ZACHERY D. ZBINDEN

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EDUCATION

2022   Ph.D., Biology–molecular ecology–University of Arkansas, Fayetteville, AR

2016   M.S., Biology–community ecology–University of Oklahoma, Norman, OK

2013   B.S., Ecology and Evolution, University of Pittsburgh, Pittsburgh, PA

EMPLOYMENT

2024–   Assistant Professor, Appalachian Lab, Univ. Maryland Center for Environmental Science
2022-2024   Postdoctoral Research Associate, Dept. of Biological Sciences, Univ. of Arkansas
2016-2022   Graduate Assistant, 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

INTERESTS

Ecology	biogeography | eDNA | fish ecology | molecular ecology | spatial ecology
Evolution	adaptation | comparative population genomics | landscape genomics
Conservation	conservation genomics | ecological forecasting | fisheries | watersheds
Data Analytics	AI | bioinformatics | multivariate statistics | programming | spatial analysis

PROFESSIONAL SOCIETIES

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

FUNDING

Awarded, Current

2025-2026   The Chesapeake Bay Trust, $50,000, *Optimizing eDNA protocols for stream restoration biodiversity assessments in Maryland: a comprehensive literature review and gap analysis*, PI: Daniel Allen, CoI: Zach Zbinden

2025–*2031*   Maryland Department of Natural Resources, $122,521, *Statewide genomic characterization of Brook Trout populations for adaptive management in Maryland*. PI: Zach Zbinden

2025–*2026*   Baltimore County Department of Environmental Protection and Sustainability, $6,875, *Detecting Brook Trout in Baltimore County using environmental DNA*. PI: Zach Zbinden

2025–*2026*   Maryland Department of Natural Resources, $38,260, *Environmental DNA surveys for the endangered Blackbanded Sunfish (*Enneacanthus chaetodon*) in Maryland*. PI: Zach Zbinden, CoI: Bob Hilderbrand

2025–*2026*   Maryland Department of Natural Resources, $85,892, *Assessing eDNA efficacy in reproducing MBSS Sentinel Site collections for fish and benthic macroinvertebrates*. PI: Zach Zbinden, CoI: Bob Hilderbrand

2024–2026   TALIN–The Appalachian Lab Investors Network, $100,000, *Harnessing natural genetic adaptations for climate resilience in Appalachian fish*. PI: Zach Zbinden

Awarded, Completed

2025   The Nature Conservancy, $35,000, *Assessing applications of artificial intelligence for the conservation of freshwater biodiversity*, PI: Katie May Laumann, CoI: Zach Zbinden, Qian Zhang

2023–2025   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*. PI: Marlis Douglas, CoI: Zach Zbinden, Mike Douglas

2022–2024   Arkansas Game & Fish Commission, $99,635, *Developing genetic approaches for sustainable long-term monitoring and modeling CWD spread in White-tailed Deer*. PI: Marlis Douglas, CoI: Zach Zbinden, Mike Douglas, Tyler Chafin

2020–2022   University of Arkansas and Arkansas Game & Fish Commission, $48,000
Harry and Jo Leggett Chancellor's Fellowship

2016–2020   University of Arkansas Graduate School, $88,000
Distinguished Doctoral Fellowship

2012–2013   Howard Hughes Medical Institute and the University of Pittsburgh, $5,000
HHMI Undergraduate Research Fellowship

Submitted, Pending

2026–2029   The Chesapeake Bay Trust, $389,332, Riverscape genomic support for stream restoration planning. PI: Zach Zbinden

Submitted, Not Funded

2026–2027   U.S. Department of the Interior, Multi-state conservation grant, USFW, $286,376, Brook Trout Across Boundaries: Physiological Vulnerability and Molecular Monitoring to Support Fisheries Management. PI: Zach Zbinden

2026–2030   National Science Foundation, $921,009, Collaborative research: Toward resilient Brook Trout populations: A genomic and physiological blueprint for adaptive management, PI: Zach Zbinden, CoI: Matt Fitzpatrick

2026–2027   TALIN—The Appalachian Lab Investors Network, $97,809, Screening indoor environments for biological invaders. PI: Zach Zbinden

PUBLICATIONS

Scholar Profile

Refereed journal articles

Student authors are underlined

* denotes corresponding/senior author

In Rev.   Zhang, Das, **Zbinden**, Boeing, Afanasyev, Guo & Xu. Diagnosing spatial patterns of ecological capacity and biodiversity deficits using an Upper Boundary Regression framework. In Review.

