

ZACHERY D. ZBINDEN

Postdoctoral Research Associate
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EDUCATION

- 2022 **Ph.D. in Biology, University of Arkansas, Fayetteville, AR**
Dissertation – *Riverscape community genomics of Ozark fishes: A comparative framework to infer ecological and evolutionary determinants of genetic diversity.*
Advisors: Marlis R. Douglas & Michael E. Douglas
- 2016 **M.S. in Biology, University of Oklahoma, Norman, OK**
Thesis – *Beta diversity of stream fish communities: partitioning variation between abiotic and spatial factors.* Advisor: William J. Matthews
- 2013 **B.S. in Ecology and Evolution, University of Pittsburgh, Pittsburgh, PA**

APPOINTMENTS

- 2022– Postdoctoral Research Associate, Dept. of Biological Sciences, Univ. of Arkansas
- 2020–2022 Chancellor's Fellow, Dept. of Biological Sciences, Univ. of Arkansas
- 2016–2020 Distinguished Doctoral Fellow, Dept. of Biological Sciences, Univ. of Arkansas
- 2013–2016 Graduate Assistant, Dept. of Biology, Univ. of Oklahoma
- 2011–2013 Undergraduate Research Assistant, Pymatuning Lab of Ecology, Univ. of Pittsburgh

RESEARCH AND TEACHING INTERESTS

Ecology	biogeography community ecology spatial ecology
Evolution	landscape genetics phylogeography population genetics
Conservation	fisheries conservation genomics ecological forecasting
Zoology	ichthyology taxonomy phylogenetics
Quantitative bio	spatial analysis programming bioinformatics multivariate statistics

GRANTS AND FELLOWSHIPS

* Grant submitted while a student

- 2023 Arkansas Game and Fish Commission, \$93,879
*Habitat associations and population genetic structure of the endemic Beaded Darter *Etheostoma clinton* in the upper Ouachita River system.* **Co-PI**
- 2022 Arkansas Game and Fish Commission, \$135,955
Developing genetic approaches for sustainable long-term monitoring and modeling CWD spread in white-tailed deer. **Major Contributor ***
- 2021 Arkansas Game and Fish Commission, \$301,687
Genomic and geometric morphometric diversity in Smallmouth Bass and their admixtures within the Interior Highlands of North America. **Major Contributor ***
- Kansas Department of Wildlife, \$42,593
*Genetic diversity of the Neosho Madtom (*Noturus placidus*).* **Major Contributor ***
- 2020 Univ. of Arkansas & AR Game and Fish Commission, Leggett Chancellor's Fellowship, \$48,000
- 2016 Univ. of Arkansas Graduate School, Distinguished Doctoral Fellowship, \$88,000
- 2012 Howard Hughes Medical Institute, Undergraduate Research Fellowship, \$5,000

Pending grant applications

- 2023 National Science Foundation, Division of Environmental Biology, \$696,812
Integrating genomic data to predict climate change resilience in freshwater communities. **Co-PI**

PUBLICATIONS

[Scholar Profile](#)

Refereed journal articles

- 2023 **Zbinden**, Douglas, Chafin & Douglas. Riverscape community genomics: A comparative analytical approach to identify common drivers of genetic structure. [Molecular Ecology](#), 0(0): 0-0. *In press—to be highlighted with perspective article.* [PDF](#)
- **Zbinden**, Douglas, Chafin & Douglas. A community genomics approach to natural hybridization. [Proceedings of the Royal Society B: Biological Sciences](#), 290: 20230768. [PDF](#)
 - Regmi, Douglas, Wangchuk, **Zbinden**, Edds, Tshering & Douglas. The Himalayan uplift and evolution of aquatic biodiversity across Asia: Snowtrout (Cyprininae: *Schizothorax*) as a test case. [PLoS ONE](#), 18(10): e0289736. [PDF](#)
- 2022 **Zbinden**, Geheber, Lehrter & Matthews. Multifaceted assessment of stream fish alpha and beta diversity using spatial models. [Hydrobiologia](#), 849(8): 1795-1820. [PDF](#)

- **Zbinden**. A needle in the haystack? Applying species co-occurrence frameworks with fish assemblage data to identify species associations and sharpen ecological hypotheses. *Journal of Fish Biology*, 100(2): 339–351. [PDF](#)

