

# Rene D. Francolini

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## EDUCATION:

**Ph.D., Marine Biology** 2020-2025 (Expected)

University of Maine, Darling Marine Center, Walpole, ME  
Bigelow Laboratory for Ocean Sciences, Boothbay, ME  
Advisors: Dr. Doug Rasher & Dr. Damian Brady

**M.S., Computational Biology** 2015-2016

Carnegie Mellon University, Pittsburgh, PA  
Thesis: *Analysis of ChIP-Seq Data to Determine Functional Uses of Primary and Secondary Tbrain Motifs*  
Advisor: Dr. Veronica Hinman

**B.S., Biological Sciences** 2011-2015

Carnegie Mellon University, Pittsburgh, PA

## RESEARCH INTERESTS:

Ecosystem Biology; Population Genomics; Bioinformatics; Molecular Ecology; Biodiversity; Environmental Impacts; Climate Change Response; Conservation Policy; Marine Sciences

## RESEARCH:

**Graduate Research Assistant** July 2020 – Current

*Bigelow Laboratory for Ocean Sciences*

Investigating the impact of climate change on the Gulf of Maine kelp forests, forecasting the future of the kelp forest community, genetic variation and associated biodiversity.

Advisors: Dr. Doug Rasher & Dr. Damian Brady

**Research Assistant III: Govindarajan Laboratory** December 2018 – June 2020

**Research Assistant II: Govindarajan Laboratory** June 2018 – December 2018

*Woods Hole Oceanographic Institution*

Developed protocols to use environmental DNA to identify and build a library of eukaryotic animals inhabiting the mesopelagic zone of the ocean. Participated in research expeditions to collect and process eDNA and zooplankton samples. Collaborated with engineers to design large scale *in situ* eDNA sampling instrument.

Advisor: Dr. Annette Govindarajan

**Research Assistant III: Stegeman Laboratory** December 2018 – November 2019

**Research Assistant II: Stegeman Laboratory** February 2017 – December 2018

*Woods Hole Oceanographic Institution*

Studied the effects of environmental toxicants, particularly PCBs, using zebrafish and killifish as model organisms. Assembled marine animal genomes with Oxford Nanopore Technology. Generated and maintained multiple wildtype and CRISPR zebrafish lines. Analyzed the effects of pharmaceuticals and sewage on oysters.

Advisor: Dr. Jed Goldstone

**Master's Thesis Research** January 2015 – May 2016

*Carnegie Mellon University*

Utilized computational methods to analyze raw ChIP-Seq data and identify binding locations of transcription factor Tbrain in *P. miniata* and *S. purpuratus* to determine evolutionary significance of presence of secondary binding site in orthologous genes.

Advisor: Dr. Veronica Hinman

**Undergraduate Research Intern** Summer 2014  
*Hawaii Institute of Marine Biology, University of Hawaii - Manoa*  
Investigated the relationship of *Montipora* coral and algae metabolomics in abnormal temperature zones through NMR analysis of metabolite extractions. Examined spawning patterns and growth of *Montipora* coral in varying carbon dioxide conditions.  
Advisor: Dr. Ruth Gates

**Andes to Amazon Study Abroad** Summer 2013  
*Ceiba Foundation for Tropical Conservation*  
Conducted field work in El Pahuma cloud forest, Tiputini Biodiversity Station, and Lalo Loor Dry Forest Ecological Station in Ecuador, focusing on zoology and botany of wet and dry forest ecosystems.  
Advisor: Dr. Joe Meisel

**Phage Genomics Research** 2011-2012  
*Carnegie Mellon University*  
Isolated, characterized, and analyzed unique bacteriophages using molecular and computational techniques including an Ion Torrent Personal Genome Machine.  
Advisors: Dr. Maggie Braun & Dr. John Jarvik

**Summer Research Intern** 2007-2012  
*Wellfleet Bay Wildlife Sanctuary, Massachusetts Audubon Society*  
Conducted juvenile horseshoe crab surveys, maintained diamondback terrapin nest protection enclosures, and aided in oyster reef spawning and restoration projects.  
Advisor: Mark Faherty

TEACHING  
EXPERIENCE:

**Instructor: Girls Who Code – Boothbay Region** January 2022 – Current  
*Girls Who Code – Boothbay Harbor Memorial Library*  
Weekly club focused on teaching girls from 5<sup>th</sup>-8<sup>th</sup> grade how to code using online block programming languages through creating animations and interactive games.