In Rev.   Zhang, **Zbinden**, Yang & Xu. Extent of fish species across the globe contaminated by microplastics. In Review.

2026   Ngeve, Rufo, **Zbinden***. Management pathways for fragmented populations: From habitat restoration to genetic intervention. *Diversity*, 18(2): 73. PDF

2025   **Zbinden**, Chafin, Tiemann, Edds, Martin, Hofmeier, Douglas & Douglas. 2025. Historic and contemporary selection define conservation units for a short-range endemic within an anthropogenically-altered riverscape. *Global Ecology and Conservation*, 62: e03783. PDF

2025   Martin, **Zbinden**, Douglas, Douglas & Chafin. 2025. GeoGenIE: A deep learning approach to predict geographic provenance of biodiversity samples from genomic SNPs. *Bioinformatics Advances*, 5(1): vbaf250. PDF

2025   Atkinson, Franzen, Hopper, Lopez, **Zbinden** & Vaughn. 2025. Environmental gradients drive convergence in life history strategies among disparate but coevolved taxonomic groups. *Ecology*, 106(12): e70273. PDF

2024   Neal, **Zbinden**, Douglas & Douglas. 2024. Reducing DNA extraction costs through factorial design for the DNAdvance kit. *BMC Research Notes*. 17: 397. PDF

2023   **Zbinden***, Douglas, Chafin & Douglas. 2023. 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

2023   **Zbinden**, Douglas, Chafin & Douglas. 2023. A community genomics approach to natural hybridization. *Proceedings of the Royal Society B: Biological Sciences*, 290: 20230768. PDF

2023   Regmi, Douglas, Wangchuk, **Zbinden**, Edds, Tshering & Douglas. 2023. 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. 2022. Multifaceted assessment of stream fish alpha and beta diversity using spatial models. *Hydrobiologia*, 849(8): 1795–1820. PDF

2022   **Zbinden**. 2022. 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. 2021. 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

2021   Chafin, **Zbinden**, Douglas, Martin, Middaugh, Gray, Ballard & Douglas. 2021. 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**. 2020. Temporal dynamics of stream fish assemblages and the role of spatial scale in quantifying change. *Ecology and Evolution*, 10(2): 952–961. PDF

2020   Chafin, Douglas, Martin, **Zbinden**, Middaugh, Ballard, Gray & Douglas. 2020. 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. 2017. Beta diversity of stream fish assemblages: partitioning variation between environmental and spatial factors. *Freshwater Biology*, 62(8): 1460–1471. Cover article. PDF

Non-refereed publications

2025   Douglas, Brewster, Chafin, **Zbinden** & Douglas. Genomic and geometric morphometric diversity in Smallmouth Bass and their admixtures within the interior highlands of North America. *Final Report* (31 Dec. 2025). Arkansas Game and Fish Commission, Little Rock, AR.

2025   Bruckerhoff, Brewster, Douglas, Douglas, Lynch, Magoulick, Taylor & **Zbinden**. Habitat associations and population genetic structure of the endemic Beaded Darter *Etheostoma clinton* in the upper Ouachita River system. *Final Report* (30 Sept. 2025). Arkansas Game and Fish Commission, Little Rock, AR.

2025   Laumann, **Zbinden**, Nair-Gonzalez, Zhang. Artificial intelligence for freshwater biodiversity monitoring and conservation: algorithms, methods, and applications. *Final Report* (31 Jul. 2025). The Nature Conservancy, Arlington, VA.

2024   Douglas, Martin, **Zbinden**, Chafin, Campbell & Douglas. Developing genetic approaches for sustainable long-term monitoring and modeling CWD spread in white-tailed deer. *Final Report* (30 June 2024). Arkansas Game and Fish Commission, Little Rock, AR.

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.

2022   Zbinden, Douglas, Chafin & Douglas. Ozark fish community genomics: ddRAD seq. NCBI sequence read archive. BioProject: PRJNA809538.

2022   Zbinden, Douglas, Chafin & Douglas. Trait-based predictors of genomic diversity within freshwater fish communities of the Ozarks. bioRxiv, 2022.10.26.513843.

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.