- 2021 **Zbinden**, Geheber, Matthews & Marsh-Matthews. Fish communities, species of greatest conservation need, and potential protected areas in southeastern Oklahoma, 2014-2016. *Proceedings of the Oklahoma Academy of Science*, 101: 14–32. [PDF](#)

- Chafin, **Zbinden**, Douglas, Martin, Middaugh, Gray, Ballard & Douglas. Spatial population genetics in heavily managed species: separating patterns of historical translocation from contemporary gene flow in white-tailed deer. *Evolutionary Applications*, 14(6): 1673–1689. [PDF](#)

- 2020 **Zbinden**. Temporal dynamics of stream fish assemblages and the role of spatial scale in quantifying change. *Ecology and Evolution*, 10(2): 952–961. [PDF](#)

- Chafin, Douglas, Martin, **Zbinden**, Middaugh, Ballard, Gray & Douglas. Age structuring and spatial heterogeneity in prion protein gene (*PRNP*) polymorphism in Arkansas white-tailed deer. *Prion*, 14(1): 238–248. [PDF](#)

- 2017 **Zbinden** & Matthews. Beta diversity of stream fish assemblages: partitioning variation between environmental and spatial factors. *Freshwater Biology*, 62(8): 1460–1471. [Cover article](#). [PDF](#)

Pending work

- **Zbinden**, Douglas, Chafin & Douglas. Phenotypic Traits as Predictors of Genomic Variability in Freshwater Fish Communities. *In revision*. [Preprint](#)

- Shepherd, Matthews, Geheber, **Zbinden**, Tobler, Marsh-Matthews & Nairn. Re-establishment of fish communities following implementation of ecologically engineered passive treatment systems to remediate mine drainage. *In revision*.

- **Zbinden**, Douglas, Chafin, Tiemann, Edds, Martin, Hofmeier & Douglas. Conservation genomics of the small range endemic Neosho Madtom (*Noturus placidus*). *In prep*.

- Zhang, Xu & **Zbinden**. Upper boundaries of fish diversity in river basins and the species saturation index. *In prep*

Technical reports and non-refereed publications

- 2023 Douglas, **Zbinden**, Chafin, Martin, Tiemann, Edds & Douglas. Genetic diversity of the Neosho Madtom (*Noturus placidus*). *Final Report*. Kansas Department of Wildlife and Parks, Pratt, KS.
- 2022 Douglas, **Zbinden**, Chafin, Martin & Douglas. Screening SNP variation to model deer dispersal in Arkansas. [Final Report](#). Arkansas Game and Fish Commission, Little Rock, AR.
- 2021 **Zbinden**. With great diversity comes great responsibility: what we can do to better archive the rich biodiversity of Arkansas. [University of Arkansas Museum Campus Contributions](#).
- 2020 Douglas, Chafin, **Zbinden**, Martin & Douglas. White-tailed deer in Arkansas: genetic connectivity and chronic wasting disease susceptibility. [Final Report](#). Arkansas Game and Fish Commission, Little Rock, AR.
- 2016 Matthews, Marsh-Matthews & **Zbinden**. Survey of Clear Boggy, Muddy Boggy, Kiamichi and Little River drainages in Oklahoma to determine current distribution and status of fish species of greatest conservation need and potential change in fish communities. [Final Report](#). Oklahoma Department of Wildlife Conservation, Oklahoma City, OK.

SEMINARS AND CONFERENCE PRESENTATIONS

As presenting author

- 2023 A community genomics approach to natural hybridization. *Joint Meeting of Ichthyologists and Herpetologists*, Norfolk, VA.
- 2022 Riverscape community genomics: Intraspecific genetic structure driven by common processes. *American Fisheries Society*, Spokane, WA.
- 2021 Hybridization between fish species in nature: a multispecies population genomic examination. *American Fisheries Society*, Baltimore, MD.
- 2020 A comparative population genetic approach for testing traits associated with variation in population connectivity across species in the White River Basin. *Southern Division American Fisheries Society*, Little Rock, AR.
- 2019 Community genomics of stream fish: multispecies, comparative population genetics spanning the White River Basin. *American Fisheries Society*, Reno, NV.
- Spatiotemporal dynamics of stream fish assemblages over four decades. *American Fisheries Society*, Reno, NV.
- 2018 DNA barcoding the Himalayan torrent ichthyofauna of Bhutan. *International Mahseer Conference*, Paro, Bhutan.

