Danielle M. Blumstein

Physiology, genomics, ecology, & evolution

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EUDCATION

PhD Student, Molecular and Evolutionary Systems Biology. University of New Hampshire. 2019-Present
GPA: 3.74/4.00

M.S., Natural Resources. Wisconsin Cooperative Fishery Research Unit, University of Wisconsin - Stevens Point. 2017-2019
GPA: 3.88/4.00

B.S., Zoology. Michigan State University. 2013 – 2017. Concentration: Ecology, Evolution, and Organismal Biology Minor: Environmental Studies and Sustainability
GPA: 3.3931/4.00

PUBLICATIONS

Blumstein DM, Colella, JP, E Linder, and MacManes, MD. High total water loss driven by low-fat diet in desert-adapted mice. bioRxiv 2022.04.15.488461; doi: https://doi.org/10.1101/2022.04.15.488461

Colella, JP, ***DM Blumstein***, and MD MacManes. 2021. Disentangling environmental drivers of circadian metabolism in desert-adapted mice. Journal of Experimental Biology. 224 (18): jeb242529.

Blumstein, DM, Campbell, MA, Hale, MC, Sutherland, BJ, McKinney, GJ, Stott, W., & Larson, WA. (2019). Comparative genomic analyses and a novel linkage map for cisco (*Coregonus artedi*) provides insight into chromosomal evolution and rediploidization across salmonids. *G3,* 10(8):2863-2878.

Blumstein DM. (2019). The first haploid linkage map in a coregonid (*Coregonus artedi*) improves knowledge of chromosomal evolution and rediploidization across Salmonids. Master's thesis. University of Wisconsin Stevens Point.

Blumstein DM, Mays D, Scribner KT. (2017). Spatial genetic structure and recruitment dynamics of burbot (*Lota lota*) in Eastern Lake Michigan and Michigan tributaries. *Journal of Great Lakes Research, 44*(1):149156.

Waraniak JM, ***Blumstein DM***, Scribner KT. (2017). Barcoding PCR primers detect larval lake sturgeon (*Acipenser fulvescens*) in diets of piscine predators. *Conservation Genetics Resources*, *10*(2):259-268.

RESEARCH EXPERENCE

2019 – Present Graduate Research Assistant. D*epartment of Molecular, Cellular, and Biomedical Sciences, University of New Hampshire*. Advisor: Dr. Matthew MacManes.

"Physiological genomics of desert adaptation in Peromyscus"

- Investigate the genomic basis of desert adaptations in desert mice (*Peromyscus eremicus*).
- Measure metabolic rates using flow-through respirometry.
- Examine gene expression patterns (RNAseq) in multiple tissues and electrolyte changes.
- Maintain *P. eremicus* colony in a desert chamber.
- Extracted DNA and used a SNP based RADseq approach to genotype individuals.

RESEARCH EXPERIENCE CONT.

2017-2019 Graduate Research Assistant. *Wisconsin Cooperative Fisheries Unit, University of Wisconsin – Stevens Point*.

"The first haploid linkage map in a coregonid (*Coregonus artedi*) improves knowledge of chromosomal evolution and rediploidization across Salmonids" Advisor: Dr. Wesley Larson. Constructed a linkage map to facilitate research on the genetic basis of phenotypic diversity in coregonines in the Great Lakes.

- Collected *C. artedi* from known spawning locations in Lake Huron
- Use dry artificial spawning methods paired with UV-irradiation of sperm to produce newly generated haploid families
- Collected morphometric measurements from previously generated diploid families
- Extracted DNA and used a SNP based RADseq approach to genotype individuals
- Constructed a high-density integrated linkage map using haploid and diploid data annotated with QTL mapping
- Aligned the linkage map to various other genomic resources
- Conducted a cross-species comparison of homeologous regions was conducted to identify regions that still exhibit residual tetraploidy, that rediploidized and diverged prior to speciation, and that diverged since diversification

Jan-Apr 2017 International Research Experience. *Victoria University of Wellington, New Zealand.*

Developed an interdisciplinary perspective of interactions between animal health, environmental health, and human health as they apply to culture.