**Instructor: 2021 Maine-eDNA Metabarcoding Workshop** December 2021  
*University of Maine – Maine EPSCoR*  
Taught how to process and visualize metabarcoding sequencing data, from raw sequences to amplicon sequence variants, using a dada2 and phyloseq pipeline.

**Instructor: 2021 Bigelow Data Carpentry Workshop** April 2021  
*Bigelow Laboratory for Ocean Sciences*  
Topics taught include best data management practices, introduction to R, manipulating data in R, plotting in R, and visualizing ocean data

**Teaching Assistant:**  
**Experimental Biochemistry** Spring 2015  
**Experimental Techniques in Molecular Biology and Genetics** Fall 2014  
*Carnegie Mellon University*  
Led review and extension sessions for students to ensure understanding of difficult material and graded problem sets, quizzes, and tests for the class.  
Advisor: Dr. Carrie Doonan

**Teacher: Research Experience in Marine Sciences** Summer 2014  
*Hawaii Institute of Marine Biology*  
Taught 20 high school students marine science, experimental design, how to write lab reports, and presentation skills. Guided student group projects on topics including jellyfish zooxanthellae and snapping shrimp regeneration.  
Advisor: Dr. Malia Rivera

**Day Camp Instructor: Natural History Day Camp**

2011-2013

*Wellfleet Bay Wildlife Sanctuary, Massachusetts Audubon Society*

Arranged and taught lessons on migration, natural habitats, salt marshes, native organisms, and coastal waterways for students age 4-15 years old. Led and managed educational tours for families focused on the environment & conservation of Cape Cod.

**PUBLICATIONS:**

**R.D. Francolini**, S.P. Farrell, Y.M. Shah Esmaili, D.S. Yiu, D. Brady, D.B. Rasher. (in prep) *Detecting and projecting the presence of Membranipora membranacea (lacy bryozoan) in the Gulf of Maine using eDNA.*

Y.M. Shah Esmaili, S.P. Farrell, **R.D. Francolini**, D.S. Yiu, D.B. Rasher. (in prep) *eDNA and visual surveys provide complementary assessments of kelp forest biodiversity.*

A. Bucklin, P.G. Batta-Lona, J.M. Questel, H. McMonagle, M. Wojcicki, J.K. Llopiz, S. Glancy, P.E. Caiger, **R.D. Francolini**, A. Govindarajan, S.R. Thorrold, M. Jech, P.H. Wiebe. (2024) *Metabarcoding and morphological analysis of diets of mesopelagic fishes in the NW Atlantic Slope Water.* *Frontiers in Marine Science.* Volume 11, doi: 10.3389/fmars.2024.1411996. [full text.](#)

E. Schutt, **R.D. Francolini**, N. Price, Z. Olson, C.J. Byron. (2023) *Supporting ecosystem services of habitat and biodiversity in temperate seaweed (Saccharina spp.) farms.* *Marine Environmental Research.* Volume 191, doi: 10.1016/j.marenvres.2023.106162. [full text.](#)

A.F. Govindarajan, L. McCartin, A. Adams, E. Allan, A. Belani, **R.D. Francolini**, J. Fujii, D. Gomez-Ibañez, A. Kukulya, F. Marin, K. Tradd, D.R. Yoerger, J.M. McDermott, S. Herrera. (2022) *Improved biodiversity detection using a large-volume environmental DNA sampler with in situ filtration and implications for marine eDNA sampling strategies.* *Deep Sea Research Part I: Oceanographic Research Papers.* Volume 189, doi: 10.1016/j.dsr.2022.103871. [full text.](#)