- Micro- and macroevolutionary consequences of dispersal differential among species. *EEB Seminar*, University of Arkansas, Fayetteville, AR.
- 2017 Beta diversity of stream fish assemblages: partitioning variation between environmental and spatial factors. *Joint Meeting of Ichthyologists and Herpetologists*, Austin, TX.
- 2016 A comparison of fish community structure between Clear Boggy and Muddy Boggy Creeks. *Oklahoma Natural Resource Conference*, Oklahoma City, OK.
- 2015 A contemporary fish survey of the Muddy Boggy Drainage, southeast Oklahoma, USA. *Joint Meeting of Ichthyologists and Herpetologists*, Reno, NV.

RESEARCH EXPERIENCE

- 2022- Postdoctoral Research Associate | University of Arkansas | Drs. Mike & Marlis Douglas
Led five conservation genomic projects aimed at guiding management via landscape genomic surveys and quantitative analysis: White-tailed Deer, Neosho Madtom, Smallmouth Bass, Beaded Darter, Collared Lizard
- 2017-2022 Research Assistant | University of Arkansas | Drs. Mike & Marlis Douglas
Assisted with numerous genetic/genomic studies of fish and wildlife (White-tailed Deer, Brown Tree Snakes, Black Bear, Himalayan fishes). Duties included: DNA extraction; next-generation sequencing library prep (ddRAD); Sanger sequencing prep; bioinformatic data processing via high-performance cluster computing; population genetic analysis (R, python); ArcGIS; multivariate analysis; sequence data archival; international fieldwork in Bhutan
- 2016-2022 Project Leader | University of Arkansas | Drs. Mike & Marlis Douglas
Conceived and designed a dissertation project on comparative riverscape genomics. Collected fish assemblages at 75 sites across the Ozarks, and SNP genotyped >3,500 individuals from 35 fish species. The project necessitated: DNA extraction; next-generation sequencing library prep (ddRAD); bioinformatic data processing via high-performance cluster computing; population genetic analysis (R, python); ArcGIS; multivariate analysis; sequence data archival.
- 2016 Research Assistant | University of Oklahoma | Dr. Richard Broughton
Led field expeditions to collect Prairie Chub for population genetic analysis in OK/TX
- 2016 Research Assistant | Oklahoma Biological Survey | Dr. Caryn Vaughn
Fish and mussel assemblage collecting and stream environmental surveys of the Kiamichi River, OK
- 2013-2016 Research Assistant | University of Oklahoma | Dr. William J. Matthews
Fish collecting and environmental surveys at 160 locations across three river drainages in SE OK. Identification and museum archival of >35,000 specimens.

- 2013 Research Assistant | Sam Noble Museum of Natural History | Dr. Edie Marsh-Matthews
Fish specimen archival and database organization
- 2012-2013 Lab Technician | University of Pittsburgh | Dr. Vernon Twombly
Lab maintenance, cleaning, DNA extraction, reagent preparation
- 2011-2013 Undergraduate Research Assistant | Pymatuning Lab of Ecology | Dr. Rick Relyea
Field sampling of aquatic invertebrates and amphibians, animal care and husbandry, toxicology and mesocosm experiments

TEACHING AND MENTORING EXPERIENCE

University of Arkansas

- 2020 Conservation Genetics – Computer Lab Instructor (senior/graduate-level)
- 2019-2021 Ichthyology – Lab Instructor (senior/graduate-level)
- 2017-2018 Global Change Biology – Recitation Leader (senior-level)
- 2016-2020 Principles of Biology – Lab Instructor (freshman-level, non-majors)

University of Oklahoma

- 2016 Zoology – Lab Instructor (freshman-level, non-majors)
- 2015 Ichthyology – Lab Instructor (senior/graduate level)
- 2015 Quantitative Biology – Teaching Assistant (junior/senior-level)
- 2014 Evolution, Ecology, and Diversity – Lab Instructor (freshman/sophomore-level)
- 2013-2014 Molecules, Cells, and Physiology – Lab Instructor (freshman/sophomore-level)

