

DR. ALEJANDRO MOLINA-MOCTEZUMA

Quantitative Fisheries Scientist

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Current Appointment

Post-Doctoral Research Associate 2022-Present
Quantitative Fisheries Center, Michigan State University
Supervisor Dr. Travis Brenden

Education

Ph.D. 2020 Wildlife, Fisheries, and Conservation Biology Department, University of Maine
Dissertation: Movement and Survival of Atlantic salmon juveniles in the Penobscot River

M.S. 2015 Faculty of Science, Universidad Nacional Autonoma de Mexico
Thesis: Food availability and mother to embryo nutrient transfer in two live-bearing fish species

B.S. 2012 Faculty of Science, Universidad Nacional Autonoma de Mexico

Professional Experience

2020 – 2022 *Post-Doctoral Fellow*, Center for Freshwater Research and Education, Lake Superior State University

2015 – 2020 *Research Assistant*, Wildlife, Fisheries, and Conservation Biology Department, The University of Maine

2015 *Lecturer*, Ecology (Bio 300), Emebioq y Farma, Mexico City

2015 *Private tutor*, Mathematics

2012 – 2015 *Research Assistant*, Laboratorio de Ecologia de Poblaciones, UNAM

Teaching Experience

2020 *Adjunct Professor*, School of Natural Resources and Environment, Lake Superior State University, NRES 432 (Fisheries Management Laboratory)

2020 *Invited Lecture*, School of Natural Resources and Environment, Lake Superior State University, NRES 431 (Fisheries Management)

2019 *Teaching Assistant*, Wildlife, Fisheries, and Conservation Department, WLE 220 (Introduction to Ecological Stats)

2015 *Lecturer*, Ecology (Bio 300), Emebioq y Farma, Mexico City

2014 *Teaching Assistant*, Faculty of Science, Universidad Nacional Autonoma de Mexico, Ecology (Bio 300)

2014 *Teaching Assistant*, Faculty of Science, Universidad Nacional Autonoma de Mexico, Biostatistics (Bio 200)

Skills

- Coding and programming in R and Python
- Designing, formulating, conducting, and leading data analysis
- Statistical modeling
- Analyses of large datasets

- Data QA/QC
- Development of relational databases
- SQL
- Retrieval and integration of data from multiple sources
- Simulations and other quantitative tools
- Generation of automated reports based on data
- Markdown
- Ability to work independently
- Experience reporting complex models, data and results to a wide audience
- Development of Interactive User Interfaces
 - CFRE's MiWaterNet regional network of affordable water sensors: <https://issu-cfre.shinyapps.io/MiWaterNet/>
 - Decision making tool for downstream passage standards in hydroelectric dams, using simulations: <https://umainezlab.shinyapps.io/sims/>
 - Alewife population model *BETA version, do not distribute* (collaborator): <https://umainezlab.shinyapps.io/alewifepopmodel/>
 - Nutrient loading calculator (currently being designed): <https://Issucfreamm.shinyapps.io/Nutrients/>

Publications

1. **Molina-Moctezuma**, A., Ellis, E., Kapuscinski, K. L., Roseman, E. F., Heatlie, T., & Moerke, A. (2021). Restoration of rapids habitat in a Great Lakes connecting channel, the St. Marys River, Michigan. *Restoration Ecology*, 29(1), e13310.
2. **Molina-Moctezuma**, A., Godby, N., Kapuscinski, K. L., Roseman, E. F., Skubik, K., & Moerke, A. (2021). Response of fish assemblages to restoration of rapids habitat in a Great Lakes connecting channel. *Journal of Great Lakes Research*.
3. **Molina-Moctezuma**, A., Hernández-Rosas, A. L., & Zúñiga-Vega, J. J. (2020). Resource availability and its effects on mother to embryo nutrient transfer in two viviparous fish species. *Journal of Experimental Zoology Part A: Ecological and Integrative Physiology*, 333(3), 181–193.
4. **Molina-Moctezuma**, A., Peterson, E., & Zydlewski, J. D. (2021). Movement, Survival, and Delays of Atlantic Salmon Smolts in the Piscataquis River, Maine, USA. *Transactions of the American Fisheries Society*, 150(3), 345–360.
5. **Molina-Moctezuma**, A., Zúñiga-Vega, J. J., & Espinosa-Pérez, H. (2013). Mortality rates in two populations of the viviparous fish *Poeciliopsis baenschi* (Teleostei: Poeciliidae). *Revista Mexicana de Biodiversidad*, 84(3), 994–998.
6. **Molina-Moctezuma**, A., & Zydlewski, J. (2020). An interactive decision-making tool for evaluating biological and statistical standards of migrating fish survival past hydroelectric dams. *River Research and Applications*, 36(7), 1024–1032.

