Lauran M. Liggan PhD

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EDUCATION

2021-2026 **Doctor of Philosophy** in Marine Molecular Ecology & Conservation Genetics at the University of Wisconsin-Milwaukee, Milwaukee, Wisconsin, USA.
Dissertation – Unlocking the microscopic life of kelp: molecular monitoring reveals gametophyte-driven processes that shape kelp habitat persistence and recovery.

2014-2016 **Master of Science** in Botany and Marine Ecology at the University of British Columbia, Vancouver, British Columbia, Canada.
Thesis – Under pressure: biomechanics of buoyancy in the Bull Kelp (*Nereocystis luetkeana*).

2008-2013 **Bachelor of Science** in Botany & Scientific Diving (cum laude) at Humboldt State University, Arcata, California, USA.

PROFESSIONAL EXPERIENCE

2021-present **Commercial SCUBA diver / Self-employed**
Commercial diving contractor for marine assessment and biodiversity surveys in British Columbia, Canada and McMurdo Sound, Antarctica.

2021-2026 **PhD Candidate / University of Wisconsin-Milwaukee**
Conducting research in the field of marine ecology, using novel molecular techniques and environmental DNA to detect and monitor microscopic kelp gametophytes in nature. Collection and curation of microscopic kelp in a biobank.

2018-2021 **Laboratory Manager / University of British Columbia**
Laboratory operations manager for the Martone Lab in the Department of Botany. Research coordinator for lab and field activities, lab safety officer, and lab finance manager.

2017-2021 **Research Technician / Hakai Institute**
Field research project lead for culturally important seaweed species; conducting and developing long-term monitoring surveys to determine drivers that influence the health and status of culturally harvested seaweed. Working with British Columbia's First Nations Communities to monitor traditional harvesting sites. Scientific diver for the Nearshore Ecology research team.

2016-2017 **Research Technician / North Pacific Marine Science Organization** Creating and developing the Algae Life History Database; conducting invasion risk assessments for algae identified on Japanese floating tsunami debris.

2016 **Research Consultant / University of Victoria**
Taxonomic identification of algal herbarium specimens from British Columbia for historical and contemporary species diversity comparisons.

TEACHING AND MENTORSHIP

2012-present **SCUBA Instructor / Professional Association of Diving Instructors**
Teaching experience for Open Water, Advanced, Rescue, Drysuit, Sponge Bioherm Specialty, Night Diving, Underwater Photography, Technical Sidemount Diver, Emergency First Response, and Oxygen Provider recreational SCUBA certifications. Mentor and instructor for SCUBA professionals in the PADI divemaster and Canadian Scientific Diving (CAUS) programs. Co-author in the development of the newly released (2019) PADI Citizen Science Diver specialty course.

2021-2026 **Teaching Assistant / University of Wisconsin-Milwaukee**
Laboratory instructor for undergraduate introductory plant biology courses.

2017-2020 **Workshops / Hakai Institute**
Field techniques for monitoring seasonal dynamics of harvestable algae – an Indigenous Coastal Guardian Watchmen workshop annual series. Calvert Island, British Columbia, Canada.

2014-2016 **Teaching Assistant / University of British Columbia**
Laboratory instructor for undergraduate courses such as Intro to Ecology, First Year Biology, Survey of Algae, and Non-Vascular Plants. Field school instructor at the Bamfield Marine Sciences Centre for the Survey of Algae courses.

Undergraduate Mentorship

Katelyn Flitcroft (2022-2025) - trained to conduct molecular lab work. She performed PCR for a kelp population genetics study supported by a California SeaGrant.

Natalie Plant (2023) - trained to conduct molecular lab work, testing new high-throughput amplicon sequencing primers with PCR and performing environmental DNA extractions.

I worked with Natalie to present our work at UWM's Biological Science Student Symposium, where she was awarded first place for best student poster.

August Humbert (2024-2025) – trained to work with me on research involving environmental DNA extraction and PCR amplification for high-throughput sequencing of amplicons.