- Completed course work that consisted of extensive field, laboratory, and statistical courses in the studies of ecology, microbiology, molecular biology, genetics, histopathology, and bioinformatics.
- Completed field work that consisted of
- Surveys for critically endangered giant land snail (*Powelliphanta*)
- Soil sample collection
- Biodiversity assays
- Macroinvertebrate community assemblage
- Point counts
- Transect surveys
- Species identification (birds, plants, macroinvertebrates)
- Interacted with the local public and stakeholders, explained scientific and conservation work

2014-2017 Undergraduate Laboratory Technician. *Department of Fisheries and Wildlife Molecular Ecology Laboratory, Michigan State University*.

Conducted molecular genetics lab work and data analysis on various projects.

- Independent research on the spatial genetic structure and recruitment dynamics of Burbot (*Lota lota*)
- Developed a molecular assay to quantify the predation of larval Lake Sturgeon (*Acipenser fulvescens*)
- Genetic assessment of male lake sturgeon (*Acipenser fulvescens*) reproductive success
- Assisted in lab work related to Steelhead and invasive species projects
- Optimized primers
- Microsatellite genotyping
- Database management
- Pedigree analysis
- Assignment to population of origin

RESEARCH EXPERIENCE CONT.

May-Aug 2016/ May-Aug 2017 Field Technician. *MSU/MDNR Black River Sturgeon Hatchery and Research Facility, Onaway, Michigan.*

Conducted hatchery and field work for research and conservation aquaculture of lake sturgeon

- Captured adult sturgeon with large dip nets during snorkel surveys
- Extracted gametes from spawning adult sturgeon
- Implanted RFID, PIT, and floy tags
- Artificial fertilization of fish eggs
- Maintained fish health during early life stages (removal of dead individuals, prophylactic treatments)
- Fed larval fishes (brine shrimp cultures, bloodworms)
- General hatchery maintenance (disinfection, pipes and filtration systems)

July-Aug 2016 Aquatic Invasive Species Technician. *Department of Fisheries and Wildlife Molecular Ecology Laboratory, Michigan State University*

Assisted in field sampling and lab work to develop eDNA assays to detect presence of aquatic invasive species

- Traveled to ~50 rivers, inland lakes, and Great Lake sites throughout the Michigan's lower peninsula to collect rusty crayfish (*Orconectes rusticus*), zebra mussels (*Dreissena polymorpha*), and round goby (*Neogobius melanostomus*).
- Collected 30 individuals from each species from locations chosen prior to sampling. Samples were collected using dip nets, snorkeling, beach seining, hand line fishing, and electroshocking.
- Sample cataloging
- DNA extractions and DNA quantification
- RADseq
- Map creation using ArcGIS

May-Dec 2015 Field Technician. *Michigan State University Department of Plant Biology Schemske Laboratory, Mammoth Cave National Park, Kentucky.*

Field sampling and greenhouse rearing of plants for research on the latitudinal biodiversity gradient

- Independently collected and analyzed field data
- Population location
- Species identification (*Ruellia*, *Cuphea*, *Desmodium*, and *Phytolacca*)
- Pollinator observations, pollinator/herbivore collection, herbivory rate measurements, insect pinning and identification, and caterpillar rearing
- Autogamy treatments, seed collections, leaf and flower marking, floral and leaf trait measurements
- Seed counting, sowing, transplanting large populations of plants, and plant care (watering, fertilization, etc.)
- Leaf drying

2013-2016 Student Intern. *RISE Bailey Greenhouse and Urban Farm, Michigan State University.*

Work in an urban greenhouse to grow organic produce and crop plan for urban farming research

- Daily greenhouse duties consisted of harvest, bed preparation, watering, soil testing, composting, and maintenance work to produce certified USDA organic vegetables and herbs.
- Participated in Urban Farming Research including "green roof" gardening, vermicomposting, hot composting, urban beekeeping, season extension, and passive solar greenhouse technology.
- Provided informational seminars and tours of Bailey Greenhouse and Urban Farm and Student Organic Farm to public and private groups

PRESENTATIONS

Blumstein DM., MacManes MD (2022) When the tap runs dry: The physiological effects of acute experimental dehydration in the desert adapted mouse. Evolution, Cleveland, Ohio

Blumstein DM., MacManes MD (2022) When the tap runs dry: The physiological effects of acute experimental dehydration in the desert adapted mouse. American Society of Mammologists, Tucson, Arizona.