A.F. Govindarajan, **R.D. Francolini**, J.M. Jech, A.C. Lavery, J.K. Llopez, P.H. Wiebe, W.G. Zhang. (2021) *Exploring the Use of Environmental DNA (eDNA) to Detect Animal Taxa in the Mesopelagic Zone.* *Frontiers in Ecology and Evolution.* Vol. 9, doi: 10.3389/fevo.2021.574877. [full text.](#)

M. C. Salanga, N. R. Brun, **R.D. Francolini**, J. J. Stegeman, J. V. Goldstone. (2020) *CRISPR-Cas9 Mutated Pregnane X Receptor (pxr) Retains Pregnenolone-induced Expression of cyp3a65 in Zebrafish (Danio rerio) Larvae.* *Toxicological Sciences,* Vol. 174, Issue 1, pgs 51-62, doi: 10.1093/toxsci/kfz246. [full text.](#)

G.A. Cary, A.M. Cheatle Jarvela, **R.D. Francolini**, V. F. Hinman. (2017) *Genome-wide use of high- and low- affinity Tbrain transcription factor binding sites during echinoderm development.* *Proc Natl Acad Sci USA.* Vol. 114 no. 23. 5854-5861, doi: 10.1073/pnas.1610611114. [full text.](#)

Pope WH, Bowman CA, et al. (2015) *Whole genome comparison of a large collection of mycobacteriophages reveals a continuum of phage genetic diversity.* Kolter R, ed. *eLife.* 2015; 4:e06416. doi:10.7554/eLife.06416. **(contributing author).** [full text.](#)

**INVITED****PRESENTATIONS:**

**Population Genomics of *Saccharina latissima* Along the Coast of Maine.** December 19, 2024. Department of Marine Resources. Augusta, ME. Invited Talk.

**Population Genomics of *Saccharina latissima* Along the Coast of Maine.** April 1, 2024. Alaska Seaweed Genetics Workshop. Juneau, AK. Invited Talk.

**On Podcasting & Communicating Science.** March 4, 2020. Sea Education Association. Woods Hole, MA. Invited Talk.

PRESENTATIONS:

**Population Genomics of *Saccharina latissima* along the Coast of Maine.** November 8, 2024. Western Society of Naturalists Annual Meeting. Portland, OR. Talk.

**Exploring Kelp Forest Ecology Along the Coast of Maine: Insights from eDNA.** October 15, 2024. National EPSCoR Meeting. Omaha, NE. Poster.

**Distribution, Seasonality, and Drivers of Lacy Bryozoan Along the Coast of Maine.** June 20, 2024. Maine EPSCoR All-Hands Meeting. Portland, ME. Poster.

**Population Genomics of the Gulf of Maine Kelp Forests.** May 8, 2023. School of Marine Sciences Graduate Student Symposium. Walpole, ME. Talk.

**Gulf of Maine Kelp Forests: Population Genomics and Responses to Climate-Driven Stressors.** December 12, 2022. PhD Proposal Defense. Bigelow Laboratory for Ocean Sciences. Boothbay, ME. Talk.

**Detecting the Presence of Lacy Bryozoan in Kelp Forests using eDNA.** December 1, 2022. Maine EPSCoR Maine-eDNA All-Hands Meeting. Orono, ME. Graphical Abstract.

**Rapid Change in Maine's Kelp Forests During the Hottest Year on Record.** May 9, 2022. School of Marine Sciences Graduate Student Symposium. Walpole, ME. Poster.

**Using Population Genetics to Characterize the Gulf of Maine Kelp Forests.** May 11, 2021. School of Marine Sciences Graduate Student Symposium. Maine. Virtual Talk.

**How are Gulf of Maine Kelp Forests Responding to Climate Change?** October 26, 2020. Maine EPSCoR Maine-eDNA All-Hands Meeting. Maine. Virtual Talk.

**LabOratory Podcast: Documenting Personal Narratives of Scientific Significance.** February 17, 2020. Ocean Sciences. San Diego, CA. eLightning Session.

