

Christina Hernández

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Department of Ecology and Evolutionary Biology
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EDUCATION:

- 2015-2020** **Ph.D., MIT/Woods Hole Oceanographic Institution Joint Program**, Biological Oceanography
WHOI Biology Dept and MIT Dept of Earth, Atmospheric, and Planetary Sciences
Thesis title: *Distribution, growth, and transport of larval fishes and implications for population dynamics*.
Advisor: Joel Llopiz
Degree completion date: October 29, 2020
- 2009-2014** **B.S., Columbia University School of Engineering and Applied Sciences**, Earth and Environmental Engineering

POSITIONS HELD:

- 2020 - Present** **Postdoctoral Associate**
Cornell University, Dept of Ecology and Evolutionary Biology
Supervisor: Stephen Ellner
- 2020- Present** **Guest Investigator**
Woods Hole Oceanographic Institution, Biology Department
Sponsor: Joel Llopiz
- 2014-2015** **Research Assistant**
Gulf of Maine Research Institute
Supervisors: Andrew Pershing and Katherine Mills
- 2013** **Summer Student Fellow**
Woods Hole Oceanographic Institution, Biology Department
Supervisor: Joel Llopiz
- 2012-2014** **Research Assistant**
Lamont-Doherty Earth Observatory
Supervisor: Jerry McManus
- 2012** **Summer Research Fellow**
Biosphere2, University of Arizona
Supervisor: Marcel Schaap

PUBLICATIONS

- In revision** **Hernandez CM**, Richardson DE, Rypina II, Chen K, Marancik KE, Shulzitski K, Llopiz JK. Support for the Slope Sea as a major spawning ground for Atlantic bluefin tuna: evidence from larval abundance, growth rates, and particle-tracking simulations. In revision at *Canadian Journal of Fisheries and Aquatic Sciences*.
- van Daalen SF, **Hernández CM**, Caswell H, Neubert MG, Gribble KE. The contribution of maternal age heterogeneity to variance in lifetime reproductive output. In revision at *The American Naturalist*.

- In prep** **Hernandez CM**, Paris CB, Vaz AC, Jones BT, Kellner JB, Richardson DE, Sponaugle S, Cowen RK, Llopiz JK. Larval traits drive patterns of marine dispersal and connectivity. Rejected at *PNAS*, in prep for re-submission at *Ecology*
- 2021** Rypina II, Dotzel MM, Pratt LJ, **Hernandez CM**, Llopiz JK (2021). Exploring interannual variability in potential spawning habitat for Atlantic bluefin tuna in the Slope Sea. *Progress in Oceanography*. <https://doi.org/10.1016/j.pocean.2021.102514>
- 2020** **Hernández CM**, van Daalen SF, Caswell H, Neubert MG, Gribble KE (2020). A demographic and evolutionary analysis of maternal effect senescence. *Proceedings of the National Academy of Sciences*. <https://doi.org/10.1073/pnas.1919988117>
- 2019** **Hernández, C. M.**, Witting, J., Willis, C., Thorrold, S. R., Llopiz, J. K., & Rotjan, R. D. (2019). Evidence and patterns of tuna spawning inside a large no-take Marine Protected Area. *Scientific Reports*, 9(1), 10772.
- Staudinger MD, Mills KE, Stamieszkin K, Record NR, Hudak CA, Allyn A, Diamond A, Friedland KD, Golet W, Henderson ME, **Hernandez CM**, Huntington TG, Ji R, Johnson CL, Johnson DS, Jordaan A, Kocik J, Li Y, Liebman M, Nichols OC, Pendleton D, Richards RA, Robben T, Thomas AC, Walsh HJ, Yakola K (2019) It's about time: A synthesis of changing phenology in the Gulf of Maine ecosystem. *Fisheries Oceanography*
- Rypina, I. I., Chen, K., **Hernández, C. M.**, Pratt, L. J., & Llopiz, J. K. (2019). Investigating the suitability of the Slope Sea for Atlantic bluefin tuna spawning using a high-resolution ocean circulation model. *ICES Journal of Marine Science*. <https://doi.org/10.1093/icesjms/fsz079>
- 2017** Mills KE, Pershing AJ, **Hernández CM** (2017) Forecasting the seasonal timing of Maine's lobster fishery. *Frontiers in Marine Science*. 4:1–10
- 2016** Pershing, A. J., Alexander, M. A., **Hernandez, C. M.**, Kerr, L. A., Le Bris, A., Mills, K. E., Nye, J. A. Record, N. R., Scannell, H. A., Scott, J. D., Sherwood, G. D., Thomas, A. C. Response to Comments on *Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine cod fishery*. *Science*. 352 (2016): 423-423.
- 2015** Pershing, A; Alexander, M; **Hernandez, C**; Kerr, L; Le Bris, A; Mills, K; Nye, J; Record, N; Scannell, H; Scott, J; Sherwood, G; Thomas, A. Slow Adaptation in the face of rapid warming leads to the collapse of the Gulf of Maine cod fishery. *Science*. 350(2015): 809-812.
- Le Bris, A., Pershing, A. J., **Hernandez, C. M.**, Mills, K. E., & Sherwood, G. D. (2015). Modelling the effects of variation in reproductive traits on fish population resilience. *ICES Journal of Marine Science*, 72(9), 2590–2599.