POPULAR MEDIA

2025   Maryland Brook Trout genomics survey. *UMCES YouTube*.

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

Invited as presenting author

2025   Fish, rivers, genes, and traits: Understanding biodiversity through spatial genomics. *West Virginia University, Wildlife and Fisheries Department,* Morgantown, WV.

2025   Screening indoor environments for biological invaders. *The Appalachian Lab Investors Network*, *University of Maryland Center for Environmental Science,* Frostburg, MD.

2025   The molecular ecology research group at the Appalachian Laboratory: Supporting conservation and management with genomic tools. *University of Maryland Center for Environmental Science*, *Horn Point Laboratory,* Cambridge, MD.

2025   The molecular ecology working group at the Appalachian Laboratory: Guiding conservation and management with genomic tools. *University of Maryland Center for Environmental Science, Chesapeake Biological Laboratory,* Solomons, MD.

2024   Integrating ecology, evolution, and conservation through spatial genomics. *University of Maryland Center for Environmental Science, Institute of Marine & Environmental Technology,* Baltimore, MD.

2024   Using nature's own tools to expedite climate adaptation. *The Appalachian Lab Investors Network*, *University of Maryland Center for Environmental Science,* Frostburg, MD.

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.

Contributed as presenting author

2025   Using nature's own tools to expedite climate adaptation. *Southern Division American Fisheries Society*, Asheville, NC.

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.

2019   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.

2018   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.

TEACHING AND MENTORING

University of Maryland Center for Environmental Science
2026   Fish Ecology – Professor (graduate; co-taught with Ryan Woodland)
2025   Ecological Genomics – Professor (graduate; co-taught with Clara Fuchsman)
2025   Ecological Foundations – Guest lecturer on Conservation Genomics
2024   Spatial Ecology – Guest lecturer on Landscape Genomics

University of Arkansas

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

University of Oklahoma

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

Graduate Mentees

* Completed Thesis | *P* Published

2025–current Kyle Rufo, UMCES Appalachian Laboratory (PhD) *P*

Graduate Committees

2026–current Pauline Lawrence, UMCES Chesapeake Biological Laboratory (MSc)
2025–current Matthew Maguire, Wildlife and Fisheries Resources, West Virginia University (MSc)

Undergraduate Mentees

* Completed Thesis | *P* Published

2023–2024	Carson Neal, Undergraduate Biological Sciences, Univ. of Arkansas ***** *P*
2023–2024	Lane Laroche, Honors 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

2025	USM Generative AI Pedagogy Fellowship
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

SERVICE

2026	Member of promotion committee, Katie May Laumann, UMCES
2025–current	Volunteer coordinator, 'Trout In The Classroom,' Trout Unlimited
2025	Member of Water Resources Faculty Search Committee, Appalachian Lab, UMCES
2025	Member of UMCES Appalachian Lab Colloquium Planning Committee
2025	Participant of the 'Living Resources Feasibility Charette,' Chesapeake Bay Program
2024–current	Member of the Graduate Faculty Council, UMCES
2024–current	Chair of the Appalachian Lab Graduate Education Committee, UMCES
2024	Co-facilitator, 'eDNA/omics' working group, MEES Colloquium, UMCES
2024	Lightning Talk Judge, MEES Colloquium, UMCES
2022	Project Judge, Undergraduate Research Competition, Univ. of Arkansas
2021	Member of the Planning Committee, Univ. of Arkansas, Dept. Biological Sciences
2020	Member of the Museum Advisory Council, Univ. of Arkansas
2020	Chair of the Fundraising Committee, Museum Advisory Council, Univ. of Arkansas
2020	Member of the Graduate Studies Committee, Univ. of Arkansas, Biological Sciences
2018	Rapporteur, International Mahseer Conference

Manuscript referee

Aquatic Sciences ('22)
Biological Conservation ('21)
Conservation Biology ('23)
Diversity & Distributions ('22)
Ecology & Evolution ('23)
Ecology of Freshwater Fish ('25)
Freshwater Biology ('23)
Journal of Biogeography ('22)
Molecular Ecology ('24)
OIKOS (25)
PLoS ONE ('18; 2x'19; 2x'20)
Reviews in Fish Biology and Fisheries ('26)
Scientific Reports ('25)
Southwestern Naturalist ('16)
USGS external review ('24; '25)