



Great Lakes Fishery Commission Pulse on Science: Deliverables Summer 2021

This bi-annual newsletter lists titles and abstracts for recently completed, Commission-funded research projects and links to associated media coverage and publications.
Questions about any of the research below? Contact research@glfc.org.

Fishery Research Program:

Council of Lake Committees

Estimating survival of acoustic telemetered walleyes in the Great Lakes and comparison of survival rates between Lake Huron and Lake Erie spawning populations

Bence, J.

July 2021

Abstract: http://glfc.org/pubs/pdfs/research/reports/2014_BEN_44032.pdf

Products:

- Peterson, L.K., Jones, M.L., Brenden, T.O., Vandergoot, C.S. & Krueger, C.C., 2021. Evaluating methods for estimating mortality from acoustic telemetry data. *Canadian Journal of Fisheries and Aquatic Sciences*. <https://doi.org/10.1139/cjfas-2020-0417>
- Peterson, L.K., Jones, M.L., Holbrook, C.M., Zipkin, E.F., Brenden, T.O., Vandergoot, C.S., & Krueger, C.C. 2017. Simulating acoustic telemetry data to evaluate mortality estimation methods and study designs. *International Conference on Fish Telemetry*, Cairns, Australia. (presentation)
- Peterson, L.K., & Jones, M.L. 2016. Evaluating methods for estimating mortality of Great Lakes walleye using acoustic telemetry. *International Association for Great Lakes Research Annual Conference*, Guelph, Ontario. (presentation)
- Peterson, L.K., & Jones, M.L. 2016. Methods for estimating natural mortality using passive acoustic telemetry data. *Great Lakes Acoustic Telemetry Observation System (GLATOS) Annual Meeting*, Ann Arbor, Michigan. (presentation)

Re-establishment of Native Deep-water Fishes

Lake trout whole genome sequencing

Bernatchez, L.

April 2021

Abstract: http://glfc.org/pubs/pdfs/research/reports/2017_BER_44071.pdf

Products:

- The first annotated, chromosome-anchored genome assembly for the lake trout *Salvelinus namaycush*.
- Publicly available set of gene annotations using the National Center for Biotechnology Information Eukaryotic Genome Annotation Pipeline.

- The Lake Trout whole genome assembly project has been deposited at DDBJ/ENA/GenBank under the accession JAEAGN0000000000.
- Smith, S.R., Normandeau, E., Djambazian, H., Mudiyansele, P.N., Muir, A.M., Ragoussis, J., Penney, C., Scribner, K., Luikart, G., Wilson, C.C., & Bernatchez, L. *In Press*. A chromosome-anchored genome assembly for lake trout (*Salvelinus namaycush*). *Molecular Ecology Resources*.

Depth and temperature preferences of Lake Ontario salmonids using novel pop-off data storage tags

Fisk, A.

June 2021

Abstract: http://glfc.org/pubs/pdfs/research/reports/2015_FIS_44039.pdf

Products:

- Raby, G.D., Johnson, T.B., Kessel, S.T., Stewart, T.J., & Fisk, A.T. 2020. Pop-off data storage tags reveal niche partitioning between native and non-native predators in a novel ecosystem. *J. Appl. Ecol.* 57(1): 181-191.
- Raby, G.D., Johnson, T.B., Kessel, S.T., Stewart, T.J., & Fisk, A.T. 2017. A field test of the use of pop-off data storage tags in freshwater fishes. *J. Fish Biol.* 91(6): 1623-1641.
- Ivanova, S.V. 2021. Movement, habitat use and bioenergetics of Lake Ontario salmonids. PhD Thesis, University of Windsor, In final prep, anticipated completion September 2021.
- Johnson, T.B. 2017. Salmonid data storage tags in Lake Ontario. *OMNRF Fishery Management Zone Council 20 meeting*, Picton, ON. (presentation)
- Raby, G.D., Johnson, T.B., & Fisk, A.T. 2019. Pop-off data storage tags reveal niche partitioning among predators in Lake Ontario. *Great Lakes Acoustic Telemetry Observation System Annual Symposium*, Ann Arbor, MI, USA.
- Raby, G.D., Johnson, T.B., & Fisk, A.T. 2019. Pop-off data storage tags reveal niche partitioning among predators in Lake Ontario. *Canadian Conference for Fisheries Research*, London, ON, Canada.

Quantification of thiamine in natural fresh water

Rinchard, J.

April 2021

Abstract: http://glfc.org/pubs/pdfs/research/reports/2020_RIN_440950.pdf

Non-theme

Lake Champlain fish ecology: A mesocosm approach to the Great Lakes (Phase 1)

Marsden, E.