Donatelli C., ***Blumstein, DM.,*** MacManes MD (2022) Changes in gene expression in the cactus mouse (*Peromyscus eremicus)* due to diet composition (poster). Undergraduate Research Conference, University of New Hampshire.

Blumstein DM., MacManes MD (2022) When the tap runs dry: The physiological effects of acute experimental dehydration in the desert adapted mouse (poster). Graduate Research Conference, University of New Hampshire.

Blumstein DM., MacManes MD (2022) When the tap runs dry: The physiological effects of acute experimental dehydration in the desert adapted mouse. The Society for Integrative & Comparative Biology Annual Meeting. Phoenix, Arizona.

Blumstein DM. (2021). When the tap runs dry: The physiological effects of acute experimental dehydration in the desert adapted mouse. Molecular, Cellular, Biomedical Sciences, University of New Hampshire.

Blumstein DM., Colella JP., MacManes MD (2021). Food for thought: Evaporative water loss driven by low-fat diet in desert-adapted mice (poster). Annual Meeting of the American Society of Mammologists, Virtual Conference Platform.

Blumstein DM. (2021). How to survive an extreme environment: a lesson from the cactus mouse. Three Minute Thesis, University of New Hampshire.

Blumstein DM. (2021). Evaporative water loss driven by low fat diet in desert-adapted mice. Molecular, Cellular, Biomedical Sciences, University of New Hampshire.

Blumstein DM. (2020). Peromics. Molecular, Cellular, Biomedical Sciences, University of New Hampshire.

Blumstein DM., Campbell, MA., Hale, MC., Sutherland, BJ., McKinney, GJ., Stott, W., & Larson, WA. (2019). Comparative genomic analyses and a novel linkage map for cisco (*Coregonus artedi*) provides insight into chromosomal evolution and rediploidization across salmonids. Hubbard Genome Center, University of New Hampshire.

Blumstein DM. (2019). The first haploid linkage map in a coregonid (*Coregonus artedi*) improves knowledge of chromosomal evolution and rediploidization across Salmonids. International Association for Great Lakes Research 62nd Annual Conference on Great Lakes Research. The College at Brockport, State University of New York

Blumstein DM. (2019). The first haploid linkage map in a coregonid (*Coregonus artedi*) improves knowledge of chromosomal evolution and rediploidization across Salmonids. Master's thesis. University of Wisconsin Stevens Point.

Blumstein DM, Stott W, Larson WA (2019) Development of a genetic linkage map for cisco (*Coregonus artedi*) to facilitate integrated studies of adaptive diversity (poster). 47th Annual Meeting of the Wisconsin Chapter of the American Fisheries Society. Green Bay, Wisconsin.

Blumstein DM, Stott W, Larson WA (2018) Development of a genetic linkage map for cisco (*Coregonus artedi*) to facilitate integrated studies of adaptive diversity. Coastwide Salmonid Genetics Meeting, Mukilteo, Washington.

Blumstein DM, Stott W, Larson WA (2018) Development of a genetic linkage map for cisco (*Coregonus artedi*) to facilitate integrated studies of adaptive diversity. USGS Great Lakes Science Center, Ann Arbor, Michigan. *Invited Seminar*.

Blumstein DM, Stott W, Larson WA (2018) Development of a genetic linkage map for cisco (*Coregonus artedi*) to facilitate integrated studies of adaptive diversity (poster). Midwest Fish and Wildlife Conference. Milwaukee, Wisconsin.

Blumstein DM, Mays D, Scribner KT (2017) Spatial genetic structure and recruitment dynamics of burbot (*Lota lota*) in Eastern Lake Michigan and Michigan tributaries. USGS Great Lakes Science Center, Ann Arbor, Michigan. *Invited Seminar*.

Blumstein DM, Waraniak JM, Scribner KT (2016) Barcoding PCR primers detect larval lake sturgeon (*Acipenser fulvescens*) in diets of piscine predators (poster). University Undergraduate Research and Arts Forum, Michigan State University.
Blumstein DM, Scribner KT (2015) Genetic assessment of the male reproductive success of lake sturgeon (*Acipenser fulvescens*) as a function of duration of river occupancy during the spawning season (poster). University Undergraduate Research and Arts Forum, Michigan State University.