GRANTS AND FUNDING

Competitive Grants (external)

Lead PI: NSF Graduate Research Fellowship Program, Geosciences. *How do larvae get home? Transport pathways, interannual variability, and implications for recruitment success along the US East Coast*. 2015-2020. \$132,000

Competitive Grants (internal)

Co-PI: Ocean Life Institute, Woods Hole Oceanographic Institution. *Atlantic Bluefin Tuna Spawning in the Slope Sea: Larval Growth and Retention*. 2016-2018. Lead PI: J. Llopiz. \$32,939

Co-PI: MISTI-Chile Program, MIT. *Arrival and Survival: Towards an improved understanding of community structure in the marine intertidal*. 2017-2018. Co-PIs: M. Freilich (MIT), K. Archibald (MIT), J. Faundez (Pontificia Universidad Catolica, Chile), M. Orellana (PUC), and N. Muñoz (PUC). Funds for travel and organization of two workshops, one at MIT and one at PUC: \$20,000

Other sources of funding

Adelaide and Charles Link Foundation. *Atlantic Bluefin Tuna Spawning in the Slope Sea: Larval Growth and Population Dynamics*. 2018-2019. Total amount to WHOI, for salary and tuition: \$50,000

Marine Policy Center Graduate Student Fellowship. J. Seward Johnson Endowment in support of the Woods Hole Oceanographic Institution's Marine Policy Center. September 1-December 31, 2019. Covered tuition and stipend.

American Fishermen's Research Foundation Scholarship to support student travel to attend the 69th Tuna Conference. May 2018. Covered conference registration, lodging, meals, and travel between Boston and San Diego.

ASLO Multicultural Program Conference Scholarship, for travel to Ocean Sciences Meeting. February 2014. Covered conference registration, lodging, meals, cultural programming, and travel between New York City and Honolulu.

AWARDS AND HONORS

2021 George "Gera" Pantaleyev Award, MIT-WHOI Joint Program. This award is conferred annually on the MIT-WHOI Graduate Student who best exemplifies the commitment to improving the graduate student experience and graduate student life at WHOI.

2020 Alfred J. Lotka prize for Best Student poster in Theoretical Ecology Section, Ecological Society of America Annual Meeting.

2019 Best Student Lightning Talk, Evolutionary Demography Society 6th annual meeting.

2019 Graduate Women of Excellence Award, MIT.

2014 Departmental Award to a graduating student, Earth and Environmental Engineering, Columbia University.

2013 Induction into Tau Beta Pi, Columbia University.

INVITED PRESENTATIONS

2021 **Hernandez, CM.** Two stories of tuna larvae: combining field observations, otolith analyses, and backtracking simulations. Quantitative Seminar Series, University of Washington School of Aquatic and Fishery Sciences. February 12, 2021. Virtual.

