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EDUCATION

Ph.D. The Ohio State University, Columbus, OH 2006.

M.S. Aquatic Ecology, Ocean University of China, Qingdao, Shandong Province, 1997.

B.S. Marine Aquaculture, Ocean University of China, Qingdao, Shandong Province, 1994.

PROFESSIONAL EXPERIENCE

2011-present: Assistant Research Scientist, CILER, SNRE, University of Michigan, Ann Arbor.

2007-2011: Research Investigator, CILER, SNRE, University of Michigan, Ann Arbor.

1997-1999: Research Fellow, Institute of Oceanology, Chinese Academy of Sciences, Qingdao,

PUBLICATIONS

1. **Zhang, H.**, Boegman, L., Scavia, D., Culver, D.A., 2016. Spatial distributions of external and internal phosphorus loads in Lake Erie and their impacts on phytoplankton and water quality. *J. Great Lakes Res.* 42, 1212-1227.
2. Lodge, D.M., Simonin, P.W., Burgiel, S.W., Keller, R.P., Bossenbroek, J.M., Jerde, C.L., Kramer, A.M., Rutherford, E.S., Barnes, M.A., Wittmann, M.E., Chadderton, W.L., Apriesnig, J.L., Beletsky, D., Cooke, R.M., Drake, J.M., Egan, S.P., Finnoff, D.C., Gantz, C.A., Grey, E.K., Hoff, M.H., Howeth, J.G., Jensen, R.A., Larson, E.R., Mandrak, N.E., Mason, D.M., Martinez, F.A., Newcomb, T.J., Rothlisberger, J.D., Tucker, A.J., Warziniack, T.W., and **Zhang, H.** 2016. Risk Analysis and Bioeconomics of Invasive Species to Inform Policy and Management. *Annual Review of Environment and Resources* **41**(1):453-488.
3. **Zhang, H.**, Rutherford, E. S., Mason, D. M., Breck, J. T., Wittmann, M. E., Cooke, R. M., Lodge, D. M., Rothlisberger, J. D., Zhu, X. and Johnson, T. B. 2016. Forecasting the impacts of Silver and Bighead Carp on the Lake Erie food web. *Transaction of American Fisheries Society*, 145:136-162.
4. Wedchaparn, O., Zhao, L., Fan, Y., He, D., **Zhang, H.**, Ivan, L.N., Liu, Q., and Ayisi, C.L. 2016. Comparison of the trophic niches between two planktivorous fishes in two

- large lakes using stable isotope analysis. *Biochemical Systematics and Ecology*, 68: 148-155.
5. Cooke, R.M., Wittmann, M.E., Lodge, D.M., Rothlisberger, J.D., Rutherford, E.S., **Zhang, H.**, Mason, D.M. 2014. Out-of-sample validation for structured expert judgment of Asian carp establishment in Lake Erie. *Integrated Environmental Assessment and Management*, 10: 522-528.
 6. Wittmann, M.E., Cooke, R.M., Rothlisberger, J.D., Rutherford, E.S., **Zhang, H.**, Mason, D.M., Lodge, D.M. 2014. Use of structured expert judgment to forecast invasions by Bighead and Silver Carp in Lake Erie. *Conservation Biology*, DOI: 10.1111/cobi.12369.
 7. **Zhang, H.**, Mason, D.M., Stow, C., Adamack, A.T., Brandt, S.B., Zhang, X., Kimmel, D. G., Roman, M.R., Boicourt, W.C., and Ludsins, S.A. 2014. Effects of hypoxia on habitat quality of pelagic planktivorous fishes in the Northern Gulf of Mexico. *Marine Ecology Progress Series*, 505: 209-226.
 8. Scavia, D., Allan, J.D., Arend, K.K., Bartell, S., Beletsky, D., Bosch, N.S., Brandt, S.B., Briland, R.D., Daloglu, I., DePinto, J.V., Dolan, D.M., Evans, M.A., Farner, T.M., Goto, D., Han, H., Hook, T.O., Knight, R., Ludsins, S.A., Mason, D.M., Michalak, A.M., Richards, R.P., Roberts, J.J., Rucinski, D.K., Rutherford, E.S., Schwab, D.J., Sesterhenn, T., **Zhang, H.**, and Zhou, Y. 2014. Assessing and addressing the re-eutrophication of Lake Erie: Central basin hypoxia. *Journal of Great Lakes Research*, 40:226-246.
 9. Langseth, B.J., Rogers, M., and **Zhang, H.** 2012. Modeling species invasions in Ecopath with Ecosim: An evaluation using Laurentian Great Lakes models. *Ecological Modelling*, 247: 251-261.
 10. Brandt, S.B., Costantini, M., Kolesar, S., Ludsins, S.A., Mason, D.M., Rea, C.M., and **Zhang, H.** 2011. Does hypoxia improve habitat quality for Lake Erie walleye? A bioenergetics perspective. *Canadian Journal of Fisheries and Aquatic Sciences*, 68: 857-879
 11. **Zhang, H.**, Culver, D.A., and Boegman, L. 2011. Dreissenids in Lake Erie: an algal filter or a fertilizer? *Aquatic Invasion*, 6: 175-194.
 12. Conroy, J.D., Boegman, L., **Zhang, H.**, Edwards, W.J., Culver, D.A. 2011. "Dead Zone" dynamics in Lake Erie: The importance of weather and sampling intensity for calculated hypolimnetic oxygen depletion rates. *Aquatic Sciences*, 73: 289-304.
 13. Xia, M., Craig, P.M., Schaeffer, B., Stoddard, A., ASCE, A.M., Liu, Z., Peng, M., **Zhang, H.**, Wallen, C.M., Bailey, N., Mandrup-Poulsen, J. 2010. The influence of physical forcing on bottom-water dissolved oxygen within the Caloosahatchee River Estuary, FL. *J. Environ. Eng. - ASCE*
 14. **Zhang, H.**, Ludsins, S.A., Mason, D.M., Adamack, A.T., Brandt, S.B., Zhang, X., Kimmel, D.G., Roman, M.R., Boicourt, W.C. 2009. Hypoxia-driven changes in the behavior and spatial distribution of pelagic fish and mesozooplankton in the Northern Gulf of Mexico. *Journal of Experimental Marine Biology and Ecology*, 381: 80-91.
 15. Culver, D.A., Conroy, J.D., Tyson, J.T., Crane, V.C., and **Zhang, H.** 2009. "Optimal" P loading in large lakes affects fish communities: Do you prefer walleye or yellow perch? *Verhandlungen des Internationalen Verein Limnologie*, 30: 1070-1072.

