Taylor R. Stewart, Ph.D.

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Professional Experience

Regional Aquatic Biologist 10/2022 – Present
Utah Division of Wildlife Resources

Research Fish Biologist/Postdoctoral Associate 11/2021 – 09/2022
U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit
Mississippi State University, Department of Wildlife, Fisheries, and Aquaculture

Student Contractor (Fisheries) 06/2020 – 01/2021
U.S. Geological Survey, Lake Superior Biological Station

Graduate Research Assistant 05/2016 – 10/2021
University of Vermont, Department of Biology

Student Contractor (Fisheries) 05/2014 – 05/2016
U.S. Geological Survey, Lake Erie Biological Station

Fisheries Research Technician 01/2012 – 05/2014
U.S. Geological Survey, Lake Superior Biological Station

Education

Ph.D. University of Vermont, Department of Biology
2021 Dissertation title: "Changing Environmental Conditions and the Response and Potential Adaptability of Freshwater Whitefishes"
Advisor: Dr. Jason D. Stockwell

B.S. Northland College, Natural Resources (Fisheries & Wildlife Ecology)
2014 Senior thesis: "Age, Growth, and Size of Lake Superior Pygmy Whitefish (*Prosopium coulterii*)"
Advisor: Dr. Derek H. Ogle

Peer-Reviewed Publications

* indicates undergraduate mentee
^ indicates awarded the Elsevier Student Author Award for Most Notable Paper in '21 J. of Great Lakes Res.

7. **Stewart, T.R.**, M.R. Vinson, and J.D. Stockwell. 2022. Effects of warming winter embryo incubation temperatures on larval cisco (*Coregonus artedi*) survival, growth, and critical thermal maximum. J. Great Lakes Res. PDF
6. ^**Stewart, T.R.**, M.R. Vinson, and J.D. Stockwell. 2021. Shining a light on Laurentian Great Lakes cisco (*Coregonus artedi*): how ice coverage may impact embryonic development. J. Great Lakes Res. 47(5):1410-1418. PDF
5. **Stewart, T.R.**, M. Mäkinen, C. Goulon, J. Guillard, T.J. Marjomäki, E. Lasne, J. Karjalainen, and J.D. Stockwell. 2021. Influence of warming temperatures on coregonine embryogenesis within and among species. Hydrobiologia. 848(18):4363-4385. PDF
4. Lucke, V.S., **T.R. Stewart**, M.R. Vinson, J.D. Glase, and J.D. Stockwell. 2020. Spring larval *Coregonus* diets and zooplankton community patterns in the Apostle Islands, Lake Superior. J. Great Lakes Res. 46(5):1391-1401. PDF
3. *Sorrentino, M.G., **T.R. Stewart**, J.E. Marsden, and J.D. Stockwell. 2020. Stockwell. Differential Lipid Dynamics in Stocked and Wild Juvenile Lake Trout. J. Great Lakes Res. 46(2):376-381. PDF
2. Kraus, R.T., C.M. Holbrook, C.S. Vandergoot, **T.R. Stewart**, M.D. Faust, D. Watkinson, C. Charles, M. Pegg, E. Enders, and C.C. Krueger. 2018. Evaluation of Acoustic Telemetry Grids for Determining Aquatic Animal Movement and Survival. Methods Ecol. Evol. 9(6):1489–1502. PDF

1. **Stewart, T.R.**, D.H. Ogle, O.T. Gorman, and M.R. Vinson. 2016. Age, Growth, and Size of Lake Superior Pygmy Whitefish (*Prosopium coulterii*). Am. Midl. Nat. 175(1):24–36. PDF

In Preparation (drafts available upon request):

Stewart, T.R., T.L. Cox, M.E. Colvin, C.G. Dunn, M.W. Rogers, and L.E. Miranda. Simulation tools for estimating statistical power to monitor invasive carps.