April 2021

Abstract: http://glfc.org/pubs/pdfs/research/reports/2013_MAR_95000.pdf

Products:

- Block B.D., Denfeld, B.A., Stockwell, J.D., Flaim, G., Grossart, H.-P.F., Knoll, L.B., Maier, D.B., North, R.L., Rautio, M., Rusak, J.A., Sadro, S., Weyhenmeyer, G.A., Bramburger, A.J., Branstrator, D.K., Salonen, & K., Hampton, S.E. 2019. The unique methodological challenges of winter limnology. *Limnol. Oceanogr. Methods* 17:42-57

- Euclide, P., & Marsden, J.E. 2018. Role of drainage and barriers in the genetic structuring of a tessellated darter metapopulation. *Cons. Genetics* 19:1378-1392
- Euclide, P.T., Flores, N., Wargo, M., Kilpatrick, C. W., & Marsden, J. E. 2018. Lack of genetic population structure of slimy sculpin in a large, fragmented lake. *Ecol. Freshwater Fish* 27:699-709
- Euclide, P., Pientka, B., & Marsden, J.E. 2020. Genetic versus demographic stock structure of rainbow smelt in a large fragmented lake. *J. Great Lakes Res.* 46:622-632
- Euclide, P., Marsden, J.E., & Kilpatrick, W.C. 2019. Genetic structure of lake whitefish (*Coregonus clupeaformis*) in Lake Champlain, Vermont, 100 years after commercial fishery closure. *J. Great Lakes Res.* 45:1310-1319
- Griffin, J.E., O'Malley, B.P., & Stockwell, J.D. 2020. The freshwater mysid *Mysis diluviana* (Audzijonyte & Väinölä, 2005) (Mysida: Mysidae) consumes detritus in the presence of *Daphnia* (Cladocera: Daphniidae). *J. Crust. Biol.* 40:520-525
- Knight, J.C., O'Malley, B.P., & Stockwell, J.D. 2018. Lake Champlain offshore benthic invertebrate community before and after zebra mussel invasion. *J. Great Lakes Res.* 44:283-288.
- Ladago, B.J., Futia, M., Marsden, J.E., Ardren, W., Honeyfield, D.C., Kelsey, K., Riley, S. C., Rinchard, J., Tillitt, D.E., & Zajicek, J. L. 2020. Thiamine concentrations in lake trout and Atlantic salmon eggs from Lake Champlain after alewife invasion. *J. Great Lakes Res.* 46: 1340-1348
- Stockwell, J.D., O'Malley, B.P., Hansson, S., Chapina, R.J., Rudstam, L.G., & Weidel, B.C. 2020. Benthic habitat is an integral part of *Mysis* ecology. *Freshw. Biol.* 65:1997-2009
- Wilkins, P.D. & Marsden, J.E. 2021. Spatial and seasonal comparisons of growth of wild and stocked juvenile lake trout in Lake Champlain. *J. Great Lakes Res.* 47:204-212
- Wilkins, P.D. & Marsden, J.E. 2021. Seasonal depth distribution of wild and stocked juvenile lake trout in Lake Champlain. *J. Great Lakes Res.* 47:252-258

Sea Lamprey Research Program:

Assessment

Towards a new tool for parasitic lamprey assessment – quantitative metrics of attack dynamics and host response

Alderman, S.

June 2021

Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2020_ALD_540970.pdf

Products:

- Bullingham, O.M.N., Firkhus, T.J., Goetz, R., Murphy, C.M., & Alderman, S.L. 2021. Lake trout clotting response acts as a plasma biomarker of sea lamprey parasitism: implications for management and wound assessment. Canadian Society of Zoologists. Virtual. (presentation)
- Bullingham OMN, Firkhus TJ, Goetz FW, Murphy CA, Alderman SL. Submitted. Lake charr (*Salvelinus namaycush*) clotting response may act as a plasma biomarker of sea lamprey (*Petromyzon marinus*) parasitism: implications for management and wound assessment. *Journal of Great Lakes Research*

Non-theme

Genetic assessment of Boardman River fish populations prior to dam removal

Larson, W.

December 2020

Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2018_LAR_79301.pdf

Products:

- Gehri, R.R., Gruenthal, K., & Larson, W.A. 2021. It's complicated: Heterogenous patterns of genetic structure in five fish species from a fragmented river suggest multiple processes can drive differentiation. *Evolutionary Applications*. <https://doi.org/10.1111/eva.13268>
- Gehri, R.R., Larson, W. A., Gruenthal, K., Sard, N. M., & Shi, Y. 2021. eDNA metabarcoding outperforms traditional fisheries sampling and reveals fine-scale heterogeneity in a temperate freshwater lake. *Environmental DNA*. <https://doi.org/10.1002/edn3.197>

Technical Assistance Program

Field evaluation of an improved solid TFM formulation for use in treating small tributary streams

Luoma, J.

