

Justin Waraniak

North Dakota State University
Environmental & Conservation Sciences

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Education History

North Dakota State University PhD Environmental & Conservation Sciences Conservation Biology Specialization	2017-present
Michigan State University MS Fisheries & Wildlife Program in Ecology, Evolutionary Biology, and Behavior	2015-2017
University of Michigan - Ann Arbor BS Ecology and Evolutionary Biology Academic Minor Mandarin Chinese	2010-2014

Research Experience

Amphibian COnservation & Landscape Genetics Research **June 2017-present**

North Dakota State University/US Geological Survey

- Analyze statewide dataset of microsatellite genotypes to determine population structure and assess genetic diversity of northern leopard frog (*Rana pipiens*)
- Plan and conduct field sampling to collect genetic samples from frogs across the state of North Dakota
- Manage wet lab operations (DNA extraction and RADseq library preparation)
- Set up and run bioinformatics pipelines to process raw sequence data and genotype individuals for genetic analyses
- Perform landscape resistance analyses to investigate genetic connectivity of northern leopard frog populations to understand how landscape and climate influence biotic connectivity of wetlands
- Use genotype-by-environment analyses to identify associations between environmental factors, genotypes, and/or morphological phenotypes
- Develop occupancy models to assess how land use and wetland characteristics influence habitat suitability for amphibians using breeding call survey data

Research Experience Cont.

Lake Sturgeon Research

March 2015-June 2017

Michigan State University/Michigan Department of Natural Resources

- Conduct field surveys understand the factors affecting predation of larval lake sturgeon in the Black River, MI. Surveys included nightly drift net surveys to measure relative abundance of larval lake sturgeon and the co-distributed larval fish and aquatic insect community and barge electrofishing surveys to collect diet samples from potential predators
- Perform molecular lab work to extract DNA from diet samples, develop and optimize sturgeon-specific PCR primers, and use universal primers to obtain prey DNA sequences to use in a metabarcoding analysis
- Design and implement controlled predation experiments manipulating densities of larval sturgeon, alternative prey items, and predator species
- Assist with other ongoing research and lake sturgeon aquaculture duties including: capture of adult sturgeon during snorkel surveys, extraction of gametes from spawning adult sturgeon, implantation of RFID, PIT, and floy tags, artificial fertilization of fish eggs, maintenance of fish health during early life stages, and feeding of larval fishes (brine shrimp cultures, bloodworms)
- Interact with the public and stakeholders, explaining scientific and conservation work

Tree censurer at the George S. Reserve

June-August 2014

University of Michigan Department of Ecology and Evolutionary Biology

- Identify tree and shrub species common to the Midwestern United States, locate trees on a predetermined spatial grid, and take measurements according to protocols established for the Smithsonian scientific forest database

Undergraduate assistant researcher for Dr. Jim Breck

November 2013 – April 2014

Institute for Fisheries Research, University of Michigan – Ann Arbor

- Develop models using fish weight to estimate lipid, protein, and energy content
- Process fish tissues to estimate the amount of carbohydrates, lipids, proteins and other biomolecules

REU Intern for Dr. Yong Wang and Kevin Messenger

May – July 2013

China REU through Alabama A&M University and Nanjing Forestry University

- Survey of herpetofaunal diversity in Wuyishan National Nature Reserve, China to compare biodiversity of herpetofauna in natural forests to bamboo plantations
- Capture and identify species of herpetofauna by visual observation and through vocalizations, and safely handle all species, including venomous snakes

REU Intern for Dr. David Mark Welch

June – August 2012

Josephine Bay Paul Center at the Marine Biological Laboratory in Woods Hole, MA

- Learn techniques for molecular genetics including DNA extraction, RNA extraction and creation of cDNA libraries, clone genes of interest into E. coli, and Sanger sequencing
- Study expression of meiotic recombination gene SPO11 in asexual bdelloid rotifers

Teaching Experience

Course Instructor

August 2020-December 2020
June 2022-August 2022

BIOL 452/652 Ichthyology

- Develop syllabi and lesson plans for hybrid online and in-person and online-only versions of fish biology courses
- Write and record 40+ mini-lectures and adaptive release lecture quizzes covering topics from fish anatomy, behavior, phylogenetic relationships, species identification, ecology, and human dimensions of fisheries
- Plan and facilitate class discussions on online message boards around research papers and other relevant current topics in fish biology
- Develop, grade, and provide feedback on assignments to help students apply knowledge from other parts of the course and develop skills in fish identification, scientific writing, and data analysis.

Graduate Teaching Assistant

August 2021-October 2021

BIOL 477/677 Wildlife and Fisheries Management Techniques

- Provide practical and experimental design feedback to students developing field research projects
- Manage logistics and safety for students before, during, and after three-day-long field trip during which students were collecting data from field surveys and experiments.

