Shane P. Farrell PhD

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Education

2020-2025	PhD, Marine Biology	University of Maine (Orono, ME, USA)
2015-2019	BA, Biology	Lawrence University (Appleton, WI, USA)

Professional Experience

2025-Present	Post Doctoral Fellow	University of Maine
2025-Present	Visiting Researcher	Bigelow Laboratory for Ocean Sciences
2020-2025	Graduate Research Assistant	Bigelow Laboratory for Ocean Sciences

Grants

Successful

2026 *Improve Seaweed Management and Genetics* – USDA – $1,350,000 (Senior Personal)
2026 *Korea-U.S. Carbon Accounting and Smart Offshore Kelp Farms* – KIMST / WHOI – $467,673 (Co-PI)
2026 *Optimizing the carbon-related benefits of kelp aquaculture* – Builders Initiative – $700,000 (Senior Personal)
2025 *Road to Restoration* – Essex Avenue Foundation - $700,000 (Co-PI)
2024 *Student Grant* – National Association of Marine Laboratories - $500
2024 *Graduate Student Government Grant*. The University of Maine - $850
2022 *Characterizing the changing chemoscape on Gulf of Maine's Rocky Reefs*. PADI Foundation - $5951
2019 *Documenting Ireland's Kelp Forest using eDNA*. Adventure Canada – Ship time
2019 *Kevin Flanagan Student Travel Award*. American Academy of Underwater Sciences - $800

Pending

2026 *Seeding the Future: Resilient Kelp for Maine's Farms and Forests* – Essex Ave - $1,400,000 (PI).

Unsuccessful

2026 *Revealing the Role of the Microbiome in Developing Thermally Tolerant Strains of Sugar Kelp* USDA– $300,000 (Co-PI)
2026 Revive and Restore - $500,000 (Co-PI)
2022 *Short-term Research Grant*, DAAD - $9,000
2022 *Kelp forest's contribution to nearshore nutrient cycling using a multi-omics approach*. Joint Genome Institute - $40,000
2021 *Exploring how microbial communities within kelp forests are shifting due to climate change*. The Explorers Club - $5,000
2020 *Sugar Kelp population genetics in the Gulf of Maine*. American Academy of Underwater Sciences - $3,000

Publications

Published

Farrell SP, D'Angelo T, Stincone P, Yiu DS, Pakkir Shah AK, Petras D, Brady D, Rasher DB. Ecosystem-wide shift in microbial composition and metabolism due to kelp forest collapse. ***PNAS*** 123(36): e2525548123

Farrell SP, Yiu DS, Ryan S, Stuart C, Esmaeili Shah Y, Francolini R, Rasher DB. 2026. From kelp forests to turf reefs: patterns, drivers, and impacts on functional diversity. ***Ecology*** 107(5): e70408.

Farrell SP, Petras D, Stincone P, Yiu DS, Burns J, Pakkir Shah AK, Hartmann A, Brady D, Rasher DB. 2025. Turf algae redefine the chemical landscape of temperate reefs, limiting kelp forest recovery. ***Science*** 388(6749): 876–880. DOI: 10.1126/science.adt6788.

Kalinski JCJ, Pakkir Shah AK, Brandao da Costa RB, **Farrell SP**, Schellenberg S, Graves GL, Schramm T, Stincone P, Koester I, Stephens MB, Torres RR, Cancelada L, Ultermann-Thusing C, Quinlan AZ, Wegley Kelly L, Nelson EC, Carlson AC, Castillo-Ilabaca C, et al. 2026. Global detection of xenobiotics in marine dissolved organic matter. ***Nature Geoscience*** 19(4): 478–487.

Yiu DS, Elliott Smith EA, **Farrell SP**, Rasher DB. Kelp forest loss and emergence of turf algae reshapes energy flow to predators in a rapidly warming ecosystem. ***Science Advances*** 11(23): eadw7396. DOI: 10.1126/sciadv.adw7396.

