

# Lucas Nathan

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## EDUCATION

### **Doctor of Philosophy, Natural Resources**

June 2014-present

Anticipated Graduation Date: May 2018

Dissertation Title: "Riverscape genetics of Brook Trout among headwater streams and influence of demogenetic processes on population viability"

University of Connecticut (UConn), Storrs, CT 06269

Advisor : Dr. Jason Vokoun

Cumulative GPA: 4.2/4.0

### **Master of Science, Conservation Biology**

June 2012-May 2014

Thesis title: "Evaluation of the Great Lakes bait trade as a pathway for invasive species introductions"

Central Michigan University (CMU), Mt Pleasant, MI 48859

Advisor: Dr. Andrew Mahon

Cumulative GPA 4.0/4.0

### **Bachelor of Science, Fisheries and Water Resources-Fisheries**

September 2008-May 2012

University of Wisconsin-Stevens Point (UWSP), Stevens Point, WI 54481

Advisor: Dr. Daniel Isermann

Cumulative GPA: 3.97/4.0 (summa cum laude)

## RELEVANT COURSEWORK

- Adaptive Management, Bioinformatics and Genomic Applications, Decision Methods in Natural Resources, Spatial Statistics and Modeling, Geospatial Data Processing Techniques, Lab Techniques in Functional Genomics (UCONN)
- Multivariate Statistics, Conservation Biology, qPCR in Aquatic Environments, Molecular Ecology, Environmental Bioinformatics, Principles and Applications of Geographic Information Systems (CMU)
- Ichthyology, Limnology, Fish Ecology, Fisheries Research, Fisheries Management, Population Dynamics in Fisheries, Life History of Fishes, Introduction to Geographic Information Systems (UWSP)

## PROFESSIONAL EXPERIENCE

### **Graduate Research Assistant**

June 2014-present

Department of Natural Resources and the Environment, University of Connecticut

- Planned, organized, and conducted research focused on the genetic structure of Brook Trout populations in the state of Connecticut
- Studied meta-population dynamics among isolated headwater Brook Trout populations using genetic analyses
- Spatial modeling using R, Python, and ArcGIS programming to explore the landscape scale influences on genetic structuring in fragmented riverscapes

- Investigated wild populations of Brook Trout for evidence of hatchery introgression
- Collaborated with state agency to conduct field sampling using backpack electrofishing

**Graduate Research Assistant**

June 2012-May 2014

Aquatic Molecular Ecology Lab, Central Michigan University

- Organized and performed eDNA invasive species surveillance of Great Lakes commercial bait retailers
- Develop species specific assays for use in polymerase chain reactions
- Process eDNA samples; extract, amplify, and visualize DNA using standard operating procedures
- Collaborate with governmental agencies to aid in additional eDNA sampling for aquatic invasive species
- Utilized innovative research techniques including quantitative PCR (qPCR), digital droplet PCR (ddPCR), and next-generation sequencing (NGS)

**Fish Genetics Lab Researcher**

September 2010- May 2012

Cooperative Fisheries Unit Genetics Lab, UWSP

- Compared historical and contemporary genetic stock structure of lake whitefish in Lake Michigan
- Managed large set of archive scale samples collected in historical commercial harvests
- Performed DNA extractions, amplifications, and genotyping using microsatellite analyses
- Organized genetic data and analyze population structure to determine temporal stability of genetic stocks
- Conducted mixed stock analysis of commercial fishing harvests

**Biological Technician**

May 2011- August 2011

US Fish and Wildlife Service, Ashland, WI

- Conducted field research to determine status and distribution of Brook Trout across the Lake Superior Watershed
- Worked with field crews to sample stream reaches using backpack and barge electrofishing
- Collected sample tissue vouchers and record biotic and abiotic data

**Volunteer Fisheries Technician**

September 2008-May 2012

UWSP Fisheries Society Student Sub Chapter

- Organized and conduct fishery surveys of lakes, rivers, and streams using fyke nets and seines
- Recorded fishery data and manage databases
- Aided in implanting and recovery of PIT and coded wire tags
- Assisted state agencies (WIDNR) with the capturing, handling, and processing of fish during state wide surveys