AWARDS

- 2022, 2021 Summer TA Fellowship, University of New Hampshire
- 2022 Charlotte Mangum Student Support Program for SICB Annual Meeting
- 2022, 2020 Molecular, Cellular, and Biomedical Sciences, Department Graduate Student Travel Grant, University of New Hampshire
- 2022 (fall and spring), 2020, 2019 Graduate Student Travel Grant, University of New Hampshire
- 2018 Muskie Clubs Alliance of Wisconsin Inc. Scholarship, University of Wisconsin – Stevens Point.
- 2018 OSCAR Travel Grant, University of Wisconsin – Stevens Point.
- 2017 Undergraduate Long-Term Study Abroad Program Scholarship, College of Natural Science, Michigan State University.
- 2016 Undergraduate Research Support Program Scholarship, College of Natural Science, Michigan State University.
- 2015 The Rajendra Essay Award, Department of Fisheries and Wildlife, Michigan State University.
- 2014 RISE Emerging Leaders Scholarship, College of Natural Resources, Michigan State University.
- 2014 Donald F. Koch and Barbara J. Sawyer-Koch Environmental Studies Scholarship, College of Natural Resources, Michigan State University.

WORKSHOPS AND SPECIAL COURSES

- 2021 RNA-Seq Concepts, Design & Workflows. Common Fund Data Ecosystem, UC Davis
- 2018 NFS-funded expert workshop for the development of a global experiment to understand Coregonid adaptive response to changing thermal regimes. Thonon – les – Bains, France.
- 2017 RAD Sequencing Workshop. Molecular Conservation Genetics Laboratory, University of Wisconsin – Stevens Point.
- 2016 Microsatellite Genotyping Workshop. Molecular Ecology Laboratory, Michigan State University.
- 2015 Ecology and Plant Systematics Field Courses. Kellogg Biological Station, Michigan. 2014. MDNR Fish Sampling Techniques Course. Gaylord, Michigan.

TEACHING EXPERENCE

GEN 711 Genomics and Bioinformatics, TA, Spring 2021, University of New Hampshire
BMS 501 Microbes in Human Disease, TA, Fall 2020, 2021, University of New Hampshire

PROFESSINAL MEMBERSHIPS

- The Society for Integrative & Comparative Biology 2021-Present
- American Society of Mammologists 2019–Present
- Society for the Study of Evolution 2019–Present
- UNH Advancing Women in Science 2019–Present
- American Fisheries Society 2017-2019

MENTORING AND ADVISING

- UNH Mechanical Engineering 2020-2021 Capstone Advisor:
  - Faisal Binsalma, Max Bundesmann, Abdulla Alradhi
- UNH Undergraduate research:
  - Christiana Donatelli, Kelsey Van Dalsum, Fall 2021-present
  - Delaney Hayward, Spring 2020 – 2021
  - Eleanor Braun, Fall 2019
- 2016 Undergraduate Advisor. Michigan State University.
- 2016 Undergraduate Tutor (math, biology, genetics, writing). Michigan State University.
- 2014-2017 Residential community recruitment and selection committee. Michigan State University.
- 2014-2017 Residential community student mentor. Michigan State University.

PROFESSIONAL SERVICE

- Ad hoc reviewer: Molecular Ecology (2), Transactions of the American Fisheries Society (1)
- 2022 Guest lecture, Science Communication (), University of New Hampshire
- 2022 Guest lecture, Animal Physiology (), University of New Hampshire
- 2022, 2021 Invited Judge College of Life Science and Agriculture Undergraduate Research Conference, University of New Hampshire
- 2022 Session Chair, The Society for Integrative & Comparative Biology Annual Meeting. Phoenix, Arizona
- 2021 Grad student social coordinator in the Department of Molecular, Cellular, Biomedical Sciences, University of New Hampshire
- 2021 Presenter, multiple one hour class periods: Intro to R programming language and R studio, The Department of Molecular, Cellular, and Biomedical Sciences, University of New Hampshire
- 2019 Skype a Scientist (middle school). Three classes: Actual Living Scientist.
- 2019 Presenter, Science Sleuths (Preschool). Two class periods: What are fish? University of New Hampshire
- 2019 Invited Judge Jim and Katie Krause College of Natural Resources Student Research Symposium, University of Wisconsin – Stevens Point.
- 2019 Presenter, STEAM Point Day for Girls (16 middle school students per class). Two class periods: Evolution Board Game. University of Wisconsin – Stevens Point
- 2018 Guest lecture, Principles of Genetics (Biology 210), University of Wisconsin – Stevens Point
- 2018 Invited Judge Jim and Katie Krause College of Natural Resources Student Research Symposium, University of Wisconsin – Stevens Point.
- 2018 Presenter, STEAM Point Day for Boys (16 middle school students per class). Two class periods: Evolution Board Game. University of Wisconsin – Stevens Point
- 2018 Presenter, STEM Exploration Day at Treehaven (16 middle school students per class). Three class periods: Evolution Board Game. University of Wisconsin – Stevens Point

