

# FINN CALLAHAN

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<https://fiona-mc.github.io/fmcallahan/>

## PROFILE

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- Computational Biology Ph.D. student at University of California, Berkeley working in Dr. Rasmus Nielsen's lab
- Currently working on computational methods development for ecological modeling using data from ancient environmental DNA
- Interested in pedagogy, mentorship, and equity-oriented teaching practices

## EDUCATION

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<b>PhD</b>	University of California, Berkeley (in progress) Computational Biology	Expected May 2027
<b>BA</b>	Scripps College, GPA 3.9 Mathematical/Computational Biology Major through Harvey Mudd College	May 2021

## PUBLICATIONS

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*Note: some publications appear under Fiona Callahan*

**Callahan, F. M.**, Kjær, K. H., Ramsøe, A. D., Willerslev, E., & Nielsen, R. Reproducibility and normalization in ancient environmental DNA. (in preparation).

Kjær, K. H.†, Ruter, A. H.†, Menendez-Serra, M.†, Vogel, N. A.†, Ramsøe, A. D.†, Farnsworth, W. R.†, Siggaard-Andersen, M.-L.†, Huang, Z.†, **Callahan, F.**†, Mesny, F.†, ... Willerslev, E. (in review). Environmental DNA reveals Reykjavík's human and ecological history.

**Callahan, F. M.**†, & Evensen, C.† (2026). Co-occurrence networks can preserve emergent properties of ecological communities. *bioRxiv*, 2026-04. DOI:10.64898/2026.04.15.718781.

Li, J. K., Lim, W., **Callahan, F. M.**, Raskin, L. Y., Lemmon-Kishi, M., & Nielsen, R. (2026). STEM-LM: Spatio-Temporal Ecological Modeling via Masked Language Model for Joint Species Distribution. *bioRxiv*, 2026-05.

**Callahan, F. M.**, Li, J. K., & Nielsen, R. (2025). Challenges in detecting ecological interactions using sedimentary ancient DNA data. *Environmental DNA*, 7(2), e70067. DOI:10.1002/edn3.70067.

†*Joint first authors*

## RESEARCH EXPERIENCE

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**Network modeling for community ecology** Spring 2025 - Present  
*UC Berkeley*

**Advisor:** Dr. Rasmus Nielsen

- Designed simulations to benchmark species interaction network modeling tools.
- Explored how co-occurrence networks and species interaction networks are related through generalized Lotka-Volterra models.

**Ecological community modeling using ancient eDNA** Spring 2022 - Present  
*UC Berkeley*

**Advisor:** Dr. Rasmus Nielsen

- Developed mechanistic simulation framework for ecological data from ancient environmental DNA (aeDNA)
- Analysis of aeDNA data from Iceland (in progress)
- Development of new data analysis tools for aeDNA (in progress)
- Development of rigorous statistical frameworks for normalization and use of replicates for aeDNA data

**Time series modeling of phytoplankton blooms in the San Francisco Bay** Spring 2022  
*UC Berkeley (first year PhD rotation project)*

**Advisor:** Dr. Perry de Valpine

- Rotation project (10 weeks) analyzing time series data to predict phytoplankton blooms in the San Francisco Bay

**Disease ecology in bees** Fall 2021  
*UC Berkeley (first year PhD rotation project)*

**Advisor:** Dr. Mike Boots

- Rotation project (10 weeks) building a simulation of disease transmission in bees

**Connecting molecular differences in TTN gene to muscle performance** 2020 - 2021  
*WM Keck Science Department, Claremont Colleges*

**Advisor:** Dr. Findley Finseth

- Undergraduate senior thesis research
- Characterized genetic differences in the protein Titin to connect them to within-species differences in muscle performance
- Adapted annotation tool for a region of the giant sarcomeric protein titin