**Watercraft Inspector**

July 2010- August 2010

Clean Boats Clean Waters, Tomahawk, WI

- Positioned at boat landings around Lincoln County, WI to inspect watercrafts for aquatic invasive species
- Educated boaters and anglers about the ecological impacts of aquatic invasive species
- Recorded survey data from recreational boaters and anglers

#### TEACHING AND MENTORING EXPERIENCE

Instructor, NRE 3205: **Stream Ecology**. Summer 2017. Present lecture material, develop lab and field exercises, assign and grade homework assignments and examinations. Class material covered broad range of ecological topics relevant to lotic systems including adaptations to stream life, nutrient dynamics, and conservation issues. Department of Natural Resources and the Environment, University of Connecticut.

Camp Counselor, **Natural Resource Conservation Academy**. Summer 2017. Lead field activities and discussions of a broad range of natural resource conservation topics with high school students. Department of Natural Resources and the Environment, University of Connecticut.

Teaching Assistant, NRE 4000W: **Natural Resources Planning and Management**. Spring 2016, 2017. Lead weekly discussion classes focused on writing environmental assessments and management plans within a structured decision making framework. Department of Natural Resources and the Environment, University of Connecticut.

Field Laboratory, NRE 4335: **Fisheries Management**. Fall 2014, 2015, 2016. Assisted in fisheries field methods labs; survey fish populations, estimate abundance, conduct age and growth analyses. Designed and instructed laboratory exercises in R and ArcGIS. Department of Natural Resources and the Environment, University of Connecticut.

Volunteer Field Assistant. Summer 2014, 2015, 2016. Assisted in **summer program for high school students**. Demonstrated and educated students on field methods in fisheries research including seining and electrofishing. Department of Natural Resources and the Environment, University of Connecticut.

Undergraduate Research Advisor. 2015-2016. **Mentored undergraduate students** performing genetics research. Taught lab protocols, analytical methods, and assisted in preparing posters for presentations at professional conferences. Department of Natural Resources and the Environment, University of Connecticut.

Field Laboratory, NRE 3205: **Stream Ecology**. Fall 2015. Designed and lead a lab on using fisheries data to evaluate community structure and estimate an index of biotic integrity. Department of Natural Resources and the Environment, University of Connecticut.

Guest Lecturer, NRE 2345: **Introduction to Fisheries and Wildlife**. Fall 2015. Lectured a unit on “genetics in fisheries and wildlife.” Department of Natural Resources and the Environment, University of Connecticut.

Guest Lecturer, NRE 4335: **Fisheries Management**. Fall 2015. Lectured on field methods used to collect and assess fisheries data. Department of Natural Resources and the Environment, University of Connecticut.

Teaching Assistant, NRE 1235: **Environmental Conservation**. Spring 2015. Lead weekly discussion classes on readings and case studies on contemporary environmental issues. Department of Natural Resources and the Environment, University of Connecticut.

Teaching Assistant, **Fisheries Biology**. Summer 2010. Assisted in field and laboratory exercises using multiple collection and analytical methods. University of Wisconsin-Stevens Point Treehaven Summer Course.