Stewart, T.R., M. Zucchetta, J. Karjalainen, C. Goulon, O. Anneville, M.R. Vinson, J. Wanzenböck, and J.D. Stockwell. Winter is not coming: a model to evaluate impacts of changing winter conditions on coregonine spawning and embryo incubation.

Lasne, E., **T.R., Stewart**, C. Brun, C. Goulon, M. Daufresne, J.D. Stockwell, and J. Guillard. Experimental evidence of strong divergences of European whitefish *Coregonus lavaretus* (L.) embryos' response to temperature increases in Fennoscandia and perialpine populations.

FUNDED GRANTS

2020 – Vinson, M.R., **T.R. Stewart**, and J.D. Stockwell. Quantifying a potential mechanism between ice cover and cisco recruitment success: what role does light play in cisco embryonic development and larval survival? Great Lakes Restoration Initiative: **$30,250**

2019 – **Stewart, T.R.** and J.D. Stockwell. Influence of changing lake temperatures on early life stages of freshwater whitefishes at local to global scales: modeling and experimental approaches. Vermont Water Resources and Lake Studies Center: **$41,737**

2018 – Stockwell, J.D. and **T.R. Stewart**. Workshop to Establish a Collaborative Global Experiment to Understand Coregonid Adaptive Response to Changing Thermal Regimes. National Science Foundation: **$14,865**

2017 – Vinson, M.R., **T.R. Stewart**, and J.D. Stockwell. Lake Superior Larval Cisco Population Dynamics. Great Lakes Restoration Initiative: **$125,000**

2016 – Vinson, M.R., **T.R. Stewart**, and J.D. Stockwell. Lake Superior *Coregonus artedi* Egg Development and Larvae Survival Dynamics. Great Lakes Restoration Initiative: **$225,000**

SCHOLARSHIPS & AWARDS

2022 – Elsevier Student Author Award for Most Notable Paper in '21 Journal of Great Lakes Research
2017 – 13th International Coregonid Symposium General Student Travel Award
2014 – Northland College's Natural Resources Department Merit Award
2014 – Northland College's Matthew Berg Endowed Award

RESEARCH EXPERIENCE

2021 – Present, **Research Fish Biologist/Postdoctoral Associate, U.S. Geological Survey, Mississippi Cooperative Fish and Wildlife Research Unit, Mississippi State University.**

40 hrs/wk; $50,000/yr

Project(s): (1) Coordinated and built a web-based application in R to provide data integration and analytics tools for invasive carps for state, federal, and academic partners within the Tennessee and Cumberland rivers. The application allowed partners to standardize, store, and analyze inter-agency datasets. The goal of the application was to permit fishery managers to quickly describe the distributions of invasive carps and estimate several population attributes at spatial and temporal scales that would be cumbersome otherwise. (2) Developed an R package to simulate statistical power of varying changes across a range of relative abundance, sampling efforts, and gear types. The simulations allowed fishery managers to evaluate surveillance and management effectiveness in invasive carps monitoring programs. (3) Fit gillnet selectivity models to estimate gear bias in invasive carps size structure analyses. (4) Developed a Bayesian belief network to guide an adaptive decision making framework for invasive carps in oxbow lakes within the Mississippi Alluvial Valley.

Duties: Managed, designed, and executed the development of a web-based data analysis application in R alongside coding project-specific data analyses. Primary duties included: writing, organizing, and annotating all code (R, HTML, and JavaScript) for the web application, analyses, and database integration in an

accessible, replicable, and well documented format; developing project objectives, collaborations, and timelines for research; writing peer-reviewed manuscripts and project reports; presenting research findings to stakeholders and fishery managers.

Collaborators: Mississippi Department of Wildlife, Fisheries and Parks; Alabama Wildlife and Freshwater Fisheries; Tennessee Tech University; Tennessee Wildlife Resources Agency; Kentucky Department of Fish and Wildlife Resources; U.S. Fish & Wildlife Service

2020 – 2021, **Student Contractor (Fisheries), U.S. Geological Survey, Lake Superior Biological Station.**

40 hrs/wk; $18.01/hr

Project(s): Led a laboratory experiment to evaluate how cisco (*Coregonus artedi*) embryos responded to different photoperiod intensities, as a proxy for different ice coverage regimes.