7. Hawkes, J., Goulette, G., **Molina-Moctezuma**, A., Atkinson, E., & Cox, O. (2019). *Supplementation of Atlantic Salmon in the Southern Extent of their Range: Evaluation of Age-1 Hatchery Smolt Stocking in a Small Coastal Watershed*. North Pacific Anadromous Fish Commission Technical Report
8. Zúñiga-Vega, J. J., Hernández-Rosas, A. L., **Molina-Moctezuma**, A., Pérez-Mendoza, H. A., Rodríguez-Reyes, F. R., Bravo-Espinosa, Y. M., & Espinosa-Pérez, H. (2012). Population Abundance and Sex Ratio of the Viviparous Freshwater Fish *Poeciliopsis baenschii* (Poeciliidae) Throughout its Range in Western Mexico. *Western North American Naturalist*, 72(3), 357–368. <https://doi.org/10.3398/064.072.0310>
9. Zúñiga-Vega, J. J., Olivera-Tlahuel, C., & **Molina-Moctezuma**, A. (2017). Superfetation increases total fecundity in a viviparous fish regardless of the ecological context. *Acta Oecologica*, 84, 48–56. <https://doi.org/10.1016/j.actao.2017.08.002>
10. Pérez-Mendoza, H. A., Zúñiga-Vega, J. J., Martorell, C., Zurita-Gutiérrez, Y. H., Solano-Zavaleta, I., Hernández-Rosas, A. L., & **Molina-Moctezuma**, A. (2014). Patterns of spatio-temporal variation in the survival rates of a viviparous lizard: The interacting effects of sex, reproductive trade-offs, aridity, and human-induced disturbance. *Population Ecology*, 56(4), 605–618.
11. Pérez-Mendoza, H. A., Zúñiga-Vega, J. J., Zurita-Gutiérrez, Y. H., Fornoni, J., Solano-Zavaleta, I., Hernández-Rosas, A. L., & **Molina-Moctezuma**, A. (2013). Demographic Importance of the Life-Cycle Components in *Sceloporus grammicus*. *Herpetologica*, 69(4), 411–435.

Manuscripts in Review or in Prep

12. **Molina-Moctezuma**, A., & Zydlewski, J. D. (submitted). Historical system-wide survival of Atlantic salmon in the Penobscot River. To be submitted to: *Canadian Journal of Fisheries and Aquatic Sciences*.
13. **Molina-Moctezuma**, A & Moerke, A. (In prep, progress: 95%). Response of fish assemblages to restoration of rapids habitat in a Great Lakes connecting channel. To be submitted to: *Journal of Great Lakes Research*.
14. **Molina-Moctezuma**, A & Moerke, A. (In prep, progress: 95%). Nutrient loading by potamodromous fish. To be submitted to: *Freshwater Biology*
15. **Molina-Moctezuma**, A., K. Kapuscinski, and A. H. Moerke. (In prep, progress: 75%). Returns of landlocked Atlantic salmon in the St. Mary's River. To be submitted to: Fisheries
16. Hawkes, J. P., Goulette, J., Kocik, J. F., & **Molina-Moctezuma**, A. (In review). Behavior and survival of naturally- and hatchery-reared Atlantic salmon smolts stocked in a Maine estuary. *Transactions of the American Fisheries Society*.

