

# ZACHERY D. ZBINDEN

Postdoctoral Research Associate  
Department of Biological Sciences, University of Arkansas  
Arkansas Conservation and Molecular Ecology Laboratory  
Science and Engineering Hall, Room 601 – 850 W. Dickson St., Fayetteville, AR 72701  
✉ [zdzbinde@uark.edu](mailto:zdzbinde@uark.edu) [zdzbinden.github.io](https://github.com/zdzbinden)

## EDUCATION

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- 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

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- Fall 2024      Asst.Professor, Appalachian Lab, Univ. Maryland Center for Environmental Science
- 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

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Ecology	biogeography   fish ecology   molecular ecology   spatial ecology
Evolution	comparative population genomics   landscape genomics   phylogeography
Conservation	fisheries   conservation genomics   ecological forecasting
Data Analytics	spatial analysis   programming   bioinformatics   multivariate statistics

## GRANTS AND FELLOWSHIPS

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- 2023 Arkansas Game & Fish Commission, \$65,000  
*Genetic monitoring of Eastern Collared Lizard to inform conservation and management actions.* **Co-PI**
- 2023 Arkansas Game & Fish Commission, \$92,775  
*Habitat associations and population genetic structure of the endemic Beaded Darter *Etheostoma clinton* in the upper Ouachita River system.* **Co-PI**
- 2022 Arkansas Game & Fish Commission, \$99,635  
*Developing genetic approaches for sustainable long-term monitoring and modeling CWD spread in White-tailed Deer.* **Co-PI**
- 2020 Univ. of Arkansas and AR Game & 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*

- 2024 National Science Foundation, Division of Environmental Biology, \$699,885  
*Forecasting organismal responses to climate change across freshwater communities.* **Co-PI**

## PUBLICATIONS

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### [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](#), 32(24): 6743–6765. Associated [perspective article](#). [Cover 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](#)

#### *Technical reports and non-refereed publications*

- 2023 Douglas, **Zbinden**, Chafin, Martin, Tiemann, Edds & Douglas. Genetic diversity of the Neosho Madtom (*Noturus placidus*). [Final Report](#) (15 Nov. 2023). 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](#) (1 Jul. 2022). 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](#) (10 Feb. 2020). 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](#) (30 Jun. 2016). Oklahoma Department of Wildlife Conservation, Oklahoma City, OK.

### *Pending manuscripts (available upon request)*

- **Zbinden**, Douglas, Chafin & Douglas. Phenotypic traits are 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**, Chafin, Tiemann, Edds, Martin, Hofmeier, Douglas & Douglas. Neutral and adaptive genetic variation define conservation units for a short-range endemic within an anthropogenically-altered riverscape. *In revision*.
- Zhang, Xu & **Zbinden**. Upper boundaries of fish diversity in river basins and the species saturation index. *In prep*

### **PRESS**

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- 2024 How fish create 'countries' in river systems. [Outdoor Life](#).
- 2024 Scientists reveal secret world of fish 'countries' that divide Arkansas. [News Week](#).
- 2024 Novel comparative approach enables mapping of fish 'countries.' [Univ. of Arkansas News](#).
- 2023 Comparative landscape genomics has arrived with a splash. [Molecular Ecology](#).
- 2021 UA partners with Arkansas Game and Fish to study Smallmouth Bass. [Univ. of Arkansas News](#).
- 2021 New hope for Tar Creek. [Sooner Magazine](#).
- 2020 Biological sciences doctoral candidate awarded Leggett Fellowship. [Univ. of Arkansas News](#).
- 2020 Researcher receives award for work on Ozark fish communities. [Univ. of Arkansas News](#).
- 2018 Researchers use genetic information to track chronic wasting disease. [Univ. of Arkansas News](#).

### **SELECTED SEMINARS AND CONFERENCE PRESENTATIONS**

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#### *Contributed as presenting author*

- 2024 Diversity of Smallmouth Bass in Arkansas. *Arkansas Chapter of the American Fisheries Society*, Texarkana, AR.
- 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, Dept. of Biological Sciences, 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.