## PUBLICATIONS

- 12) **Nathan, L.R.**, N. Mamoozadeh, H.R. Tumas, S. Gunselman, K. Klass, A. Metcalfe, C. Edge, L. Waits, P. Spruell, E. Lowery, E. Connor, A. Bearlin, M.-J. Fortin, E. Landguth. A simulation framework for evaluating fish hybridization dynamics in heterogeneous riverscapes (in review)
- 11) **Nathan, L.R.**, A.A. Smith, A.B. Welsh, and J.C Vokoun. Are culvert assessment scores an indicator of population fragmentation? *Ecological Indicators*. (in press)
- 10) **Nathan, L.R.**, Y. Kanno., J.C. Vokoun. 2017. Population demographics influence genetic responses to fragmentation: A demogenetic assessment of the 'one migrant per generation' rule of thumb. *Biological Conservation* 210: 261-272.
- 9) O'Connor, K.M., **L.R. Nathan**, M.R. Liberati, J. Vokoun, M. Tingley, T. Rittenhouse. 2017. Camera trap arrays improve detection probability of wildlife: Investigating study design considerations using an empirical dataset. *PLoS ONE* 12(4): e0175684. doi:10.1371/journal.pone.0175684
- 8) Driess, L., J.-M. Hessenauer, **L. Nathan**, K. O'Connor, M. Liberati, D.P. Kloster, J. Barclay, J.C. Vokoun, A.T. Morzillo. 2017. Adaptive Management as an Effective Strategy: Interdisciplinary Perceptions for Natural Resources Management. *Environmental Management* 59(2):218-229.
- 7) **Nathan, L.R.**, B.L. Sloss, J.A. VanDeHey, R.T. Andvik, R.M. Claramunt, S. Hansen, T.M. Sutton. 2016. Temporal stability of lake whitefish genetic stocks in Lake Michigan. *Journal of Great Lakes Research* 42 (2):433-439.
- 6) Driess, L., D. Kloster, M. Liberati, J. Barclay, J.-M. Hessenauer, **L. Nathan**, K. O'Connor, J. Vokoun. 2015. Introducing Adaptive Management for Natural Resources: An Estuary Case Study. *Natural Sciences Education* 44: 1-10.
- 5) **Nathan, L.R.**, B.J. Wegleitner, M. Simmons, C.L. Jerde, A.R. Mahon. 2014. Quantifying environmental DNA signals for aquatic invasive species across multiple detection platforms. *Environmental Science and Technology* 48(21): 12800-12806.
- 4) **Nathan, L.R.**, C.L. Jerde, M. McVeigh, A.R. Mahon. 2014. An assessment of angler education and bait trade regulations to prevent invasive species introductions in the Laurentian Great Lakes. *Management of Biological Invasions* 5(4):319-326.
- 3) **Nathan, L. R.**, C.L. Jerde, M. Budny, A.R. Mahon. 2014. The use of environmental DNA in invasive species surveillance of the Great Lakes commercial bait trade. *Conservation Biology* 29(2):430-439.
- 2) Mahon, A. R., **L.R. Nathan**, C.L. Jerde. 2014. Meta-genomic surveillance of invasive species in the bait trade. *Conservation Genetic Resources* 6(3):563-567.

- 1) Andvik, R., **L. Nathan.**, J. VanDeHey, R.M. Claramunt, S. Hansen, T. Sutton. 2011. Mixed-stock analysis of Lake Michigan's lake whitefish commercial fishery and historical integrity of resolved genetic stocks. Great Lakes Fishery Commission Completion Report, Ann Arbor, MI.

## PRESENTATIONS

- 15) **Nathan, L.R.**, A.B Welsh, J.C. Vokoun. 2017. Identifying conservation opportunities for eastern Brook Trout using riverscape genetics. American Fisheries Society 147<sup>th</sup> Annual Meeting. Tampa, FL. (**Awarded Honorable Mention for Best Student Presentation**)
- 14) **Nathan, L.R.**, A.B Welsh, J.C. Vokoun. 2017. Evaluation and application of landscape genetics for riverscape conservation. US Regional Meeting of the International Association for Landscape Ecology. Baltimore, MD.
- 13) **Nathan, L.R.**, A.B Welsh, J.C. Vokoun. 2017. A tale of two watersheds: exploring riverscape drivers of Brook Trout genetic structuring. Joint meeting of the Southern New England Chapter and Northeast Division of American Fisheries Society Meeting. Mystic, CT. (**Awarded Best Student Presentation**)
- 12) **Nathan, L. R.**, A.B Welsh, J.C. Vokoun. 2016. Using riverscape genetics to inform conservation of Eastern Brook Trout populations. American Fisheries Society 146<sup>th</sup> Annual Meeting. Kansas City, MO.
- 11) **Nathan, L. R.**, A.A. Smith, A.B. Welsh, J.C. Vokoun. 2016. Evaluating the effects of culverts on fine scale genetic structuring of Brook Trout. Southern New England Chapter American Fisheries Society Meeting. Providence, RI. (**Awarded Best Student Presentation**)
- 10) **Nathan, L. R.**, A.B Welsh, J.C. Vokoun. 2016. A landscape genetics approach to assessing Brook Trout population connectivity at the watershed scale. Northeast Fish and Wildlife Conference. Annapolis, MD.
- 9) **Nathan, L. R.**, and J.C. Vokoun. 2016. Hatchery introgression in Connecticut's Brook Trout populations: identifying the five W's for better management. Connecticut Conference on Natural Resources. Storrs, CT.
- 8) **Nathan, L. R.**, A.B Welsh, J.C. Vokoun. 2015. Delineation of brook trout landscape-level genetic structure among headwater stream networks: isolates or meta-populations? Southern New England Chapter American Fisheries Society Meeting. Dartmouth, MA. (**Awarded Best Student Presentation**)
- 7) **Nathan, L. R.**, A.R. Mahon, M.L. Budny, C.L. Jerde. 2013. Environmental DNA detection of invasive species in the Great Lakes commercial bait trade. American Fisheries Society 143<sup>rd</sup> Annual Meeting. Little Rock, AR.