17. Hawkes, J. P., Goulette, J., **Molina-Moctezuma, A.**, Atkinson, E., & Cox, O. (In review).
Evaluation of Age-1 Hatchery Smolt Stocking in a Small Maine Coastal Watershed. *Transactions of the American Fisheries Society*.

Research Grants

Four grants funded for ~1.4 million dollars.

1. Building capacity at LSSU's Center for Freshwater Research and Education
FUNDED; \$956,658
US Department of Commerce, Economic Development Administration
Co-investigators: Ashley Moerke (lead), Kevin Kapuscinski, John Doubek
2. Expanding the MiWaterNet initiative to implement water sensors in the Eastern Upper Peninsula of Michigan
FUNDED; \$35,000
Michigan Department of Natural Resources
Co-investigators: Ashley Moerke (lead)
3. Migratory characterizations of Atlantic salmon smolts and adults in the Penobscot River, Maine
FUNDED; \$350,000
NOAA Section 6
Co-investigators: Oliver Cox (lead), Joseph Zydlewski, George Maynard
4. Penobscot River Restoration Trust. Passage success and survival of hatchery-reared smolts through Howland Dam
FUNDED; \$25,000
Penobscot River Restoration Trust
Co-investigators: Joseph Zydlewski
5. Will a changing climate facilitate expansion of Dreissenid mussels into the St. Marys River?
IN REVIEW. Submitted as PI
Michigan DNR – MISGP
Co-investigators: Kevin Kapuscinski, John Doubek, Neil Ashton
6. Enhancing data quality from a low-cost sensor network to target future conservation efforts
NOT FUNDED
Great Lakes Observing System
Co-investigators: Ashley Moerke

Fellowships, Assistantships, Honors and Awards

- 2019 University of Maine; **Chase Distinguished Research Assistantship**
2019 University of Maine, College of Natural Sciences, Forestry, and Agriculture; **Graduate**

	Research Excellence Award
2019	University of Maine and Penobscot County Conservation Association; Horace Bond Award
2019	American Fisheries Society; Skinner Memorial Award
2018	University of Maine; UMaine GSG travel award
2017	University of Maine; GSG UMaine club funding
2016	NoWPas; NoWPas graduate fellowship (travel to present)
2016	SEP Mexico; Excellence in Graduate Studies
2013	CONACyT (MX); Award (travel to present)
2013	UNAM PAEP (MX); Travel Award

American Fisheries Society Executive Board

Member since 2015

2016-2017 University of Maine Student Subunit President

2017-2018 University of Maine Student Subunit President

Honors and awards as UMaine AFS president:

2017 “**AFS Outstanding Student Subunit Award**”; national award for the most outstanding student subunit

2017 **Maine Graduate Student Government Club Funding**; Funding for outreach activities awarded by the Umaine Graduate Student Government

2016 **Maine Graduate Student Government Club Funding**; Funding for outreach activities awarded by the Umaine Graduate Student Government

Outreach activities organized:

1. Organized the 2017 Sunkhaze Café seminar series, with help of the Friends of Sunkhaze organization
2. Organized R Workshop taught by Dr. Trevor Avery (Acadia University)
3. Co-organizer of the 3rd Annual Spawning Run 5K- Proceeds used to bolster and expand science and learning to local grade schools
4. Co-organizer of the 3rd Women in Science Luncheon
5. Presented “Macroinvertebrate I.D.” and “Squid Anatomy and Ecology” lessons for elementary school and middle school students in the state of Maine
6. Co-Developed an “Ask a Fisheries Scientist” lesson for elementary school
7. Outreach talks about Atlantic salmon
8. Organized Resume and Cover-Letter Workshop for University of Maine Students
9. Organized a “Build your own website” workshop
10. Diadromous Fish Ecology lesson at John Bapst High School
11. Co-organized the 4th Annual Spawning Run 5K- Proceeds used to bolster and expand science and learning to local grade schools
12. Organized and lead over 25 weekly meetings, with over 10 having invited speakers