2019 **Hernandez, CM.** Biophysical modeling to maximize insight gained from field data on larval fish. Biology Department Seminar Series, Woods Hole Oceanographic Institution. April 25, 2019. Woods Hole, Massachusetts.

CONTRIBUTED PRESENTATIONS

2020 Hernandez, C; van Daalen, S; Caswell, H; Neubert, M; Gribble, K. Maternal age and fitness in a rotifer: a demographic analysis.* Ecology Society of America Annual Meeting. Virtual. August 3-6, 2020. Poster.

*Awarded the Alfred J. Lotka prize for Best Student Poster in Theoretical Ecology Section

Hernández, CM; Paris, CB; Vaz, AC; Jones, BT; Kellner, JB; Richardson, DE; Sponaugle, S; Cowen, RK; Llopiz, JK. Larval traits drive patterns of marine dispersal and connectivity. Ocean Sciences Meeting. San Diego, California. Feb 17-21, 2020. Poster.

- 2019** Hernandez, C; van Daalen, S; Caswell, H; Neubert, M; Gribble, K. Maternal age and fitness in a rotifer: a demographic analysis.* Evolutionary Demography Society 6th annual meeting. Miami, Florida. January 10, 2019. Lightning talk and poster.
*Awarded the prize for Best Student Lightning Talk
- 2018** Hernandez, C; Llopiz, J; Witting, J; Willis, C; Thorrold, S; Rotjan, R. Distribution of larval tunas in the Phoenix Islands Protected Area and estimated spawning sites during multiple phases of an ENSO cycle (2015-2016). Climate Impacts on Top Predators (CLIOTOP) meeting. Keelung, Taiwan. October 15, 2018. Talk.
- Hernandez, C; Richardson, D; Rypina, I; Chen, K; Pratt, L; Llopiz, J. Larval habitat suitability for Atlantic bluefin tuna spawned in the Slope Sea. Southern New England Chapter of the American Fisheries Society Summer Meeting. Portsmouth, Rhode Island. June 28, 2018. talk.
- Hernandez, C; Richardson, D; Rypina, I; Chen, K; Pratt, L; Llopiz, J. Larval habitat suitability for Atlantic bluefin tuna spawned in the Slope Sea. The 69th Annual Tuna Conference. Lake Arrowhead, California. May 21-24, 2018. talk.
- Hernandez, C; Richardson, D; Rypina, I; Chen, K; Pratt, L; Llopiz, J. Larval habitat suitability for Atlantic bluefin tuna spawned in the Slope Sea. Ocean Sciences Meeting. Portland, Oregon. February 12-16, 2018. Poster.
- 2017** Hernandez, C; Llopiz, J; Paris, C. Vertical distributions of coral reef fish larvae influence dispersal and connectivity. Sixth International Conference on Mathematical Modeling and Analysis of Biological Systems (ICMA VI). Tucson, Arizona. Oct 20-22, 2017. poster.
- 2015** Hernandez, C; Mills, K; Pershing, A. Seasonal forecasts of the timing of Maine lobster landings. Regional Association for Research on the Gulf of Maine (RARGOM) Fall Meeting 2015: How is the timing of all things changing in the Gulf of Maine? Portsmouth, New Hampshire. Oct 14, 2015. oral presentation.
- Hernandez, C; Llopiz, J; Paris, C; Kellner, J; Vaz, A; Jones, B. The influence of ontogenetic vertical migration of coral reef fish larvae on dispersal and connectivity. Ocean Carbon Biogeochemistry (OCB) Scoping Workshop on Trait-Based Approaches to Ocean Life. Waterville Valley, New Hampshire. Oct 5-8, 2015. poster.
- 2014** Hernandez, C; Paris, C; Vaz, A; Jones, B; Kellner, J; Llopiz, J. The influence of taxon-specific vertical distributions of coral reef fish larvae on dispersal and connectivity. Ocean Sciences Meeting. Honolulu, HI. Feb 24-28, 2014. oral presentation.