May 2021

Abstract: http://www.glfc.org/pubs/pdfs/research/reports/2020_LUO_760150.pdf

Products:

- Luoma, J.A., Robertson, N.J., Schueller, J.R., Schloesser, N.A., Johnson T.J., Severson T.J., & Meulemans E.K. 2021. Field evaluation of an alternate solid TFM formulation for use in treating small tributary streams. Project completion report submitted to the Great Lakes Fisheries Commission. 20 pp.
- Luoma, J.A. 2021. Upper Midwest Environmental Sciences Center Lampricide Formulations Update. *Lamprey Control Task Force 21-01 virtual meeting*. February 09, 2021. (presentation)
- Luoma, J.A. 2020. Upper Midwest Environmental Sciences Center GLFC Technical Assistance Update. *Lamprey Control Task Force Standard Operating Procedure virtual meeting*. December 08, 2020. (presentation)

Other recent publications from previously funded GLFC projects (SLRP)*

*This list may not be all-inclusive

Adams, J.V., Barber, J.M., Bravener, G.A., & Lewandoski, S.A. 2021. Quantifying Great Lakes sea lamprey populations using an index of adults. *Journal of Great Lakes Research*.

<https://doi.org/10.1016/j.jglr.2021.04.009>

Chung-Davidson, Y.W., Bussy, U., Fissette, S.D., Scott, A.M., & Li, W. 2021. Bile acid production is life-stage and sex dependent and affected by primer pheromones in the sea lamprey. *Journal of Experimental Biology*, 224 (9), jeb229476. <https://doi.org/10.1242/jeb.229476>

- Criger, L. A., Barber, J. M., Bravener, G. A., Brenden, T. O., & Neave, F. B. 2021. The evolution of sea lamprey control in the St. Marys River: 1997–2019. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.03.014>
- Dunlop, E.S., Christie, M.R., McLaughlin, R., & Steeves, T.B. 2021. Life history evolution of sea lamprey is predicted to reduce the effectiveness of pesticide control. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.03.021>
- Evans, T. M., Wagner, C.M., Miehl, S.M., Johnson, N.S., Haas, T.F., Dunlop, E., & Manzon, R.G. 2021. Before the first meal: The elusive pre-feeding juvenile stage of the sea lamprey. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.02.005>
- Fisette, S.D., Buchinger, T.J., Wagner, C.M., Johnson, N.S., Scott, A.M., & Li, W. 2021. Progress towards integrating an understanding of chemical ecology into sea lamprey control. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.02.008>
- Grunder, S.A., Markham, J.L., Sullivan, W.P., Eilers, C., Tallon, K., & McGarry, D. 2021. A review of sea lamprey control in Lake Erie, 2000–2019. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.03.019>
- Holub, R.R., Bravener, G.A., & McLaughlin, R.L. 2021. A management-scale investigation of consistent individual differences in behaviour and trapping bias in Sea Lamprey (*Petromyzon marinus*). *Canadian Journal of Fisheries and Aquatic Sciences*, (ja). <https://doi.org/10.1139/cjfas-2019-0448>
- Hume, J.B., Bravener, G.A., Flinn, S., & Johnson, N.S. 2021. What can commercial fishery data in the Great Lakes reveal about juvenile sea lamprey (*Petromyzon marinus*) ecology and management? *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.03.023>
- Johnson, N.S., Lewandoski, S.A., & Merkes, C. 2021. Assessment of sea lamprey (*Petromyzon marinus*) diet using DNA metabarcoding of feces. *Ecological Indicators*, 125, 107605. <https://doi.org/10.1016/j.ecolind.2021.107605>
- Lawrence, M.J., Mitrovic, D., Foubister, D., Bragg, L.M., Sutherby, J., Docker, M.F., ... & Jeffries, K.M. 2021. Contrasting physiological responses between invasive sea lamprey and non-target bluegill in response to acute lampricide exposure. *Aquatic Toxicology*, 105848. <https://doi.org/10.1016/j.aquatox.2021.105848>
- Nelson, J., Rous, A.M., McLean, A.R., Barber, J., Bravener, G.A., Holbrook, C.M., & McLaughlin, R.L. 2021. Implications of tagging effects for interpreting the performance of sea lamprey traps in a large river. *Journal of Great Lakes Research*. 47(4): <https://doi.org/10.1016/j.jglr.2021.03.008>
- Robinson, K.F., Miehl, S.M., & Siefkes, M.J. 2021. Understanding sea lamprey abundances in the Great Lakes prior to broad implementation of sea lamprey control. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.04.002>

Schloesser, N., Boogaard, M., Johnson, T., Kirkeeng, C., Schueller, J., & Erickson, R. 2021. Use of an artificial stream to monitor avoidance behavior of larval sea lamprey in response to TFM and niclosamide. *Journal of Great Lakes Research*. 47(4): <https://doi.org/10.1016/j.jglr.2021.04.015>

Siefkes, M. J., Johnson, N. S., & Muir, A. M. 2021. A renewed philosophy about supplemental sea lamprey controls. *Journal of Great Lakes Research*. <https://doi.org/10.1016/j.jglr.2021.03.013>