Academic Committees and Professional affiliations

2015-Present American Fisheries Society (2015-present)

2015-2020 (AFS) Northeast Division
Atlantic International Chapter
UMaine Student Sub-Unit

2020-Present (AFS) North Central Division
Michigan Chapter

2020-Present The International Association for Great Lakes Research

2015-2020 Maine Atlantic Salmon Passage Working Group

2013-2015 American Society of Ichthyologists and Herpetologists

2011-2015 Ichthyological Society of Mexico

Technical Reports and Grants Reviewer

Technical report of 2015 Atlantic salmon smolt survival in the Penobscot River, as part of the Maine Atlantic salmon passage group

Technical report 2016 Atlantic salmon smolt survival in the Penobscot River, as part of the Maine Atlantic salmon passage group

Technical report 2016 Atlantic salmon upstream passage

Technical report 2017 Atlantic salmon smolt survival in the Penobscot River, as part of the Maine Atlantic salmon passage group

Technical report 2018 Atlantic salmon smolt survival in the Penobscot River, as part of the Maine Atlantic salmon passage group

NOAA 2020 Section 6 Grant Reviewer

Presentations

*Co-organized the symposium “The Role of Interactive User Interfaces in Fisheries and Wildlife Sciences” with Dr. Danielle Quinn during AFS/TWS2019

1. **Molina-Moctezuma A., J. Zydlewski.** 2020. Historical system-wide survival of Atlantic salmon in the Penobscot River. Restoration Ecology. International Association for Great Lakes Research, Virtual [oral/recorded]
2. **Molina-Moctezuma A., A., E. Ellis, K. Kapuscinski, E. Roseman, T. Heatlie, and A. H. Moerke.** 2020. Restoration of rapids habitat in a Great Lakes connecting channel in the St. Marys River, Michigan. Restoration Ecology. International Association for Great Lakes Research, Virtual [oral/recorded]
3. **Molina-Moctezuma A., J. Zydlewski.** 2019. A Decision-Making Tool for Evaluating Biological and Statistical Thresholds for Survival Analysis of Migrating Fishes. American Fisheries Society Annual Meeting, Reno, Nevada [oral]
4. **Molina-Moctezuma A., J. Zydlewski.** 2019. Phenology and Energetic Effects on Individual Physiological Response to Salinity in *Salmo salar* Juveniles. American Fisheries Society Annual Meeting, Reno, Nevada [poster]
5. Zydlewski J., Mensinger M., **Molina-Moctezuma A.,** Murphy J., Payne-Wynne M., Peterson E., Rubenstein S., Vogel S. 2019. Fish Passage in a Changing System - How Bioengineering and Policy Are Shaping the Ecology of the Penobscot River. American Fisheries Society Annual Meeting, Reno, Nevada [oral]
6. Hawkes J., G. Goullete, **A. Molina-Moctezuma A,** Atkinson E, Cox, E. 2019. Supplementation of Atlantic salmon in the southern extent of their range: Evaluation of age-1 hatchery smolt stocking in a small coastal watershed. PAFC-IYS Workshop on Salmon Ocean Ecology in a Changing Climate, Portland, Oregon [oral]
7. **Molina-Moctezuma A., J. Zydlewski.** 2018. System-wide survival of downstream-migrating Atlantic salmon smolts in the Penobscot River, Maine in 2017 and 2018. American Fisheries Society Annual Meeting, Atlantic City, New Jersey [oral]
8. Weaver D., **A. Molina-Moctezuma A.** 2018. Challenges and Successes in Revitalizing the

University of Maine Student Subunit of AFS. American Fisheries Society Annual Meeting, Atlantic City, New Jersey [oral]