TECHNICAL REPORTS

- 2016** Die, D. et al. Report of the ICCAT GBYP workshop on bluefin tuna larval studies and surveys. ICCAT SCRS Document 206.
- 2015** Mills, K. E., C. M. Hernandez, R. Young Morse, and A. J. Pershing. 2015. Final report to the Northeast Regional Ocean Council: Environmental Influences on Spatial Patterns of Commercial Fisheries in New England. Gulf of Maine Research Institute, Portland, ME.

TEACHING AND GUEST LECTURES

- 2019** “Tuna spawning in the Phoenix Islands Protected Area: combining field data and computational methods.” February 27, 2019. University of Rhode Island. Bio260X: Undergraduate Biology Seminar. Narragansett, RI.
“Tuna and PIPA: from larvae to international politics.” June 18, 2019. Sea Education Association. Protecting the Phoenix Islands summer course. Woods Hole, Massachusetts.
- 2018** “Tuna and PIPA: from larvae to international politics.” June 20, 2018. Sea Education Association. Protecting the Phoenix Islands summer course. Woods Hole, Massachusetts.
- 2016** “Tuna and PIPA: from larvae to international politics.” June 16, 2016. Sea Education Association. Protecting the Phoenix Islands summer course. Woods Hole, Massachusetts.

MENTORSHIP EXPERIENCE

- 2017** Graduate student supervisor (under Principal Investigator Joel Llopiz) to Ciara Willis, WHOI Summer Student Fellowship Program
- 2016** Supervised four undergraduate projects for Sea Education Association summer course, Protecting the Phoenix Islands.
1. Alexandra Bonecutter and Sergio Morales. Distribution of mesopelagic fish in net samples.
 2. Peter Baek. Distribution of tuna larvae and the relationship to environmental factors.
 3. Jennah McDonald, Ruthann Monsees, and Panyu Peng. Distribution of appendicularians and the relationship to environmental factors.
 4. Alison Gaffney. Characterizing the community of coral reef fish larvae in pelagic samples.

SERVICE TO SCIENTIFIC COMMUNITY

Positions held:

- 2017-present** Chair/President, Society for Women in Marine Science (SWMS)
Oversaw the establishment of chapters across the USA and internationally, managed a fundraising campaign, and spearheaded application process for non-profit status.
- 2019-present** Student Representative to The Oceanography Society (TOS) Council
Established international TOS Student Committee
- 2017-2019** Student Member, Workplace Climate Committee, Woods Hole Oceanographic Institution
Planned and facilitated institution-wide community discussions on sensitive topics including racism, implicit bias, gender discrimination, and relationships between scientific and administrative staff.
- 2020** Co-organizer and presenter at a community presentation in the wake of George Floyd’s murder and the Black Lives Matter protests. *Hope amidst Hurt: Anti-Racism and the Future of WHOI*. Presented *A Primer on Anti-racism*. Woods Hole Oceanographic Institution, June 12, 2020.
- 2019** Co-author of *A Student Charge for Measurable Progress on Diversity and Inclusion*, submitted to the President, Vice Presidents, Staff Council, and the Board of Trustees of the Woods Hole Oceanographic Institution, May 2019.
- 2018** Steering Committee for Fall Symposium of the Society for Women in Marine Science, September 22, 2016. Woods Hole, Massachusetts.
- 2017** Steering Committee for Fall Symposium of the Society for Women in Marine Science, November 3, 2017. Woods Hole, Massachusetts.
Session Chair, Biology and Climate Session, Graduate Climate Conference. November 10-12, 2017. Woods Hole, Massachusetts.
- 2016** Steering Committee for Fall Symposium of the Society for Women in Marine Science, September 29, 2016. Woods Hole, Massachusetts.

OUTREACH ACTIVITIES

2019 Skype a Scientist: 1 session about life cycles of fish and frogs with an elementary school class in Carrollton, Georgia. January 2019.

Mashpee 9 film screening. Together with two other PhD students, I organized a screening of a documentary film about local issues of indigenous and cultural rights, and the gentrification of a nearby town (Mashpee). We invited the filmmaker (who is a Wampanoag woman from Mashpee), two of the men featured in the film, and an indigenous scholar of social justice to speak as a panel after the film. March 9, 2019. Woods Hole, Massachusetts.