PEER REVIEWED PUBLICATIONS

Journal Articles

Liggan L.M., Rolheiser K.C., Pontier O., Ramírez-Ibaceta B., Giménez I., Alberto F. (2025). Beyond presence and absence: using eDNA and microsatellite genotyping to estimate densities of microscopic life forms in wild populations. *Molecular Ecology Resources*. http://doi.org/10.1111/1755-0998.14116

Liggan, L.M., and Martone, P.T. (2020) Gas composition of developing pneumatocysts in bull kelp *Nereocystis luetkeana* (Phaeophyceae). *Journal of Phycology*, 56(5), 1367-1372

Liggan, L.M., and Martone, P.T. (2018) Under pressure: biomechanical limitations of developing pneumatocysts in the bull kelp *Nereocystis luetkeana* (Phaeophyceae). *Journal of Phycology*, 54(5), 608-615 ***Journal Cover Photo**

Therriault, T.W., Nelson, J.C., Carlton, J.T., **Liggan, L.,** Otani, M., Kawai, H., Scriven, D., Ruiz, G.M. and Murray, C.C. (2018). The invasion risk of species associated with Japanese tsunami debris in Pacific North America and Hawaii. *Marine Pollution Bulletin*, 132, 82-89. ***Special Edition**

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Submitted

Liggan, L.M., Grime, B., McHugh, T.A., Cavanaugh, K., Alberto, F., Cavanaugh, K.C. Blueprints for Restoration: Molecular Monitoring and Remote Sensing Reveal Dispersal-Driven Kelp Recolonization. *Ecological Applications.* (in revision)

In preparation

Liggan, L.M., Rolheiser, K., Pontier, O., Gímenez, I., and Alberto, F. Unlocking the microscopic life of kelp: integrating eDNA and microsatellite genotyping to resolve in situ dynamics of gametophyte banks under grazing stress. Intended journal, *Molecular Ecology.*

Liggan, L.M., Pontier, O., Twist, B., and Alberto, F. Gametophyte-bank dynamics from kelp forests to urchin barrens: using eDNA to monitor temporal fluctuations of gametophyte density in nature. Intended journal, *Ecological Monographs.*

Liggan, L.M., Pontier, O. Hessing-Lewis, M. Alberto, F. Localized seascape genetics of kelp populations in Hakai Passage along an environmental gradient from the Koeye Estuary to the open coast. Intended journal, *Journal of Phycology.*

Clark, J.S., **Liggan, L.M.**, Lindstrom, S.C., Martone, P.T., Hessing-Lewis, M. The aftermath of 'the Blob': using heatwaves as a tool to predict and manage traditionally harvested seaweed *Pyropia abbottiae*. Intended journal, *Ecological Applications.*

Twist, B.A., **Liggan, L.M.,** Martone, P.T. Urchin barrens to kelp forests: successional changes in coralline algae community structure. Intended journal, *Frontiers in Marine Science.*

OTHER PUBLICATIONS

Liggan, L.M., and Clark, J. (2020) Seasonal *Pyropia abbottiae* productivity surveys from 2017-2019 collected at Calvert Island, British Columbia, Canada. Development Version 1.0. Hakai Institute. Dataset.

Saunders, S.R., Hunt, B., **Liggan, L.M.,** and Monteith, Z. (2019) Supportive environmental data for the Calvert area nearshore monitoring program from Jan 1, 2014 to Dec 31, 2018. Version 1.0. Hakai Institute Dataset.

Nelson, J.C., Murray, C.C., Otani, M., **Liggan, L.M.,** Kawai, H., Ruiz, G.M., Hansen, G., Carlton, J.T. (2016) PICES Japanese tsunami marine debris (JTMD). Database.

Liggan, **L.M.** (2016). Under pressure: biomechanics of buoyancy in bull kelp (*Nereocystis luetkeana*). MSc Dissertation., University of British Columbia

CODING AND STATISTICAL PACKAGES

Ampicomsat R package - A bioinformatic pipeline to score microsatellite genotypes from high-throughput amplicon sequencing and eDNA samples (Co-author with Filipe Alberto)
https://github.com/UWMAlberto-Lab/Amplicomsat

GenotypeQuant R package - Using microsatellites to estimate the number of different genotypes from a single species in an eDNA sample (Co-author with Filipe Alberto)
https://github.com/UWMAlberto-Lab/GenotypeQuant

PRESENTATIONS

Conference presentations - Oral

Liggan, **L.M.,** Rolheiser, K.C., Pontier, O., B., Giménez, I., Alberto, F. Unlocking the secret microscopic life of kelp: assessing gametophyte longevity in kelp forest and urchin barren ecosystems. International Seaweed Symposium in Victoria, British Columbia, Canada, May 2025.

Liggan, **L.M.,** Rolheiser, K.C., Pontier, O., Ramírez-Ibaceta, B., Giménez, I., Alberto, F. Going beyond presence and absence: development of novel eDNA techniques to monitor kelp gametophyte-banks in wild populations. Phycological Society of America (PSA) in Seattle, Washington, USA, August 2024.