Tan SH, Jourdain E, **Farrell SP**, Price NN, Rich JJ, Emerson D. 2025. Using eDNA tools to examine the impact of kelp farming on underlying sediments. ***PLOS One*** 20(9). DOI: 10.1371/journal.pone.0331416.

Pakkir Shah AK, Walter A, Ottosson F, Russo F, Navarro-Diaz M, Boldt J, Kalinski JCJ, Kontou EE, Elofson J, Polyzois A, González-Marín C, **Farrell SP**, Aggerbeck MR, Pruksatrakul T, Chan N, Wang Y, Pöchhacker M, Brungs C, Cámara B, et al. 2024. Statistical analysis of feature-based molecular networking results from non-targeted metabolomics data. **Nature Protocols**. DOI: 10.1038/s41596-024-01046-3.

Lambidis PS, Schramm T, Steuer-Lodd K, **Farrell SP**, Stincone P, Schmid R, Koester I, Torres R, Dittmar T, Aluwihare L, Simon C, Petras D. 2024. Two-dimensional liquid chromatography tandem-mass spectrometry untangles the deep metabolome of marine dissolved organic matter. ***Environmental Science & Technology*** 58(43): 19289–19304. DOI: 10.1021/acs.est.4c07173.

Piasecki BP, Sasani TA, Lessenger AT, Huth N, **Farrell SP**. 2017. MAPK-15 is a ciliary protein required for PKD-2 localization and male mating behavior in Caenorhabditis elegans. ***Cytoskeleton*** 74(10): 390–402. DOI: 10.1002/cm.21387.

Under review

Stincone P, Braun LM, Bağcı C, Navarro-Diaz M, Pérez-Lorente AI, **Farrell SP**, Gómez-Pérez D, Bode J, Steuer-Lodd K, Mahmoudi M, Chaudhry V, Romero D, Aron AT, Ziemert N, Molina-Santiago C, Kemen EM, Petras D. Cooperative siderophore use stabilizes a protective leaf microbiome. ***Nature***

Shah Esmaeili MY, **Farrell SP**, Francolini DR, Yiu DS, Grey E, Sleith R, Countway DP, Rasher DB. Unveiling kelp forest biodiversity in the Gulf of Maine: complementary insights from eDNA and visual surveys. ***eDNA***

Current Projects

Funded & Leading

Chemical Barriers to Kelp Forest Recovery

- Identifying turf-derived bioactive compounds that inhibit kelp recruitment and testing their effects across kelp life stages using bioassays and bioassay-guided fractionation.

Climate-Ready Kelp Restoration in Maine

- Developing restoration methods for sugar kelp, including gametophyte induction, substrate testing, spray-based inoculation, permitting pathways, and field experiment design

Selective Breeding for Thermally Resilient Sugar Kelp

- Building a breeding framework to identify heat-tolerant sugar kelp strains, validate thermal tolerance in offspring, and support resilient aquaculture and restoration seedstock.

Sugar Kelp DOC and Recalcitrant Carbon Dynamics

- Coordinating mesocosm experiments to quantify dissolved organic carbon release from farmed sugar kelp and evaluate the persistence of kelp-derived carbon pools.

Maine Rocky Reef Field Survey and Kelp Biobanking Program

- Leading coastal field sampling to assess rocky reef communities, collect reproductive kelp for biobanking, and support trait, microbiome, and restoration research.

Global Kelp Chemical Ecology and Allelopathy

- Comparing chemically mediated interactions in kelp forest systems across regions to understand how turf algae and other benthic competitors affect kelp recovery. Working in Norway, Portugal, Western Australia and Tasmania.

Seaweed Analytical Capacity for Farmers and Industry

- Helping build analytical workflows to measure nutrients, metals, metabolites, and bioactive compounds in seaweed for farmer support, biostimulant development, and ecological research.

Unfunded / Collaborating with lead institution.