Graduate Teaching Assistant

August 2021-December 2021
January 2019-May 2019
September 2017-May 2018

BIOL 150L General Biology I / BIOL 111L Environmental Science & Human Biology Labs

- Introduce and generate enthusiasm for topics in human genetics, microbiology, and ecology to undergraduate non-science majors
- Lead students in lab classes in developing questions and hypotheses, learning technical skills to collect data and perform analyses, and presenting data
- Grade class assignments and poster presentations and provide feedback
- Answer student questions in lab, office hours, and through email

Graduate Teaching Assistant

August 2016-April 2017

BS 172 Organisms and Populations Lab

- Cover field & laboratory biology skills (e.g. sampling, basic statistics, genetics)
- Lead lab classes through weekly lab assignments and develop a theme for semester long student research projects (aquatic macroinvertebrates)
- Help students with developing their own research projects, generating testable hypotheses, conducting field sampling, analyzing data, and presenting results

Graduate Teaching Assistant

August 2015-April 2016

BS 171 Cells and Molecules Lab

- Cover basic laboratory skills (e.g. pipetting, serial dilutions, spectrophotometry), assays for common biomolecules, basic microbiology skills including agar plate inoculation, PCR, cell transformation, and restriction digestion
- Lead lab classes through weekly projects, lecture and demonstrate lab skills, help students one-on-one to complete lab work
- Help students develop their own research projects, generating testable hypotheses, experimental design, and basic data analysis

Presentations cont.

Trade-offs among life history traits and parasite intensity in the White Sands Pupfish (*Cyprinodon tularosa*). Justin Waraniak, David Rogowski, and Craig Stockwell. Virtual Presentation at the Desert Fishes Council 2021 Annual Meeting.

Population connectivity in agricultural landscapes: Land use effects on gene flow in northern leopard frog (*Rana pipiens*) in the Prairie Pothole Region. Justin Waraniak, David Mushet, and Craig Stockwell. Virtual oral presentation at the 2020 North American Congress for Conservation Biology Virtual Conference.

Conservation genomics in the northern Great Plains: Assessments of genetic diversity, population structure, demographic history, and anthropogenically mediated selection in the northern leopard frog. Justin Waraniak, David Mushet, and Craig Stockwell. Invited symposium at Northern Prairie Wildlife Research Center, Feb 27, 2020, Jamestown, ND.

Landscape genetics reveal broad and fine-scale population structure due to landscape features and climate history in the northern leopard frog in North Dakota. Justin Waraniak, David Mushet, and Craig Stockwell. Oral presentation at the American Fisheries Society/ The Wildlife Society 2019 Joint Annual Conference, Reno, NV.

18S rRNA metabarcoding diet analysis of a predatory fish community across seasonal changes in prey availability. Justin Waraniak, Terence Marsh, and Kim Scribner. Oral presentation at the American Fisheries Society/ The Wildlife Society 2019 Joint Annual Conference, Reno, NV.

Landscape genetics reveal possible drought and Ice Age refugia drive population subdivision of northern leopard frog in North Dakota. Justin Waraniak, Justin Fisher, Kevin Purcell, David Mushet, and Craig Stockwell. Oral presentation at the 2018 North Dakota Chapter of the Wildlife Society Annual Meeting, Bismark, ND.

Landscape genetics reveal possible drought and Ice Age refugia drive population subdivision of northern leopard frog in North Dakota. Justin Waraniak, Justin Fisher, Kevin Purcell, David Mushet, and Craig Stockwell. Oral Presentation at the 2017 Society of Wetland Scientists Northern Prairie Chapter Meeting, Fargo, ND.

Factors affecting levels of larval lake sturgeon (*Acipenser fulvescens*) predation by piscivorous fishes in the Black River, MI. Justin Waraniak, Edward Baker, and Kim Scribner. Oral presentation at the 2017 International Association of Great Lakes Research Conference, Detroit, MI.

Factors affecting levels of larval lake sturgeon (*Acipenser fulvescens*) predation by piscivorous fishes in the Black River, MI. Justin Waraniak, Edward Baker, and Kim Scribner. Oral presentation at the 2017 Midwest Fish and Wildlife Conference, Lincoln, NE.

Predation of larval lake sturgeon by piscine predators in the Black River, MI. Justin Waraniak, Kim Scribner, Nicholas Gezon, and Edward Baker. Poster presentation at the 2015 North American Sturgeon and Paddlefish Society Conference, Oshkosh, WI.

