/pdfs/research/reports/2020_LEP_440870.pdf
Products:

- Lauber, T.B., Lepak, J., Connelly, N.A., Schroeder, B., Stedman, R.C., Knuth, B.A., and Furgal, S.L. 2022. Stakeholder and manager responses to the Lake Huron Chinook Salmon fishery collapse: Informing future decision making. Center for Conservation Social Sciences Publ. Series 22-3.

Re-establishment of Native Deep-water Fishes

***Genomics of Great Lakes ciscoes (Coregonus spp.): identifying genetic differences associated with morphological differences**
Krabbenhoft, T. | *July 2022*
Abstract: http://glfc.org/pubs/pdfs/research/reports/2018_KRA_44073.pdf
Products:

- Eaton, K. M., Bernal, M. A., Backenstose, N. J., Yule, D. L., & Krabbenhoft, T. J. (2021). Nanopore amplicon sequencing reveals molecular convergence and local adaptation of rhodopsin in Great Lakes salmonids. Genome Biology and Evolution, 13(2), evaa237.
- Bernal, M. A., Yule, D. L., Stott, W., Evrard, L., Dowling, T. E., & Krabbenhoft, T. J. (2022). Concordant patterns of morphological, stable isotope, and genetic variation in a recent ecological radiation (Salmonidae: Coregonus spp.). Molecular Ecology. https://doi.org/10.1111/mec.16596
- Krabbenhoft interviewed on NPR radio station WBFO, February 1, 2021. https://www.wbfo.org/environment/2021-02-01/ub-research-looking-at-freshwater-fish-with-deep-sea-eyes
- Krabbenhoft interviewed on March 5, 2021. Great Lakes Echo, "Fish genes could inform Great Lakes Restoration". https://greatlakesecho.org/2021/03/05/fish-vision-genes-could-inform-great-lakes-restoration/
- Press Release: UBNow: "This Great Lakes fish may have evolved to see like its ocean ancestors did. New research could help inform fisheries restoration in the Great Lakes." January 20, 2021. https://www.buffalo.edu/news/releases/2021/01/017.html
- Press Release: ScienMag: https://scienmag.com/this-great-lakes-fish-may-have-evolved-to-see-like-its-ocean-ancestors-did/
- Press Release: Phys.org: https://phys.org/news/2021-01-great-lakes-fish-evolved-ocean.html
- Press Release: ScienceDaily: https://www.sciencedaily.com/releases/2021/01/210121131913.htm
- Press Release: AAAS Eurekalert!: https://www.eurekalert.org/news-releases/631514

Council of Lake Committees

***Using genomics to delineate stock structure and create a standardized genetic resource for Great Lakes walleye**
Euclide, P. | *July 2022*
Abstract: http://glfc.org/pubs/pdfs/research/reports/2019_LAR_440830.pdf
Products:

- Euclide, P. T., Larson, W. A., Bootsma, M., Faust, M., Miller, L., Wilson, C. C., Scribner, K.T., Sott, W., Latch, E. K. in prep. A new genetic resource for multijurisdictional research and management of walleye *Sander vitreus* in the Great Lakes.

- Euclide, P.T., Robinson, J., Faust, M., Ludsin, S.A., MacDougall, T.M., Marschall, E.A., Chen, K.-Y., Wilson, C. C., Bootsma, M., Stott, W., Scribner, K.T., and Larson, W.A. 2021a. Using Genomic Data to Guide Walleye Management in the Great Lakes. In Yellow Perch, Walleye, and Sauger: Aspects of Ecology, Management, and Culture. Edited by J.C. Bruner and R.L. DeBuryne. Springer, Cham. pp. 115–139. doi:10.1007/978-3-030-80678-1_5.

Sea Lamprey Research Program:

Assessment

Body size, body condition, and reproductive potential in sea lamprey: nature or nurture?
Docker, M. | *December 2022*
Abstract: www.glfc.org/pubs/pdfs/research/reports/2020_DOC_540960.pdf

Reducing uncertainty in the sea lamprey operating model with life-stage specific empirical evidence: A methodological approach and model-based evaluation
Hume, J. | *December 2022*
Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2018_HUM_54068.pdf

Barriers and Trapping

Assessing the potential of selective fish passage using trap-and sort fishways
McLaughlin, R. | *December 2022*
Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2017_MCL_54062.pdf

Chemosensory Communications

Anatomy and physiology of the taste system in the sea lamprey
Zielinski, B. | *December 2022*
Abstract: www.glfc.org/pubs/pdfs/research/reports/2019_ZIE_540780.pdf
Products:

- Aurangzeb, Z., Dubuc, R., Innes, L., Daghfous, G., Zielinski, 2021 Current Understanding of Lamprey Chemosensory Systems. Journal of Great Lakes Research 47: 1 S650-S659. https://doi.org/10.1016/j.jglr.2021.04.020
- Polat, H Sept 2022. Studies of Neural Chemosensory Responses in the Pharynx of the Sea Lamprey (*Petromyzon marinus*). University of Windsor. https://scholar.uwindsor.ca/cgi/viewcontent.cgi?article=9990&context=etd
- Zeenat Aurangzeb, University of Windsor January 2020 Studies of cells within three chemosensory structures in sea lamprey (*Petromyzon marinus*) https://scholar.uwindsor.ca/cgi/viewcontent.cgi?article=9298&context=etd