- 6) **Nathan, L. R.**, A.R. Mahon, M.L. Budny, C.L. Jerde. 2013. Invasive species surveillance of the Great Lakes basin commercial bait trade using environmental DNA surveillance. International Conference on Aquatic Invasive Species. Niagara Falls, ON.
- 5) **Nathan, L. R.**, A.R. Mahon, M.L. Budny, C.L. Jerde. 2013. The Great Lakes basin commercial bait trade as a vector for Asian carp: surveillance using environmental DNA as a detection method. Central Michigan University Institute of Great Lakes Research Student Symposium. Mt Pleasant, MI.
- 4) Sloss, B.L., J.A. VanDeHey, R.T. Andvik, **L.R. Nathan**, S.P. Hansen, R.M. Claramunt, T.M. Sutton. Stock identification and distribution in the Lake Michigan Lake Whitefish commercial fishery. American Fisheries Society 142<sup>nd</sup> Annual Meeting. Minneapolis-St. Paul, MN.
- 3) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss, J.A. VanDeHey, T.M. Sutton, S. Hansen, R.M. Claramunt. 2012. Mixed stock analysis of Lake Michigan lake whitefish commercial harvests. University of Wisconsin-Stevens Point Undergraduate Research Symposium. Stevens Point, WI. (**Awarded Best Student Presentation**)
- 2) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss, J.A. VanDeHey, T.M. Sutton, S. Hansen, R.M. Claramunt. 2012. Temporal stability of lake whitefish stocks in Lake Michigan. Joint Wisconsin-Michigan Chapter American Fisheries Society Meeting. Marinette, WI. (**Awarded Best Student Presentation**)
- 1) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss, J.A. VanDeHey, T.M. Sutton, S. Hansen, R.M. Claramunt. 2011. Temporal stability of genetic stocks of lake whitefish in Lake Michigan. University of Wisconsin-Stevens Point Undergraduate Research Symposium. Stevens Point, WI.

#### POSTER PRESENTATIONS

(\* denotes undergraduate advisee)

- 8) Greene, D.K., **L.R. Nathan**, J.C. Vokoun. 2017. Landscape correlates of hybridization between wild and stocked Brook Trout. Joint meeting of the Southern New England Chapter and Northeast Division of American Fisheries Society Meeting. Mystic, CT.
- 7) \*Jaffee, J.E., **L.R. Nathan**, J.C. Vokoun. 2016. Investigating the prevalence of hatchery introgression in Southern New England wild Brook Trout populations. Northeast Fish and Wildlife Conference. Annapolis, MD.
- 6) \*Smith, A., **L.R. Nathan**, J.C. Vokoun. 2016. Do culvert assessment scores accurately predict Brook Trout population fragmentation? Northeast Fish and Wildlife Conference. Annapolis, MD. (**Awarded Best Student Poster**)