16. **Zhang, H.**, Culver, D.A., and Boegman, L. 2008. A two-dimensional ecological model of Lake Erie: Application to estimate dreissenid impacts on large lake plankton populations. *Ecological Modelling*, 214: 219-241.
17. Zhang, G., Li, C., Sun, S., **Zhang, H.**, Sun, J., and Ning, X. 2006. Feeding habits of *Calanus sinicus* (Crustacea: Copepoda) during spring and autumn in the Bohai Sea studied with the herbivore index. *Scientia Marina*, 70: 381-388.
18. Conroy, J.D., Edwards, W.J., Pontius R.A., Kane D.D., **Zhang, H.**, Shea J.F., Richey J.N., and Culver, D.A. 2005. Soluble nitrogen and phosphorus excretion of exotic freshwater mussels (*Dreissena* spp.): Potential impacts for nutrient remineralization in western Lake Erie. *Freshwater Biology*, 50: 1146-1162.
19. Wang, R., **Zhang, H.**, Wang, K., and Zuo, T. 2002. Distribution and population dynamics of *Paracalanus parvus*, *Paracalanus crassirostris*, and *Acartia bifilosa* (Copepoda, Calanoida) in the Bohai Sea. *Chinese Journal of Oceanology and Limnology*. 20: 348-357.
20. Wang, R., **Zhang, H.**, Wang, K., and Zuo, T. 2002. Function performed by small copepods in marine ecosystem. *Oceanologia et Limnologia Sinica*, 33: 453-460.
21. Wang Y, **Zhang, H.**, and Qi. Z. 2000. Ecological effects of tilapia stocked in seawater experimental enclosures. *Acta Oceanologica Sinica*, 22: 81-87.
22. Yang, H., Li, D., Dong, S., Lu, J., Xu, N., and **Zhang, H.** 2000. Fish productivity and carrying capacity of fertilized seawater ponds for tilapia culture. *Oceanologia et Limnologia Sinica*, 31: 117-122.
23. Wang Y, **Zhang, H.** 1999. Ingestion of copepod on *Prorocentrum micans* in seawater experimental enclosures. *Chinese Journal of Applied Ecology*, 10: 489-491.
24. **Zhang, H.**, Li, D., and Wang, Y. 1999. The impacts of tilapia polycultured in shrimp ponds on the structure of plankton communities. *Journal of Fishery Sciences of China*, 6: 114-116.
25. Wang Y, **Zhang, H.** 1999. Studies on primary production in seawater experimental enclosures with different monoculture and polyculture. *Journal of Fisheries of China*, 23: 138-143.
26. Wang Y, Qi Z, **Zhang H.** 1999. Studies on water chemistry of seawater experimental enclosures with different monoculture and polyculture. *Journal of Fisheries of China*, 23: 350-356.
27. **Zhang, H.**, Li, D., and Wang, Y. 1998. The impact of constricted tagelus polycultured in shrimp ponds on the structure of plankton communities. *Journal of Ocean University of Qingdao*, 28: 210-216.
28. Wang, Y. **Zhang, H.**, and Qi, Z. 1998. Occurrence and effects of harmful bloom caused by *Prorocentrum micrans* in seawater experimental enclosures. *Journal of Fisheries of China*, 22: 218-222.
29. Li, D, Lu, J., Xu, N., Liu, G, and **Zhang, H.** 1998. A device for *in situ* sediment-respiration-determining apparatus used in pond. *Journal of Ocean University of Qingdao*, 28: 204-209.