Girl Scouts “Geek is Glam!” Workshop for girls ages 8-13. Together with a few other students, we put together materials for an exhibitor table, representing both SWMS and WHOI. I also served on a panel about career opportunities. October 12, 2019. Worcester, MA.

2018 Chile es Mar: full-day workshop with local summer school students. Short presentation in Spanish about bipartite life cycles, followed by a game where students match larval invertebrates with the intertidal adult forms. January 15, 2018. Las Cruces, Chile.

Blue Lobster Bowl, New England Regional Ocean Sciences Bowl, March 3, 2018. Science judge. Cambridge, Massachusetts.

Skype a Scientist: 2 sessions about life cycles of plants with elementary school classes in Lima, Peru. June 2018.

Half-day event for Falmouth High School Spanish Exchange Program. Introductory talks about WHOI, geosciences, and physical oceanography, followed by hands-on activities on the dock and in the laboratory. 15-20 students, including local host students and their visitors from Spain. October 11, 2018. Woods Hole, Massachusetts.

2017 Northeast Regional Science Bowl. February 11, 2017. Timekeeper. Cambridge, Massachusetts.

Guest lecture at John Paul II High School, “Drifters and swimmers: tuna from eggs to adults.” May 5, 2017. Hyannis, Massachusetts.

2016 Blue Lobster Bowl, New England Regional Ocean Sciences Bowl, March 5, 2016. Science grader and facilitator for box model group activity. Cambridge, Massachusetts.

FIELD WORK EXPERIENCE

2018 August 3 to 27, 2018: SKQ201818S. Beaufort Shelf Upwelling Project Year 2. Fish team. Deployed, recovered, and processed midwater trawl samples targeting Arctic cod.

2017 June 10 to 23, 2017: GU1702. NEFSC Larval Bluefin Tuna Survey. Participated in sampling for larval tuna, processed plankton samples, performed at-sea identification of larval fish, and trained and supervised an undergraduate researcher on these same tasks.

July 6 to 20, 2017: HB1704. NEFSC Sea Turtle Tagging Cruise. Oceanography team. Participated in sampling for larval tuna, processed plankton samples, performed at-sea identification of larval fish, and released one set of oceanographic drifters.

August 25 to September 18, 2017: SKQ201713S. Beaufort Shelf Upwelling Project Year 1. Fish team. Deployed, recovered, and processed midwater trawl samples targeting Arctic cod.

2016 June 17 to 23, 2016: AR06. R/V Armstrong Science Verification Cruise IV. Tested biological sampling techniques, including CTD-mounted Video Plankton Recorder, various plankton nets, and a mid-water trawl net system. Participated in deployment, recovery, and sample processing.

July 5 to Aug 13, 2016: S268. Sea Education Association summer program ‘Protecting the Phoenix Islands.’ A major cruise objective was to sample larval tunas in the Phoenix Islands Protected Area. Supervised net tows and sample processing, advised 4 undergraduate research projects.

PROFESSIONAL DEVELOPMENT AND WORKSHOP PARTICIPATION

2021 Participant, NIMBioS “Discussions with Students on Quantitative Education in the Life Sciences.” January 22. Virtual.

Student, Stanford course “Matrix Methods for Dynamic Models and Data Analysis” taught by Shripad Tuljapurkar. 6 sessions, January-March. Virtual.

Building Mentorship Skills for Academic Careers, Future Faculty and Academic Careers, Cornell University Graduate School, Spring 2021 (*8 hours*).

2018 Organizer-Participant, MISTI-Chile Workshop on “Arrival and Survival: Towards an improved understanding of community structure in the marine intertidal.” January 5-11. Santiago and Las Cruces, Chile.

2017 Organizer-Participant, MISTI-Chile Workshop on “Arrival and Survival: Towards an improved understanding of community structure in the marine intertidal.” August 2-12. Cambridge and Woods Hole, Massachusetts.

2016 Participant, International Commission for the Conservation of Atlantic Tunas (ICCAT) Working Group on Larval Studies and Surveys

2015 Participant, OCB: Trait-Based Approaches to Understanding Marine Life Workshop, Waterville Valley, NH, USA. 5-8 October.