Duties: Led, designed, and executed an experimental laboratory study. Primary duties included: developing project objectives and timelines for research; implementing standardized experimental design protocols; designing and constructing a laboratory aquaculture system; conducting broodstock field collections, fish husbandry, disease sampling, and early-life fish sampling; developing analyses in R; writing project reports, animal use and care permits, fish importation permits, and peer-reviewed manuscripts.

Collaborators: University of Vermont

2016 – 2021, **Graduate Research Assistant, University of Vermont, Department of Biology.**

40 hrs/wk; $27,377/yr

Project(s): (1) Led a multi-laboratory experiment to evaluate the reaction norms of coregonine embryos within and among species from multiple sampling locations across North America and Europe to a standardized thermal gradient during incubation. (2) Led a laboratory experiment to estimate how cisco embryo incubation temperatures influenced the survival and performance of hatching larvae within and between two Great Lakes populations. (3) Developed population-specific temperature-dependent coregonine embryo development models to investigate how simulated future water temperatures from climate model outputs may influence coregonine reproductive phenology for populations across North America and Europe. (4) Evaluated global remote sensing outputs to assess if seasonal water temperature and ice concentration regimes have changed in response to major climatic events.

Duties: Led, designed, and executed modeling and laboratory studies in North America and Europe. Primary duties included: developing project objectives, collaborations, and timelines for research; coordinating and delegating work to be accomplished by project collaborators across three laboratories and two continents; implementing standardized experimental design protocols; designing and constructing multiple laboratory aquaculture systems; conducting broodstock field collections, fish husbandry, disease sampling, and early-life fish sampling; developing analyses in R; quantifying the variability in phenotypes induced by parental effects (i.e., heritability); supervising multiple laboratory technicians; writing project reports, animal use and care permits, fish importation permits, and peer-reviewed manuscripts.

Collaborators: U.S. Geological Survey; University of Jyväskylä (Finland); National Research Institute for Agriculture, Food and Environment (France); Institute of Polar Sciences (Italy); University of Innsbruck (Austria); Wisconsin Department of Natural Resources; New York Department of Environmental Conservation; Vermont Fish and Wildlife Department

2014 – 2016, **Student Contractor (Fisheries), U.S. Geological Survey, Lake Erie Biological Station.**

40 hrs/wk; $16.47/hr

Duties: Performed as a deck-hand, engineer, technician, and biologist on board the USGS Research Vessel Muskie and small vessels. Primary duties included: deploying bottom and midwater trawls, gill and plankton nets, sonde, and Ponar grab samplers; collecting biological information (length, weight, sex, maturity, age-class) from fish catches, fish tissue, organ, stomach, and aging samples, and water quality samples; analyzing benthic invertebrates samples, fish diets, and hydroacoustic data; deploying and retrieving acoustic telemetry receivers; surgical implanting acoustic telemetry transmitters in fish; building and repairing sampling gear; performing vessel maintenance; writing annual reports and a peer-reviewed manuscript.

Collaborators: Ohio Department Of Natural Resources; Michigan Department Of Natural Resources; New York State Department of Environmental Conservation; Pennsylvania Department of Conservation and Natural Resources; Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry; Great Lakes Fishery Commission

2012 – 2014, **Fisheries Research Technician, U.S. Geological Survey, Lake Superior Biological Station.**
20 hrs/wk; $10.50/hr

Duties: Performed as a deck-hand, technician, and biologist on board the USGS Research Vessel Kiyi and small vessels. Primary duties included: deploying bottom and midwater trawls, gill, fyke, trap, and plankton nets, sonde, and Ponar grab samplers; collecting biological information (length, weight, sex, maturity, age-class) from fish catches, fish tissue, organ, stomach, and aging samples, and water quality samples; analyzing zooplankton, mysid, and fish diet samples for predator-prey and food web modeling; building and repairing sampling gear; performing vessel maintenance; recording data in an Oracle database; writing annual reports and a peer-reviewed manuscript.