GRANTS:

**Maine Sea Grant Program Development, *co-written with Dr. Doug Rasher*** April 2021  
**Graduate Student Government Individual Grant, *University of Maine*** March 2021  
**Technical Staff Training & Development Opportunity, *WHOI*** July 2018

SPECIAL

COURSEWORK:

**Structural Equation Modeling for Ecology and Evolutionary Biology, *PR Statistics*** March 2023  
**OceanHackWeek, *University of Washington/Bigelow Laboratory*** August 2020  
**Strategies & Techniques for Analyzing Microbial Populations & Structures, *Marine Biological Laboratory*** August 2018  
**Oxford Nanopore Training, *Woods Hole Oceanographic Institution*** December 2017

AWARDS:

**Western Society of Naturalists Rafe Sagarin Award:**  
**Best Student Paper in Observational Ecology** November 2024  
**NSF-GRFP Honorable Mention** April 2020  
**Academic Achievement Scholarship** 2015-2016  
**CMU Senior Leadership Recognition** May 2015  
**Biology Student Advisory Council Service Award** May 2015  
**Alpha Phi Omega Distinguished Service Key** May 2015  
**CMU Dean's List** May 2014  
**CMU Dean's List with Honors** December 2013  
**Tartans Abroad Scholarship** Summer 2013

MENTORING:

Jeremy Goldrick, Bigelow Sea Change Semester Student, 2024  
Katie Pell, WHOI Undergraduate Guest Student, 2020  
Sarah Stover, WHOI Undergraduate Guest Student, 2019  
Nicole Suren, WHOI Summer Student Fellow, 2018

OUTREACH:

<b>Volunteer</b> , <i>Bigelow Open House</i>	July 2023
<b>Volunteer</b> , <i>GreenME UP!</i>	April 2023
<b>Invited Speaker</b> , <i>Marine Science Club, Seattle Aquarium</i>	January 2023
<b>Volunteer</b> , <i>Bigelow Open House</i>	July 2022
<b>Invited Speaker</b> , <i>QueerSci Talks, RIT COSLISC</i>	October 2022
<b>Skype A Scientist LIVE!</b> , <i>Skype-A-Scientist, Virtual YouTube Event</i>	March 2022
<b>Skype A Scientist</b> , <i>Gifted Education, Bedford County Schools</i>	February 2022
<b>Skype A Scientist</b> , <i>Girl Guides of Canada</i>	April 2021
<b>Skype A Scientist</b> , <i>Ellis Mendell Elementary School 3<sup>rd</sup> Grade</i>	March 2021
<b>Skype A Scientist</b> , <i>MSU Montclair Marine Biology Organization</i>	March 2021
<b>Skype A Scientist</b> , <i>Parkway South High School AP Bio</i>	March 2021
<b>Judge</b> , <i>Falmouth Academy Science Fair</i>	February 2021
<b>Host and Producer</b> , <i>LabOratory Podcast</i>	January 2020 – April 2021
<b>Interviewee</b> , <i>Kai Talks Science, Falmouth Community TV</i>	February 2020
<b>Volunteer</b> , <i>Woods Hole Science Stroll</i>	August 2017 & 2018
<b>Instructor</b> , <i>East Falmouth Elementary School 3<sup>rd</sup> Grade Field Trip</i>	2018
<b>Judge</b> , <i>Falmouth Academy Science Fair</i>	February 2018
<b>Tutor</b> , <i>Falmouth Volunteers in Public Schools High School</i>	2017-2018
<b>Instructor</b> , <i>East Falmouth Elementary School 3<sup>rd</sup> Grade Field Trip</i>	June 2017
<b>Instructor</b> , <i>Leonard Gelfand Center Biological Sciences Outreach</i>	2012-2016
<b>Instructor</b> , <i>Pennsylvania Junior Academy of Science Workshops</i>	2011-2016

CRUISES:

**R/V Armstrong**, Woods Hole, March 10 – March 16, 2020  
**R/V Manta**, Texas, September 21 – September 27, 2019  
**R/V Henry B. Bigelow**, Rhode Island, July 24 – August 8, 2019  
**S.S.V. Corwith Cramer**, Visiting Scientist, Bermuda to NYC, April 22 – May 2, 2019