Lampricides

Forensic markers of lampricide toxicity & mortality in non-target fishes
Wilkie, M. | *August 2022*
Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2014_WIL_54028.pdf
Products:

- Christopher J. White. 2018. Thesis: Forensic markers of lampricide toxicity in Oncorhynchus mykiss. https://scholars.wlu.ca/etd/2052/
- Darren Foubister. 2018. Thesis: Distribution and stability of the lampricide 3-trifluormethyl-4-nitrophenol (TFM) in non-target rainbow trout (Oncorhynchus mykiss) and white sucker (Catostomus commersonii). https://scholars.wlu.ca/etd/2051/

Other recent publications supported by the Commission[†]

[†]*This list may not be all-inclusive*

Borowiec, B.G. Birceanu, O., Wilson, J.M., McDonald A.E., Wilkie, M.P. J. M. Wilson, A. E. McDonald, Wilkie, M.P. 2022. Niclosamide is a much more potent toxicant of mitochondrial respiration than TFM in the invasive sea lamprey (*Petromyzon marinus*). Environmental Science & Technology 2022 Vol. 56 Issue 8 Pages 4970-4979. https://pubs.acs.org/doi/abs/10.1021/acs.est.1c07117

Bullingham, O.M.N., Firkus, T.J., Goetz, F.W., Murphy, C.A., and Alderman, S.L. (in review). Lake charr clotting response may act as a plasma biomarker of sea lamprey parasitism: implications for management and wound assessment. J. Great Lakes Research. 48 (2022) 207 – 218. https://doi.org/10.1016/j.jglr.2021.11.005

Firkus, T. J., Goetz, F. W., Fischer, G., & Murphy, C. A. (2022). The Influence of Life History on the Response to Parasitism: Differential Response to Non-Lethal Sea Lamprey Parasitism by Two Lake Charr Ecomorphs. Integrative and comparative biology, 62(1), 104–120. https://doi.org/10.1093/icb/icac001

Flynn, R.W., Hoover, G., Iacchetta, M., Guffey, S., De Perre, C., Huerta, B., Li, W., Hoverman, J.T., Lee, L., Sepulveda, M.S. (2022) Comparative toxicity of aquatic PFAS exposure in three species of amphibians. Environmental Toxicology and Chemistry. https://doi.org/10.1002/etc.5319

Ionescu, R.A., Mitrovic, D., Wilkie, M.P., 2022a. Disturbances to energy metabolism in juvenile lake sturgeon (*Acipenser fulvescens*) following exposure to niclosamide. Ecotoxicology and Environmental Safety 229, 112969. https://doi.org/10.1016/j.ecoenv.2021.112969

Ionescu, R.A., Mitrovic, D., Wilkie, M.P., 2022b. Reversible disruptions to energy supply and acid-base balance in larval sea lamprey exposed to the pesticide: Niclosamide (2 ',5-dichloro-4 '-nitrosalicylanilide). Aquatic Toxicology 242, 106006. https://doi.org/10.1016/j.aquatox.2021.106006

Lantz, S.R., Adair, R.A., Amberg, J.J., Bergstedt, R.A., Boogaard, M.A., Bussy, U., Docker, M.F., Dunlop, E.S., Gonzalez, A., Hubert, T., Siefkes, M.J., Sullivan, W.P., Whyard, S., Wilkie, M.P., Young, B., Muir, A.M. 2022. Next Generation Lampricides: A three-stage process to develop improved control tools for invasive sea lamprey. Canadian Journal of Fisheries and Aquatic Sciences 79, 692-702. http://dx.doi.org/10.1139/cjfas-2020-0316.

Lawrence, M.J., Grayson, P., Jeffrey, J.D., Docker, M.F., Garroway, C.J., Wilson, J.M., Manzon, R.G., Wilkie, M.P., Jeffries, K.M. 2022. Variation in the transcriptome response and detoxification gene diversity drives pesticide tolerance in fishes. *Environmental Science and Technology* 56, 12137-12147 https://pubs.acs.org/doi/abs/10.1021/acs.est.2c00821

Mensch EL, Dissanayake AA, Nair MG, Wagner CM. The effect of putrescine on space use and activity in sea lamprey (Petromyzon marinus). Scientific Reports. 2022 Oct;12(1):17400. https://www.nature.com/articles/s41598-022-22143-x

Mensch, E.L., Dissanayake, A.A., Nair, M.G. et al. Sea Lamprey Alarm Cue Comprises Water- and Chloroform-Soluble Components. J Chem Ecol 48, 704–717 (2022). https://doi.org/10.1007/s10886-022-01384-0

Wagner CM, Bals JD, Hanson ME, Scott AM. 2022. Attenuation and recovery of an avoidance response to a chemical antipredator cue in an invasive fish: implications for use as a repellent in conservation. Conservation Physiology.10 (2022). https://doi.org/10.1093/conphys/coac019

Weise, E. M., Scribner, K. T., Adams, J. V., Boeberitz, O., Jubar, A. K., Bravener, G., Johnson, N. S., & Robinson, J. D. (2022). Pedigree analysis and estimates of effective breeding size characterize sea lamprey reproductive biology. Evolutionary applications, 15(3), 484–500. https://doi.org/10.1111/eva.13364