SKILLS

Genetics Lab Work:

- 96 well Qiagen/Promega DNA extraction
- Qiagen single tube DNA extraction (tissue, diet samples, eDNA, insects)
- Trizol RNA extraction
- Agarose and polyacrylamide gel electrophoresis
- PCR, qPCR optimization & clean up
- Microsatellite genotyping
- DNA quantification (nanodrop and PicoGreen)
- Plate prep for ABI 3730
- NEB RNAseq library preperation
- RAD (ddRAD, bestRAD) library preparation and data management

Computer Skills:

- Programs: STACKS, Rqtl, ArcMap, LepMap, Sable Systems expedata, Colony Parentage Analysis Program
- High performance computing with slurm scheduling
- Microsoft Office (Word, Excel, Powerpoint)
- Image J
- Adobe Photoshop
- Coding languages: Python, R statistical software, BASH, Java, HTML

Mammal work:

- Metabolic phenotyping with Sable Systems Field Metabolic System (FMS)
- Mouse colony management
- Small mammal trapping
- Desert mouse identification
- Mouse dissections and tissue extraction for RNA
- Implantation of PIT tags

Fisheries Field Work:

- Morphometric measurements
- Barge and backpack electrofishing
- Kick net, seine net, drift net, fyke net, trap net, and gill net sampling
- Implantation of RFID, PIT, and floy tags
- Tissue sample collection for genetic analyses
- Fish care and fish feeding, fish disease prevention, identification, and treatment

Other Skills:

- Extensive backcountry camping experience
- Snorkeling
- Graphic design
- Knot tying
- Outdoor rock climbing
- Driving 4WD vehicles, including manual transmission

COURSEWORK

Graduate (University of New Hampshire)

GEN 812: Programming for Bioinformatics
MCBS 913: Applied Bioinformatics
NR 995: Landscape Genetics
LSA 900: College Teaching
ANFS 933: Experimental Design/ Analysis
BIOL 950: Scientific Communication
ANFS 933: Design, Analysis, and Interpretation of Experiments
NR 712: Mammalogy

Graduate (University of Wisconsin – Stevens Point)

CNMT 110: Object-Oriented Programming
DS 700: Data Science
GEOG 641: GIS Programming and Customization
NRES 605: R Programming
NRES 775: Topics in Conservation Genetics
NRES 796: Conservation Biology and Modeling
NRES 797: Research Methods Design & Analysis
WATR 584: Life History of Fishes
WLDL 742: Ecological Data Analysis

Undergraduate (Michigan State University)

FW 101/101L: Fundamentals of Fish and Wildlife
FW 419: Application of GIS in Natural Resources
IBIO 341: Fundamental Genetics
IBIO 445: Evolution
IBIO 492: Interdisciplinary Study Conservation Medicine
IBIO 492L: Advance Research Applied Conservation Medicine
IBIO 493: International Communication Conservation Medicine
MC 391: Selected Topics in Public Affairs Environmental Policy
NSC 192: Environmental Issues Seminar
NSC 292: Application of Environmental Studies
PLB 418: Plant Systematics
ZOL 355/355L: Ecology
ZOL 489: Seminar in Zoo and Aquarium Sc

REFRENCES

Dr. Matthew MacManes
matthew.macmanes@unh.edu
Professor, University of New Hampshire

Dr. Wesley Larson
wes.larson@uwsp.edu
Professor, University of Wisconsin- Stevens Point

Dr. Wendylee Stott
wstott@usgs.gov
Research Fisheries Biologist, USGS Great Lakes Science Center