Collaborators: Northland College; University of Minnesota Duluth; Great Lakes Fishery Commission

PROFESSIONAL PRESENTATIONS

Oral Conference Presentation:

Stewart, T.R., T.L. Cox, M.E. Colvin, C.G. Dunn, M.W. Rogers, and L.E. Miranda. Simulation tools for estimating statistical power to monitor invasive carps. 152nd Annual Meeting of the American Fisheries Society. Spokane, WA. August 2022.

Stewart, T.R., M. Makenen, Brun, C., C. Goulon, J. Guillard, E. Lasne, J. Karjalainen, and J.D. Stockwell. Influence of changing lake temperatures on coregonine embryogenesis at local to global scales. 14th International Coregonid Symposium (WebCoregonid2020). June 2020. Video

Stewart, T.R., M. Zucchetta, J. Karjalainen, C. Goulon, O. Anneville, M.R. Vinson, J. Wanzenböck, I.J. Winfield, and J.D. Stockwell. A Modeling Approach to Better Understand Impacts of Changing Thermal Habitat on Coregonine Spawning and Egg Incubation Across Latitudes and Continents. European Large Lakes Symposium- International Association of Great Lakes Research. Evian-les-Bains, France. September 2018.

Stewart, T.R., E. Lasne, C. Goulon, J. Guillard, M.R. Vinson, J. Wanzenböck, I.J. Winfield, and J.D. Stockwell. Coregonines in the Face of Climate Change: A Collaborative Global Experiment. 148th Annual Meeting of the American Fisheries Society. Atlantic City, NJ. August 2018.

Stewart, T.R., M.R. Vinson, and J.D. Stockwell. Effect of Photoperiod Intensity on Cisco (*Coregonus artedi*) Egg Development. 13th International Coregonid Symposium. Bayfield, WI. September 2017.

Stewart, T.R., D.H. Ogle, O.T. Gorman, and M.R. Vinson. Age, Growth, and Size of Lake Superior Pygmy Whitefish. 145th Annual Meeting of the American Fisheries Society. Portland, OR. August 2015.

Poster Conference Presentation:

Stewart, T.R., M.E. Colvin, C.G. Dunn, M.W. Rogers, and L.E. Miranda. Teamwork makes the dream work: an app to standardize inter-agency invasive carps surveillance. 152nd Annual Meeting of the American Fisheries Society. Spokane, WA. August 2022.

Stewart, T.R., M.R. Vinson, and J.D. Stockwell. Effect of Photoperiod Intensity on Cisco (*Coregonus artedi*) Egg Development. University of Vermont Student Research Conference. Burlington, VT. April 2019.

Stewart, T.R., A.M. Muir, M.R. Vinson, K.R. Newman, and J.D. Stockwell. Opportunities and Constraints for Coregonid Response to a Changing Environment: A Global Assessment. 13th International Coregonid Symposium. Bayfield, WI. September 2017.

Stewart, T.R., M.R. Vinson, and J.D. Stockwell. Effect of Photoperiod Intensity on Cisco (*Coregonus artedi*) Egg Development. 60th Annual International Association of Great Lakes Research Meeting. Detroit, MI. May 2017.

Stewart, T.R., D.H. Ogle, and M.R. Vinson. Age and Growth of Pygmy Whitefish, *Prosopium coulterii*, in Lake Superior. Wisconsin Chapter of the American Fisheries Society Annual Meeting. Green Bay, WI. February 2013.