9. Barber B, A. J. F. Gibson, **A. Molina Moctezuma**, J. Zydlewski. 2018. A Tool for Understanding Likely Fish Passage and Harvest Management Outcomes for Alewife on the St. Croix River, Maine. American Fisheries Society Annual Meeting, Atlantic City, New Jersey [poster]
10. **Molina-Moctezuma A.**, J. Zydlewski. 2018. A Decision Making tool for evaluating statistical thresholds for survival analysis, 74th Annual Northeast Fish & Wildlife Conference, Burlington, Vermont [oral]
11. **Molina-Moctezuma A.**, J. Zydlewski. 2018. System-wide survival of downstream-migrating Atlantic salmon smolts in the Penobscot River, Maine, 2017. Atlantic Salmon Ecosystem Forum, Orono, Maine [oral]
12. **Molina-Moctezuma A.**, J. Zydlewski. 2017. A Decision Making tool for evaluating statistical thresholds for survival analysis, American Fisheries Society Annual Meeting, Tampa Bay, Florida [oral]
13. **Molina-Moctezuma A.**, J. Zydlewski. 2017. A Decision Making tool for evaluating statistical thresholds for survival analysis, 74th Annual Northeast Fish & Wildlife Conference, Burlington, Vermont [oral]
14. Zydlewski J, B. Heres B., G. Maynard, **A. Molina-Moctezuma**, D. Stich, G. Zydlewski. 2017. Behavioral Characterization of Downstream-Migrating Atlantic Salmon Smolts in the Estuary of the Penobscot River, Maine, Maine. American Fisheries Society Annual Meeting [oral]
15. **Molina-Moctezuma A.**, J. Zydlewski. 2017. Movement and Survival of Downstream Migrating Atlantic Salmon in the Piscataquis River, Maine. Maine Cooperative Fish and Wildlife Research Unit Annual Meeting, University of Maine, Orono, Maine [poster]
16. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2017. Assessing Atlantic salmon downstream migration in a changing system (Penobscot River, Maine). Maine Cooperative Fish and Wildlife Research Unit Annual Meeting, University of Maine, Orono, Maine [oral]
17. **Molina-Moctezuma A.**, J. Zydlewski. 2017. Decision making tool for survival standards, Maine Atlantic Salmon Passage Working Group, Orono, ME. INVITED PRESENTATION [oral]
18. **Molina-Moctezuma A.**, J. Zydlewski. 2016. Behavioral Characterization of Downstream-Migrating Atlantic Salmon Smolts in the Estuary of the Penobscot River, Maine, Maine. American Fisheries Society Annual Meeting [oral]
19. **Molina-Moctezuma A.**, J. Zydlewski. 2016. Characterization of the downstream migration in the Atlantic salmon smolts in Penobscot River, Maine. European (formerly Nordic) Workshop of PhD and Post-Doctoral fellows on anadromous Salmonids [oral]
20. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2016 UMO Historical survival at West Enfield Dam. Maine Atlantic Salmon Passage Working Group, Orono, ME. INVITED PRESENTATION [oral]

21. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2016. Atlantic salmon movement and survival in the Penobscot River, Maine. Maine Cooperative Fish and Wildlife Research Unit Annual Meeting, University of Maine, Orono, Maine [poster]
22. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2016. Atlantic salmon movement and survival in the Penobscot River, Maine. Maine Cooperative Fish and Wildlife Research Unit Annual Meeting, University of Maine, Orono, Maine [oral]
23. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2016 Post-restoration assessment of Atlantic salmon (*Salmo salar*) survival during their downstream migration in the Penobscot River, Maine. 2016. The 2016 Atlantic Salmon Ecosystem Forum. Orono, Maine
24. **Molina-Moctezuma A.**, D. Stich, J. Zydlewski. 2015. UMO Atlantic salmon downstream survival. Maine Atlantic Salmon Passage Working Group, Orono, ME. INVITED PRESENTATION
25. **Molina-Moctezuma A.**, J. J. Zúñiga-Vega. 2014 Food Availability and Matrotrophy: a Test of the Trexler-DeAngelis Model of Maternal Provisioning. Joint Meeting of Ichthyologists and Herpetologists. Chattanooga, Tennessee
26. Marsh-Matthews E., **A. Molina-Moctezuma**, R. Knapp. 2014. Effects of Cortisol on Brood Characteristics of Western Mosquitofish, *Gambusia affinis*. Joint Meeting of Ichthyologists and Herpetologists. Chattanooga, Tennessee
27. **Molina-Moctezuma A.**, J. J. Zúñiga-Vega. 2013. Demography of the freshwater fish *Poeciliopsis baenschi* using multi-state mark-recapture methods. Euring Analytical Meeting. Athens, Georgia
28. Pérez-Mendoza H. A., J. J. Zúñiga-Vega, I. Solano-Zavaleta, Y. Zurita-Gutiérrez, A. L. Hernández-Rosas, **A. Molina-Moctezuma**. 2011. Life history characters and their relationship with survival rates in *Sceloporus grammicus*. 96th ESA Annual Meeting. Austin, Texas
29. Zúñiga-Vega, J., H. A. Pérez-Mendoza, A. L. Hernández-Rosas, R. J. Maceda-Cruz, **A. Molina-Moctezuma**, Olivera-Tlahuel, Claudia. Zurita-Gutiérrez, Yazmín. Solano-Zavaleta, Israel. 2011. The relative importance of the life-cycle components for average fitness: a demographic test of the fast-slow continuum hypothesis. 12th European Ecological Federation Congress. Avila, Spain
30. **Molina-Moctezuma, A.**, J. J. Zúñiga-Vega. 2010. Influencia de la depredación sobre las características de historias de vida y la dinámica poblacional de *Poeciliopsis baenschi*. XII Congreso Nacional de Ictiología. Nayarit, México
31. Hernández-Rosas, A. L., **A. Molina-Moctezuma**, F. R. Rodríguez-Reyes, R. Vega-Trejo, E. García-Molina, J. J. Zúñiga-Vega. 2010 Calidad del agua, supervivencia y reclutamiento de jóvenes de *Rhinella marina* (Amphibia: Bufonidae) en el Occidente de México. XI Reunión Nacional de Herpetología. Estado de México, México
32. Pérez-Mendoza H. A., I. Solano-Zavaleta, Y. Zurita-Gutiérrez, A. L. Hernández-Rosas, **A. Molina-Moctezuma**, J. J. Zúñiga-Vega. 2010 Caracteres demográficos y de historias de vida de ocho

poblaciones de *Sceloporus grammicus* en el Centro de México. XI Reunión Nacional de Herpetología. Estado de México, México

33. Rodríguez-Reyes, F. R., A. L. Hernández-Rosas, **A. Molina-Moctezuma**, H. A. Pérez-Mendoza, Y. M. Bravo-Espinosa, J. J. Zúñiga-Vega. 2010 Probabilidades de supervivencia en *Lithobates forreri* y *Leptodactylus melanonotus*. XI Reunión Nacional de Herpetología. Estado de México, México

Relevant Coursework

Fisheries Population Dynamics, Structured Decision Making, Evolutionary Theory and Application, , Biological Modeling and Simulation, Discussions in Population Ecology, Fish Physiology, Behavioral Ecology, Population Ecology, Natural Resources, Biostatistics, Genetics, Reproductive Biology of Vertebrates, Field Course in Terrestrial Vertebrates of the Deciduous Tropical Forest.

Relevant Workshops

- 2020 Relational Databases in Access, Northern Michigan University
2019 Nimble Workshop, at TWS-AFS joint meeting
2016 Bayesian integrated population modeling (IPM) using BUGS and JAGS. Patuxent Wildlife Research Center, Laurel, Maryland
2014 EURING Analytical Workshop. 2013. University of Georgia. Athens, Georgia.
2013 Sampling design and statistics applied to biodiversity monitoring. 2013. Colorado State University and UNAM. Mexico City, Mexico
2010 Mark-recapture models for natural populations: basic elements and current tendencies. CIMAT, University of Idaho and University of Montana. Guanajuato, Mexico