**Differential gene expression in high-running versus control mice** Summer 2019

**Differential gene expression in pair-bonded versus naïve zebra finch** Spring 2020

*WM Keck Science Department, Claremont Colleges*

**Advisors:** Dr. Findley Finseth, Dr. Jenna Monroy

- Performed RNA extraction for RNA-seq and qPCR from mouse muscle tissue
- Analyzed RNA-seq data from mouse muscle tissue and zebra finch brain tissue
- Performed a comparative analysis of computational tools for RNA-seq differential expression analysis

## TEACHING AND MENTORSHIP

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### **Graduate Student Instructor, UC Berkeley**

- Led discussion sections for Human Biological Variation (~80 students, Spring 2026)
- Taught Berkeley Connect in Computational Biology (40 students, Fall 2023 & Spring 2024)
- Designed original syllabi, and lesson plans; coordinated accessibility accommodations; graded assignments

### **Math Instructor, Mount Tamalpais College, San Quentin Rehabilitation Center**

- Volunteer math instructor for college preparatory courses at San Quentin Rehabilitation Center (Summer 2024 - Present)
- Designed lessons, assignments, and exams for adult students preparing for college-level mathematics

### **Research Mentorship**

- Mentored 6 undergraduate research assistants in computational biology projects (2022 - Present)
- Designed independent research projects and provided weekly mentorship meetings

### **Mentorship & Outreach**

- Computational Biology Mentorship Committee (2023 - Present): coordinating professional development workshops and one-on-one peer mentorship for early-career PhD students
- Workshop leader, Expanding Your Horizons conference (2023 - 2026): introducing middle school girls and gender-diverse youth to STEM careers
- Volunteer mentor, Be A Scientist program: guided 7th grade students in designing and conducting independent experiments

### **Pedagogical Training**

- Certificate in Teaching and Learning in Higher Education (UC Berkeley, in progress)
- Completed workshops in inclusive classroom design, accessibility, and evidence-based teaching practices
- Completed pedagogy and mentorship courses at UC Berkeley

## COURSEWORK AND SKILLS

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- **Computer Science:** Data Structures and Program Development, Algorithms, Introduction to Computer Science, Principles of Computer Science
  - **Programming languages:** Python (advanced), R (advanced), Bash (advanced), Java, C++
  - **Lab server administrator:** managed technical support for two Ubuntu servers for the Nielsen lab
- **Statistics:** Introduction to Statistical Computing (graduate level), Hierarchical Statistical Modeling in Environmental Science (graduate level), Statistical models: Theory and

Applications (graduate level), Stochastic Processes, Introduction to Statistics at an Advance Level (graduate level), Introduction to Probability at an Advance Level (graduate level)

- **Ecology and Biology:** Network approaches to infer the resilience of ecological communities, Genomics and Bioinformatics, Biostatistics, Molecular Genetics, Ecology and Environmental Biology, Introduction to Mathematical/Computational Biology, Advanced Computational Biology, Evolutionary Genomics, Topics in Biochemistry and Molecular Biology, Molecular/Cellular Biology Lab, Experimental Biology Lab
  - **Lab skills:** RNA extractions, PCR, qPCR, primer design, gel electrophoresis, bacterial transformations
- **Mathematics:** Number Theory, Real Analysis, Linear Algebra, Discrete Mathematics, Multivariable Calculus

#### **SERVICE**

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CCB peer mentorship committee, UC Berkeley	(Fall 2023 – Spring 2026)
CCB Diversity, Equity, and Inclusion committee, UC Berkeley	(Fall 2023 – Spring 2026)
CCB seminar organizing committee, UC Berkeley	(Fall 2023 – Spring 2024)
CCB retreat planning committee, UC Berkeley	(Fall 2022 – Fall 2023)

#### **HONORS AND AWARDS**

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<b>Student Leadership and Service Award</b> , Center for Computational Biology	Spring 2026
<b>Best Senior Thesis Award</b> , Harvey Mudd College Biology Dept.	Spring 2021
<b>Johnson Summer Research Fellowship</b> , Scripps College	Summer 2020