Undergraduate and graduate mentees

* Completed Thesis / Dissertation | ^PPublished

- 2023– Emerson Lejong, Graduate Biological Sciences, Univ. of Arkansas
- 2023– Carson Neal, Undergraduate Biological Sciences, Univ. of Arkansas
- 2023– Carter White, Graduate Biological Sciences, Univ. of Arkansas
- 2023– Lane Laroche, Honors Biological Sciences, Univ. of Arkansas
- 2022– Timothy Goodhart, Graduate Biological Sciences, Univ. of Arkansas
- 2023-2023 Hyatt Fox, Undergraduate Biological Sciences, Univ. of Arkansas
- 2019-2021 Kevin Hollar, Honors Biological Sciences, Univ. of Arkansas *
- 2018-2020 Mackenzie Reed, Honors Biological Sciences, Univ. of Arkansas *
- 2017-2019 McKenna George, Honors Biological Sciences, Univ. of Arkansas *
- 2014-2016 Richard Lehrter, Undergraduate Biological Sciences, Univ. of Oklahoma ^{*P}

AWARDS AND HONORS

- 2022 James E. Wright Graduate Award, American Fisheries Society
- 2020 Jimmie Pigg Student Achievement Award, Southern Division of American Fisheries Society
- 2017 G.T. Johnson Memorial Scholarship Outstanding 1st Year Student, Univ. of Arkansas
- 2016 Teaching Excellence Award, Univ. of Oklahoma
- 2015 L.G. Hill Graduate Excellence Award, Univ. of Oklahoma
- 2014 L.G. Hill Graduate Excellence Award, Univ. of Oklahoma

ADDITIONAL TRAINING

- 2022 Faculty Peer Mentoring Program, Univ. of Arkansas
- 2022 Equity 101: Building Understanding/ Engaging in Action, IDEALS Institute, Univ. of Arkansas
- 2022 Writing a Land Acknowledgement, Multicultural Center, Univ. of Arkansas
- 2022 Gender Bias: Building Understanding/ Creating Allies, IDEALS Institute, Univ. of Arkansas
- 2022 Safe Zone Allies Training, Multicultural Center, Univ. of Arkansas
- 2022 OUCH! That Stereotype Hurts Training, Division of DEI, Univ. of Arkansas
- 2022 Facing Bias: Exposing Blind Spots/ Engaging in Action, IDEALS Institute, Univ. of Arkansas
- 2022 Diversity & Inclusion, Employee Development Program, Univ. of Arkansas
- 2022 Principles of Diversity, Equity, & Inclusion, IDEALS Institute, Univ. of Arkansas
- 2017 Jetstream Cloud Computing, High-Performance Computing Center, Univ. of Arkansas

SERVICE

- 2022 Project Judge, Undergraduate Research Competition, Univ. of Arkansas
- 2021 Planning Committee, Univ. of Arkansas, Dept. Biological Sciences
- 2020 Museum Advisory Council, Univ. of Arkansas
- 2020 Fundraising Committee Chair, Museum Advisory Council, Univ. of Arkansas
- 2020 Graduate Studies Committee, Univ. of Arkansas, Dept. Biological Sciences
- 2018 Rapporteur, International Mahseer Conference

Manuscript referee

Aquatic Sciences – Biological Conservation – Diversity & Distributions – Ecology & Evolution – Freshwater Biology – Journal of Biogeography – Molecular Ecology – PLOS One – The Southwestern Naturalist

PROFESSIONAL SOCIETIES

American Fisheries Society – American Society of Ichthyologists & Herpetologists – American Society of Naturalists – Society for Conservation Biology – Society for the Study of Evolution

REFERENCES

- Dr. Marlis R. Douglas Ph.D. Co-advisor
Professor & Endowed Chair, University of Arkansas
mrd1@uark.edu | 479-575-4176
- Dr. William J. Matthews M.S. Advisor
Professor Emeritus, University of Oklahoma
wmatthews@ou.edu | 405-227-4377
- Dr. Jeremy M. Beaulieu Ph.D. Committee member
Associate Professor, University of Arkansas
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- Dr. Michael E. Douglas Ph.D. Co-advisor
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- Dr. Adam M. Siepielski Ph.D. Committee member
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- Dr. Edie Marsh-Matthews M.S. Committee member
Professor Emeritus, University of Oklahoma
emarsh@ou.edu
- Dr. Richard E. Broughton RA Supervisor
Professor, University of Oklahoma
rbroughton@ou.edu
- Dr. Caryn C. Vaughn RA Supervisor
Professor, University of Oklahoma
cvaughn@ou.edu
- Dr. Vernon J. Twombly RA Supervisor and UG mentor
Instructor, University of Pittsburgh
vernjtwombly@gmail.com
- Dr. Rick A. Relyea UGRA Supervisor and mentor
Professor & Endowed Chair
Rensselaer Polytechnic Institute
relyer@rpi.edu