Subantarctic Kelp Forest Baseline Monitoring (leading)

- Developing a South Georgia kelp forest monitoring program focused on community structure, ecosystem function, environmental gradients, and long-term change.

East Coast Coastal Pollutant Sampling Network

- Serving as lead coordinator for East Coast sampling of pollutants in coastal ecosystems, paired with West Coast sampling led by UCR.

Kelp Microbiome and Culture Probiotics

- Developing a microbiome project to characterize kelp-associated microbial communities and explore probiotic approaches for aquaculture and restoration.

Pycnopodia Restoration and Coastal Predator Recovery

- Providing ecological guidance for collaborative work on Pycnopodia recovery and its role in coastal ecosystem restoration and resilience.

Presentations

2026 Exploring by the seat of your pants (Global live stream)
2026 Mare-IPLeiria Departmental Seminar (Peniche, Portugal)
2025 105th Western Society of Naturalists Meeting (Portland, OR, USA)
2024 73rd Conference on Mass Spectrometry and Allied Topics (Anaheim, CA, USA)
2024 School of Marine Science Research Symposium (Walpole, ME, USA)
2024 52st Benthic Ecology Meeting (Charleston, SC, USA)
2023 104th Western Society of Naturalists Meeting (Monterey, CA, USA)
2023 School of Marine Science Symposium (Walpole, ME, USA)
2023 51st Benthic Ecology Meeting (Miami, FL, USA)
2022 1st Tubingen Graduate Student Symposium (Tubingen, Germany)
2022 2nd Virtual Metabolomics Symposium (Virtual)
2022 School of Marine Science Symposium (Walpole, ME, USA)
2021 School of Marine Science Symposium (Walpole, ME, USA)
2019 Our World Underwater Scholarship Society Annual Weekend (Manhattan, NY, USA)
2018 American Academy for Underwater Sciences Symposium (Tahoe, CA, USA)

Mentorship

Graduate Students

2026-Present Daniel Gossard (PhD, University of Maine)
2026-Present Rachele Spadafore (PhD, University of Maine)
2025-Present Phoebe Churney (MS, University of Maine)
2025-Present Samantha Smith (MS, University of Maine)

Undergraduate Students

2023 Elias Porte, Undergraduate Independent Study Intern (Colby College)
2023 Emma Nickerson – Maine eDNA internship (University of Maine)
2022 Phoebe Churney, Our World Underwater/AAUS Scholar (Maine Maritime)
2021 Zaie Nursey, Undergraduate Independent Study Intern (Colby College)
2020 Zaie Nursey, Undergraduate Independent Study Intern (Colby College)

Highschool

2020 Jonathon Bacon – Summer Independent Study

Outreach

2026 Pemaquid Oyster Festival (Boothbay Harbor, ME, USA)
2025 Boston High School Marine Science Event (Boston, MA, USA).
2024 Pemaquid Oyster Festival (Boothbay Harbor, ME, USA)
2024 Ocean Point Community Center (East Boothbay, ME, USA)
2024 Boothbay Library Ocean Day (Boothbay Harbor, ME, USA)
2024 Boothbay Sea and Science Center (East Boothbay, ME, USA)
2024 Green ME Up: Girl Scouts of Maine (Freeport ME, USA)
2024 Bigelow Open House (East Boothbay, ME, USA)
2024 Ocean on Tap (Boothbay Harbor, ME, USA)
2023 Boothbay Library Ocean Day (Boothbay Harbor, ME, USA)
2023 Bigelow Open House (East Boothbay, ME, USA)

External Service

Manuscript Reviewer for: Marine Ecological Progress Series, PLOS One, and Nature Communications
Proposal Reviewer for: Oregon Sea Grant

Media

2026 Maine NPR (PNAS)
2026 Maine NPR (Ecology)
2026 Inside Climate News
2025 Maine NPR
2025 WBUR
2023 Sea Change Series: Gulf of Maine (PBS Nova)