*Invited as presenting author*

- 2024 From genes to ecosystems: A genomic approach to ecology and conservation. *University of Maryland Center for Environmental Science, Appalachian Laboratory, Frostburg, MD.*
- 2023 Integrating ecology, evolution, and conservation using genomics. *University of Nebraska, School of Natural Resources, Lincoln, NE.*

## RESEARCH EXPERIENCE

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- 2022- **Postdoctoral Research Associate | University of Arkansas | Drs. Mike & Marlis Douglas**  
 Managing six 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, feral hog eDNA)  
*Skills: project management, workflows, coding, mentorship, communicating with stakeholders, grant writing, eDNA*

- 2017-2022    **Research Assistant | University of Arkansas | Drs. Mike & Marlis Douglas**  
 Collaborator on genomic studies of fish and wildlife (White-tailed Deer, Brown Tree Snake, Black Bear, Himalayan fishes)  
*Skills: communicating with stakeholders, bioinformatics, population genomic analysis*
- 2016-2022    **Project Leader | University of Arkansas | Drs. Mike & Marlis Douglas**  
 Conceived, designed, and executed a dissertation project on comparative riverscape genomics. Collected fish assemblages at 75 sites across the Ozarks and genotyped >3,500 individuals from 35 fish species using reduced representation genomics  
*Skills: field expedition planning and management, fish collection, genomic library prep, bioinformatics, coding, population genomic analysis, project management, mentorship*
- 2016          **Research Assistant | University of Oklahoma | Dr. Richard Broughton**  
 Led field expeditions to collect fish populations for genetic analysis in OK and TX  
*Skills: field expedition planning, fish seining, habitat assessment*
- 2016          **Research Assistant | Oklahoma Biological Survey | Dr. Caryn Vaughn**  
 Fish and mussel assemblage collecting and stream environmental surveys in OK  
*Skills: fish identification, electroshocking, stream surveying techniques, data loggers*
- 2013-2016    **Research Assistant | University of Oklahoma | Dr. William Matthews**  
 Fish collecting and environmental surveys at 160 locations across OK. Identification and museum archival of >35,000 specimens.  
*Skills: field expedition planning and management, fish seining, habitat assessment and stream surveys, fish identification, museum specimen archival, multivariate analysis in R*
- 2013          **Research Assistant | Sam Noble Museum of Natural History | Dr. Edie Marsh-Matthews**  
 Fish specimen archival and database organization  
*Skills: museum database management, collections management*
- 2012-2013    **Lab Technician | University of Pittsburgh | Dr. Vernon Twombly**  
 Lab maintenance, media preparation, DNA extraction and quantification  
*Skills: laboratory protocols and molecular methods*
- 2011-2013    **Research Assistant | Pymatuning Lab of Ecology | Dr. Rick Relyea**  
 Field sampling of aquatic invertebrates and amphibians, animal care and husbandry, toxicology and mesocosm experiments  
*Skills: experimental design, field techniques, invertebrate identification*

## TEACHING AND MENTORING EXPERIENCE

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### *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 | <sup>P</sup>Published

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
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 <sup>*P</sup>

### **AWARDS AND HONORS**

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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 1 <sup>st</sup> 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**

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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

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- 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 – Conservation Biology – Diversity & Distributions – Ecology & Evolution – Freshwater Biology – Journal of Biogeography – Molecular Ecology – PLoS ONE – The Southwestern Naturalist*

### *Conference sessions organized*

- 2024 Innovative session: 'Do the D.N.A., and communicate it with a K.I.S.S: Convert nerd-speak into actions.' *American Fisheries Society*, Honolulu, HI.

## PROFESSIONAL SOCIETIES

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American Fisheries Society – American Society of Ichthyologists & Herpetologists – American Society of Naturalists – Ecological Society of America – Society for Conservation Biology – Society for the Study of Evolution – Sigma Xi

## REFERENCES

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### *Ordered by contact priority*

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|-------------------------|--|
| Dr. Marlis R. Douglas   | Ph.D. co-advisor and postdoc supervisor<br>Professor & Endowed Chair, University of Arkansas<br>mrd1@uark.edu   479-575-4176 |
| Dr. William J. Matthews | M.S. advisor and RA supervisor<br>Professor Emeritus, University of Oklahoma<br>wmatthews@ou.edu   405-227-4377              |
| Dr. Jeremy M. Beaulieu  | Ph.D. committee member<br>Associate Professor, University of Arkansas<br>jmbeauli@uark.edu   479-575-2618                    |
| Dr. Michael E. Douglas  | Ph.D. co-advisor<br>Professor & Endowed Chair, University of Arkansas<br>med1@uark.edu   479-575-6343                        |