30. Lu, J., **Zhang, H.**, Li, D., Lei, Y., and Xu, K. 1997. Population growth and production estimation of planktonic ciliates in a fertilized seawater enclosure. *Journal of Fishery Sciences of China*, 4: 50-54.
31. Lu, J., Li, D., and **Zhang, H.** 1997. Bacterioplankton secondary production estimates for artificially fertilized shrimp pond. *Chinese Journal of Oceanology and Limnology*, 15: 92-96.
32. Lu J., Li D., Yang H, Xu N, **Zhang H.** 1997. Interactions between plankton and shellfish in fish-shellfish polyculture ecosystem of fertilized seawater pond. *Journal of Fisheries of China* 21: 158-164.
33. Lu, J., Li, D., Yang, H., Xu, N., and **Zhang, H.** 1996. Preliminary studies of phytoplankton in enclosed tilapia-rearing ecosystems in seawater ponds in Laizhou Bay. *Journal of Fishery Sciences of China*, 3: 56-63.

OTHER PUBLICATIONS

Great Lakes Water Quality Agreement Nutrient Annex Draft Ensemble Modeling Report. Modeling Subgroup, Ann Arbor, MI. March 2015.

Currie, W.J.S., Cuddington, K.M.D., Stewart, T.J., **Zhang, H.** and Koops, M.A. 2012. Modelling spread, establishment and impact of Bighead and Silver Carps in the Great Lakes. DFO Canadian Science Advisory Secretariat Research Document 2011/113. vi + 74 p. http://www.dfo-mpo.gc.ca/Csas-sccs/publications/resdocs-docrech/2011/2011_113-eng.pdf

Stewart, T.J., **Zhang, H.**, and Currie, W.J.S. 2012. Preliminary assessment of the trophic consequences of Asian Carp establishment in offshore Lake Ontario. DFO Canadian Science Advisory Secretariat Research Document 2011/113. Page 58-73.

RECOGNITIONS AND AWARDS

Chandler-Misener Award (for most notable paper), International Association for Great Lakes Research, 2015, <http://www.iaglr.org/as/cm.php>

Scavia, D., Allan, J.D., Arend, K.K., Bartell, S., Beletsky, D., Bosch, N.S., Brandt, S.B., Briland, R.D., Daloglu, I., DePinto, J.V., Dolan, D.M., Evans, M.A., Farner, T.M., Goto, D., Han, H., Hook, T.O., Knight, R., Ludsins, S.A., Mason, D.M., Michalak, A.M., Richards, R.P., Roberts, J.J., Rucinski, D.K., Rutherford, E.S., Schwab, D.J., Sesterhenn, T., **Zhang, H.**, and Zhou, Y. 2014. Assessing and addressing the re-eutrophication of Lake Erie: Central basin hypoxia. *Journal of Great Lakes Research*, 40:226-246.

PRESENTATIONS (2016-2018)

Apriesnig, J.L., Warziniack, T.W., Finnoff, D.C., Zhang, H., Rutherford, E.S., Lee, K.D., Breck, J., and Wittmann, M. A coupled bioeconomic model of a regional economy and an aquatic food web. The International Institute of Fisheries Economics & Trade: Adapting to a Changing World – Challenges and Opportunities, Seattle, OR. July 16-20, 2018