- 5) **Nathan, L. R.**, A.B. Welsh, J.C. Vokoun. 2016. Using Genetics and Cost-Distance Modeling to Uncover Stream Network Features that Structure Brook Trout Populations. Landscape Genetics DGS Synthesis Meeting. Coeur d'Alene, ID.
- 4) **Nathan, L. R.**, A.B. Welsh, J.C. Vokoun. 2015. Using Genetics and Cost-Distance Modeling to Uncover Stream Network Features that Structure Brook Trout Populations. Northeast Fish and Wildlife Conference. Newport, RI.
- 3) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss, J.A. VanDeHey, T.M. Sutton, S. Hansen, R.M. Claramunt. 2011. Looking back in time: assessing the stability of lake whitefish stocks in Lake Michigan. Midwest Fish and Wildlife Conference. Des Moines, IA.
- 2) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss. 2011. Temporal stability of genetic stocks of lake whitefish in Lake Michigan. University of Wisconsin System Posters in the Rotunda. Madison, WI.
- 1) **Nathan, L. R.**, R.T. Andvik, B.L. Sloss, J.A. VanDeHey, T.M. Sutton, S. Hansen, R.M. Claramunt. 2011. Genetic stock temporal stability of lake whitefish in Lake Michigan. University of Wisconsin-Stevens Point Undergraduate Research Symposium. Stevens Point, WI. (**Awarded Best Student Poster**)

#### AWARDS and SCHOLARSHIPS

- AFS/Sea Grant Outstanding Student Presentation Award (Honorable Mention, 2017)
- AFS Education Section Skinner Memorial Award (Honorable Mention, 2017)
- AFS Northeast Division/Southern New England Chapter Best Student Presentation Award (2017)
- US-IALE Student Travel Award (2017)
- AFS NED John Moring Student Travel Award (2015, 2016, 2017)
- AFS SNEC Saul B. Saila Best Student Paper Award (2015, 2016, 2017)
- AFS Genetics Section James E. Wright Graduate Award (2016)
- AFS SNEC Student Travel Award (2016)
- New England Outdoor Writers Association Scholarship (2015)
- CMU Dean's Scholarship (2012; 2 year assistantship)
- UWSP Highest Academic Honors (2008-2012; 8 semesters)
- UWSP Outstanding Water Student (2012)
- Salmon Unlimited Scholarship (2010, 2011, 2012)
- Madison Fishing Expo Scholarship (2010, 2012)
- Walleyes for Tomorrow Scholarship,(2011)
- 12 Apostles Musky Club Scholarship (2011)
- Dorothy Vallier Treehaven Camp Scholarship (2010)
- Robert Neale Scholarship for Continuing Education (2009)
- Robert Neale Freshman Scholarship (2008)
- Butch Hiscox Memorial Scholarship (2008)
- Stella Heth Scholarship (2008)
- Luther Memorial Scholarship (2008)

- WisConservation Club Scholarship (2008)

## PROFESSIONAL SERVICE

### **Journal Reviewer**

PLOS One (3), Transactions of the American Fisheries Society (2), Biological Conservation (1), Conservation Genetics Resources (1), Freshwater Science (1)

**Student Representative**, Annual Meeting Planning Committee, SNEC AFS (2017)

**Website Manager**, Northeast Division of the American Fisheries Society (2014-present)

**Treasurer**, UConn Student Subchapter of the American Fisheries Society (2016-2017)

**Vice President**, UConn Student Subchapter of the American Fisheries Society (2015-2016)

## SOCIETY MEMBERSHIPS

- International Association for Landscape Ecology (2017)
- American Fisheries Society (2008-present)
  - Northeast Division (2014-present)
  - Southern New England Chapter (2014-present)
  - UConn Student Subchapter (2014-present)
  - Education Subsection (2016-present)
  - Genetics Subsection (2015-present)
  - UWSP Student Subchapter (2008-2012)
- Xi Sigma Pi Natural Resources Honor Society (Inducted 2012)
- Omicron Delta Kappa National Leadership Society (Inducted 2011)
- Phi Eta Sigma National Honor Society (Inducted 2009)
- The Society of Leadership and Success (Inducted 2009)