Coding & Software Experience

Coding Environments:

R
python
Unix/Linux

Bioinformatics/Genetics:

STRUCTURE	BAPS
STACKS	ipyrad
BAPS	diyABC
NeEstimator	Bayescan
pcaadapt	Bayenv
COLONY	mothur
BEAST	

Geographic Information Systems:

ArcMap	QGIS
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Circuitscape

Other:

Microsoft Office (Word, Excel, Powerpoint)

ImageJ

Adobe Photoshop

Adobe Illustrator

Adobe Audition

Skills

Molecular Benchwork Skills

- DNA extraction
 - § Blood and tissue
 - § Feces and degraded diet samples
- Gel electrophoresis
- RNA extraction and creation of cDNA libraries
- Primer design and PCR optimization
- RAD-seq library preparation
- Reagent preparation and management

Field Work Skills

- Identification of freshwater fishes, reptiles, amphibians, and aquatic macroinvertebrates
- Active sampling of reptiles and amphibians (including handling of venomous snakes)
- Barge and backpack electrofishing
- Kick net, seine net, drift net, and gill net sampling
- Implantation of RFID, PIT, and floy tags
- Tissue sample collection for genetic analyses
- Backcountry camping
- Operating vehicles (manual 4WD, small boats)
- Snorkeling

Data Analysis Skills

- Expertise in multivariate data analysis
 - § Principal components analysis (PCA)
 - § Redundancy analysis (RDA)
 - § Non-metric multidimensional scaling (NMDS)
 - § Latent factor mixed models (LFMM)
- Database and bioinformatics pipeline management
- Habitat suitability and occupancy modelling
- Landscape resistance analysis
- Phylogenetic inference analyses
- Data visualization

Communication Skills

- Scientific Writing
 - § Lead author on >8 peer-reviewed manuscripts (published and in prep)
 - § Grant and fellowship proposals
- Public Speaking
 - § >20 poster and oral presentations at professional conferences and symposia
 - § 5+ years of teaching experience
- Preparation of educational materials
 - § ArcMap Online Story Maps
 - § >12 hours of pre-recorded lectures for online courses

Awards

North Dakota Water Resources Research Institute Graduate Fellowship (2018-2021)

Winner 2021 Desert Fishes Council Annual Meeting Best Student Poster Competition

Runner-up 2021 Northern Plains Biological Symposium Best Poster Competition

References

Dr. Craig Stockwell
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Professor, North Dakota State University

Dr. David Mushet
dmushet@usgs.gov

Research Wildlife Biologist, US Geological Survey

Dr. Kim Scribner
scribne3@msu.edu

Professor, Michigan State University

Dr. Edward Baker
bakere1@michigan.gov

Research Biologist Manager, Michigan Dept. of Natural Resources

Publications

Waraniak JM, Mushet DM, Stockwell CA. (2022). Over the hills and through the farms: Land use and topography influence genetic connectivity of northern leopard frog (*Rana pipiens*) in the Prairie Pothole Region. *Landscape Ecology*. doi: 10.1007/s10980-022-01515-8

Waraniak JW, Fisher JDL, Purcell K, Mushet DM, and Stockwell CA. (2019). Landscape genetics reveal broad and fine-scale population structure due to landscape features and climate history in the northern leopard frog (*Rana pipiens*) in North Dakota. *Ecology and Evolution* 9(3), 1041-1060. doi: 10.1002/ece3.4745

Waraniak JW, Marsh TC, and Scribner KT. (2019). 18S rRNA metabarcoding diet analysis of the predatory fish community across seasonal changes in prey availability. *Ecology and Evolution* 9(3), 1410-1430. doi: 10.1002/ece3.4857

Waraniak JW, Baker EA, and Scribner KT. (2018). Molecular diet analysis reveals predator-prey community dynamics and environmental factors affecting predation of larval lake sturgeon *Acipenser fulvescens* in a natural system. *Journal of Fish Biology* 93(4), 616-629. doi: 10.1111/jfb.13726

Waraniak J, Valentine S, and Scribner KT. (2017). Effects of changes in alternative prey densities on predation of drifting lake sturgeon larvae (*Acipenser fulvescens*). *Journal of Freshwater Ecology* 32(1), 619-632. doi: 10.1080/02705060.2017.1375440

Waraniak JW, Blumstein DB, and Scribner KT. (2017). Barcoding PCR primers detect larval lake sturgeon (*Acipenser fulvescens*) in diets of piscine predators. *Conservation Genetics Resources* 10(2), 259-268. doi: 10.1007/s12686-017-0790-5

Waraniak J. (2017). Barcoding, metabarcoding, and experimental analyses of community dynamics and environmental conditions affecting predation of larval lake sturgeon in the Black River, MI. MSc Thesis. Michigan State University, East Lansing, MI, USA.

Scribner KT, Walquist RW, Waraniak JM, Bauman J, Marsh T, Kanefsky J, and Larson D. (in press). Aquatic insects differentially affect lake sturgeon larval phenotypes and egg surface microbial communities. Submitted to PlosOne.

Presentations

Population connectivity in an agricultural landscape: Land use effects on gene flow in northern leopard frog (*Rana pipiens*) in the Prairie Pothole Region. Justin Waraniak, David Mushet, and Craig Stockwell. Oral Presentation at the 2022 Joint Aquatic Sciences Meeting, Grand Rapids, MI.

Population connectivity in an agricultural landscape: Land use effects on gene flow in northern leopard frog (*Rana pipiens*) in the Prairie Pothole Region. Justin Waraniak, David Mushet, and Craig Stockwell. Poster Presentation at the 2021 American Genetics Association President's Symposium, Snowbird, UT.