- Boucher, N*, **Zhang, H.**, Rutherford, E., Mason, D., Bunnell, D., and Hu, H. Investigating the effects of climate change in Lake Michigan using the Atlantis Ecosystem Model. IAGLR 2018, Great Science for Tomorrow's Solutions. Toronto, Canada, June18-22, 2018
- Rutherford, E., **Zhang, H.**, Kao, Y., Mason, D., Shakoor, A., Lodge, D., Chadderton, L. Predicted biomass and food web impacts of bigheaded carp across Great Lakes habitats. IAGLR 2018, Great Science for Tomorrow's Solutions. Toronto, Canada, June18-22, 2018
- Alsip, P.*, **Zhang, H.**, Rowe, M., Mason, D., Rutherford, E., Riseng, C., and Su, Z. Habitat suitability assessment for bigheaded carp using 3D water quality data from Lake Michigan. IAGLR 2018, Great Science for Tomorrow's Solutions. Toronto, Canada, June18-22, 2018
- Rowe, M., Anderson, E.J., Lang, G., Ruberg, S., Moegling, S., Verhamme, E., Beletsky, D., **Zhang, H.**, Johengen, T.H., and Stow, C. Development of a hypoxia forecast model for Lake Erie: Retrospective analysis of the first season. IAGLR 2018, Great Science for Tomorrow's Solutions. Toronto, Canada, June18-22, 2018
- Alsip, P.*, **Zhang, H.**, Rowe, M., Rutherford, E., Mason, D., Riseng, C., and Su, Z. Modeling bioenergetic habitat suitability for invasive bigheaded carp in Lake Michigan. The 2018 Ocean Science Meeting, Portland, OR. February 11-16, 2018
- Rowe, M., Anderson, E.J., Ruberg, S., Beletsky, D., **Zhang, H.**, Johengen, T.H., Moegling, S., Verhamme, E.M., and Stow, C. Coastal upwelling dynamics influence spatial patterns of hypoxia and nearshore hypoxia events in the central basin of Lake Erie. The 2018 Ocean Science Meeting, Portland, OR. February 11-16, 2018
- Zhang, H.**, Rutherford, E., Mason, D., Harris, T., Weimer, E., and B. Miller. Identifying nutrient tipping points for water quality and fishery production in western Lake Erie. State of Lake Michigan Conference, Green Bay, WI. Nov 7-10, 2017.
- Alsip, P.*, **Zhang, H.**, Rowe, M., Mason, D., Rutherford, E, Riseng, C., and Su, Z. Habitat suitability assessment for Asian carp using 3D water quality data from Lake Michigan. State of Lake Michigan Conference, Green Bay, WI. Nov 7-10, 2017.
- Boucher, N*, **Zhang, H.**, Rutherford, E, Mason, D. and Hu, H. Simulating spatial variability in Lake Michigan food web dynamics using an Atlantis Ecosystem Model. State of Lake Michigan Conference, Green Bay, WI. Nov 7-10, 2017.
- Weiskerger, C*, Rowe, M., **Zhang, H.**, Stow, C., Davis, T., and Stuart, D. Using water quality parameters to predict light attenuation in western Lake Erie. State of Lake Michigan Conference, Green Bay, WI. Nov 7-10, 2017.
- Zhang, H.**, Rutherford, E., and Mason, D. Modeling nutrient loads to improve water quality and maintain fishery production in Lake Erie. The 2017 annual meeting of American Fisheries Society, Tampa, FL, August 20-24, 2017.
- Zhang, H.**, Rowe, M.D., Johengen, T.H., Anderson, E.J., and Ruberg, S.A. Modeling succession of algal functional groups associated with Lake Erie harmful algal blooms. IAGLR 2017 from Cities to Farms: Shaping Great Lakes Ecosystems. Detroit, MI. May 15-19, 2017