Invited Speaker:

2022 – *"Teamwork makes the dream work: an app to standardize inter-agency invasive carps surveillance."*, Ohio River Basin Invasive Carp Partnership

2017 – *"Physiological consequences of changes in photoperiod intensity on cisco (Coregonus artedi) recruitment"*, U.S. Geological Survey, Great Lakes Science Center

2015 – *"Online Data Reporting & Visualization Tools"*, Lake Erie Committee Meeting

2015 – *"Status and Trends of Forage Fish in Western Basin of Lake Erie"*, Lake Erie Committee, Forage Task Group Meeting

COMPUTATIONAL SKILLS

R – Statistical software for data analysis and visualization

(R)Markdown – Integrative word processing and technical reporting

GitHub – Reproducible science through version control and online notebooks

FB4 – Fish bioenergetics modeling

lme4 – Fit linear and generalized linear mixed-effects models in R

RStan – C++ library for Bayesian modeling and inference

rjags – Bayesian data analysis using Markov Chain Monte Carlo simulations in R

Shiny – Interactive web-based apps for data reporting & visualization

Highcharts – JavaScript charting library

ArcGIS – Spatial analysis software for mapping & visualization

VUE – VEMCO acoustic monitoring software

SAS – Statistical software for data analysis and visualization

Microsoft Office – Data preparation, organization, and word processing

SQL – Database management

HTML – Website development

DATA APPLICATIONS

Stewart, T.R. 2022. Tennessee and Cumberland Rivers Invasive Carps Data Application - Link

Stewart, T.R. 2019. Lake Superior Remote Sensing Data Explorer - Link

Stewart, T.R. 2015. U.S. Geological Survey Lake Erie Fish Community Data Explorer - Link

TEACHING & OUTREACH

2021 – Graduate Teaching Assistant, University of Vermont, Biology Core 012 – Exploring Biology

2020, 19 – Graduate Teaching Assistant, University of Vermont, Biology Core 102, Ecology and Evolution

2020 – Graduate Teaching Assistant, University of Vermont, Biology 002 - Principles of Biology

2019 – Graduate Teaching Assistant, University of Vermont, Plant Biology 095 - Plants on the Move

2016 – Graduate Teaching Assistant, University of Vermont, Biology 001 - Principles of Biology

2015 – Co-Instructor, American Fisheries Society National Meeting, Age and Growth Analyses with R

2014 – Teaching Assistant, Northland College, Natural Resources 349 - Fisheries Science & Management

2013 – Teaching Assistant, Northland College, Natural Resources 225 - Fisheries & Wildlife Techniques

STUDENT MENTORING

2023 – S. Wayment, Seasonal Technician, Utah Division of Wildlife Resources

2020 – C. Dunbar, Undergraduate Research Assistant, University of Vermont

2020 – D. McDonough, Undergraduate Research Assistant, University of Vermont
2018 – V. Giacchino, Undergraduate Research Assistant, University of Vermont
2017-19 – M. Sorrentino, Undergraduate Research Assistant & Honor's Thesis Student, University of Vermont

PROFESSIONAL SERVICE

fishR Development Team Member
Journal Reviews: Ecology of Freshwater Fish; Journal of Fish Biology; Journal of Great Lakes Research; North American Journal of Aquaculture; North American Journal of Fisheries Management
Search Committees: Vermont Cooperative Fish & Wildlife Research Unit – Unit Leader (2022)

PROFESSIONAL TRAINING & WORKSHOPS

2016 – Vermont Boating License
2015 – American Red Cross Lifeguarding Certification
2015 – Early Development of Four Cyprinids Native to the Yangtze River, China
2015 – Department of Interior Motorboat Operator Certification Course
2014 – American Red Cross Adult First Aid/CPR/AED with Anaphylaxis Shock
2013 – Wilderness Search & Rescue Certification
2012 – PADI Open Water Scuba Certification

PROFESSIONAL REFERENCES

Dr. Jason D. Stockwell
University of Vermont
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Dr. Michael E. Colvin
U.S. Geological Survey, Columbia Research
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Dr. Mark R. Vinson
U.S. Geological Survey, Lake Superior
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