- Rowe, M.D., Anderson, E.J., Ruberg, S.A., Moegling, S., Verhamme, E.M., Beletsky, D., **Zhang, H.**, Johengen, T.H., and Stow, C.A. Modling dissolved oxygen dynamics near drinking water intakes in the central basin of Lake Erie. IAGLR 2017 from Cities to Farms: Shaping Great Lakes Ecosystems. Detroit, MI. May 15-19, 2017
- Ouyan, W., Rowe, M.D., and **Zhang, H.** Skill assessment of the Lake Erie HAB Tracker Forecast Model using variable spatial neighborhoods. Poster. IAGLR 2017 from Cities to Farms: Shaping Great Lakes Ecosystems. Detroit, MI. May 15-19, 2017
- Stow, C.A., Rowe, M.D., Ruberg, S.A., Johengen, T.H., **Zhang, H.**, Beletsky, D., Joshi, S.J., Collingsworth, P., Mason, D.M., Kraus, R.T. And Anderson, E.J. **Lake Erie Hypoxia Forecasting for Public Water Systems Decision Support.** IAGLR 2017 from Cities to Farms: Shaping Great Lakes Ecosystems. Detroit, MI. May 15-19, 2017
- Zhang, H.**, Mason, D., Ivan, L., and Rutherford, E.S. Modeling potential effects of bighead and silver carp on Great Lakes food webs. Canada AIS Centre. Mar 28, 2017. Webinar
- Zhang, H.**, Rutherford, E., Mason, D., Johnson, T., Zhu, X., Adamack, A., Gorman, A., Kayle, K., and Scavia, D. Ecosystem level assessment of hypoxia impacts on the food web and fisheries of Lake Erie. ASLO 2017, Honolulu, HI, February 26 – March 3, 2017
- Rowe, M.D., Anderson, E.J., Ruberg, S.A., Verhamme, E.M., Beletsky, D., **Zhang, H.**, Johengen, T.H., and Stow, C.A. Investigation of a hydrodynamic forecast model as a predictor of dissolved oxygen dynamics near public water system intakes in the central basin of Lake Erie. ASLO 2017, Honolulu, HI, February 26 – March 3, 2017
- Zhang, H.**, Rutherford, E.S, Mason, D. M., Ivan, L., Campbell-Arvai, V., Beletsky, D., Hoff, M., and Fulton, E. Ecosystem and Fisheries Impacts of Asian Carp on Lake Michigan - the Atlantis Ecosystem Model Approach. The 2016 annual meeting of American Fisheries Society, Kansas City, MO, August 21-26, 2016

STUDENTS

- Tony Harris, Doris Duke Conservation Scholar, June-July, 2017. Implications of phosphorus reduction for sustainable Great Lakes fisheries.
- Rachel Fadlovich. GLERL-CILER Summer Fellow, 2017. Ecosystem modeling
- Chelsea Weiskerger. GLERL-CILER Summer Fellow, 2017. Water quality statistical modeling.
- Nicholas Boucher, SNRE Thesis Master Student 2016-2018.
- Peter Alsip, SNRE Thesis Master Student 2016-2018.
- Wanqi Ouyang, SNRE Master Project. Feb. 2016-April 2017.
- Emily Murphy, Doris Duke Conservation Scholar, June-July, 2016. Implications of phosphorus reduction for sustainable Great Lakes fisheries.
- Ryan Anderson, Doris Duke Conservation Scholar, June-July, 2016. Implications of phosphorus reduction for sustainable Great Lakes fisheries.
- Raquel Goosey, undergraduate student, May, 2016 –May 2017. Potential impacts of Asian carp on Muskegon Lake.

Cody Yarbrough, CILER/GLERL Summer Fellow May-July, 2016. Fish spatial distribution in Lake Michigan – A hydroacoustic approach.

Maria Hernandez, CILER/GLERL Summer Fellow May-July, 2016. Ecosystem-based Modeling of Remediation Action Effects on the Lake Erie Food Web.

Lillian McGill, CILER/GLERL Summer Fellow May-Aug, 2015. Ecosystem-based Modeling of Remediation Action Effects on the Lake Erie Food Web.

Kyle Dettloff, CILER/GLERL Summer Fellow May-Aug, 2015. Advancing Dreissenid Mussel Biomass and Growth Estimates.

Sherika Gibson, CILER/GLERL Summer Fellow Jun-Nov, 2014. Using an ecosystem-based model to study the spatiotemporal impacts of remediation actions on the Lake Erie food web.

Ali Shakoor, hourly graduate student Jul 2013-Jun 2014. Lake Michigan Ecopath with Ecosim mode. Mentor.

Wan-Ning Chen, graduate student. Volunteered on impacts of trace organic matter on aquatic food web during her graduate studies. May-Sept 2013. Currently volunteer on constructing Atlantis ecosystem model for Lake Huron. Sept 2014- present. Mentor.

Xin Xu, hourly MS graduate. Jul-Oct. 2014. Eutrophication in Lake Erie using the Ecological model of Lake Erie that I developed during my Ph.D. research. Mentor.

Kiefer Forsch, CILER/GLERL Summer Fellow Jun-Aug 2013. Using an ecosystem-based model to study the spatiotemporal impacts of remediation actions on the Lake Erie food web. Mentor.

Linsay Cain, Master graduate student, 2012. SNRE, University of Michigan. Committee member.

Li, Miling, CILER/GLERL Summer Fellow May-Aug 2011. Impacts of seasonal hypoxia on the bioaccumulation of methylmercury through the food web in the central basin of Lake Erie. Mentor.

Keith Hayse-Gregson, CILER/GLERL Summer Fellow Jun-Aug 2011. Constructing an Ecopath model of Lake Michigan. Mentor.