Liggan, **L.M.,** Martone, P.T. Staying afloat: biomechanical limitations of buoyancy and the risk of sinking in the bull kelp (*Nereocystis luetkeana*). Western Society of Naturalists (WSN) in Tacoma, Washington, USA, November 2018.

Liggan, **L.M.,** Clark, J.S., Martone, P.T., Lindstrom, S.C., Hessing-Lewis, M. Documenting population dynamics of a traditionally harvested seaweed: development of long-term monitoring surveys. Phycological Society of America (PSA) in Vancouver, British Columbia, Canada, August 2018.

Liggan, **L.M.,** Martone, P.T. Under pressure: biomechanics of buoyancy in bull kelp (*Nereocystis luetkeana*). Western Society of Naturalists (WSN) in Monterey Bay, California, USA, November 2016.

Liggan, **L.M.,** Martone, P.T. Biomechanics of buoyancy in bull kelp (*Nereocystis luetkeana*). Pacific Ecology and Evolution Conference in Bamfield, British Columbia, Canada. February 2016.

Conference presentations - Poster

Rolheiser, K.C., **Liggan, L.M.,** Giménez, I. Beyond Conservation: Germplasms as tools to investigate climate change effects on multiple life-stages of a canopy kelp species. Joint meeting for Phycological Society of America (PSA) and the International Society of Protists (ISOP) in Seattle, Washington, USA, August 2024.

Plant, N., **Liggan, L.M**., Alberto, F. Monitoring kelp forests in decline: development of novel eDNA techniques to quantify densities of kelp seed-banks. University of Wisconsin-Milwaukee Biological Sciences Student symposium in Milwaukee, Wisconsin. April 2023. ***Best Undergraduate Poster**

Liggan, **L.M.,** Rolheiser, K.C., Ramírez-Ibaceta, B., Giménez, I., Alberto, F. Going beyond presence and absence: development of novel eDNA techniques to monitor kelp gametophyte-banks in wild populations. Western Society of Naturalists (WSN) in Monterrey, California, USA, November 2023.

Liggan, **L.M.,** Martone, P.T. Under pressure: biomechanics of buoyancy in bull kelp (*Nereocystis luetkeana*). Northwest Algae and Seagrass Symposium in Whidbey Island, Washington, USA. June 2016. ***Best Student Poster**

Seminars

Liggan, L.M., Grime, B., McHugh, T., Cavanaugh, K., Alberto, F. Blueprints for restoration: molecular monitoring and remote sensing reveal dispersal-driven kelp restoration. Invited speaker, Eastern Pacific Kelp Congress, January 2026.

Liggan, L.M. Unlocking the black box of kelp: understanding gametophyte population dynamics. Invited speaker, NOAA Kelp Restoration Network meeting, February 2025.

Liggan, L.M., Grime, B., McHugh, T., Cavanaugh, K., Alberto, F. Characterizing the role of spore dispersal in kelp recovery along the coast of northern California. Invited speaker, Eastern Pacific Kelp Congress, January 2025.

Liggan, L.M., Rolheiser, K.C. Unlocking the black box of kelp: understanding gametophyte-bank longevity with that Hakai germplasm. Invited speaker, Kelp Node, May 2024.

Liggan, L.M., Martone, P.T. Under pressure: biomechanics of buoyancy in bull kelp (*Nereocystis luetkeana*). Oral presentation in the University of British Columbia Botany Seminar Series. December 2016.

Liggan, L.M., Martone, P.T. Seaweed biomechanics and applied physics. Guest lecturer for the University of British Columbia Survey of Algae undergraduate courses. April 2015, 2016, and 2017. October 2015.

GRANTS, AWARDS AND SCHOLARSHIPS

2025-2026 **Distinguished Dissertator Fellowship**. University of Wisconsin-Milwaukee ($17,000)

2025-2026 **PhD Award**. Clifford H. Mortimer Scholarship, University of Wisconsin-Milwaukee ($3,500)

2024-2025 **PhD Award**. Clifford H. Mortimer Scholarship, University of Wisconsin-Milwaukee ($1,500)

2023-2025 **Discovery and Innovation Grant**. University of Wisconsin-Milwaukee. Co-written with Dr. Filipe Alberto ($80,000)

2023-2025 **National Geographic Explorer**. Level-1 Early Career Project Grant, National Geographic Society ($20,000)

2023-2025 **Distinguished Graduate Student Fellowship**. University of Wisconsin-Milwaukee ($16,500)

2023-2024 **The Nature Conservancy California**. Collaborative research grant with University of Wisconsin-Milwaukee and University of California – Los Angeles. Co-written with Dr. Filipe Alberto and Dr. Kyle Cavanaugh ($32,000)

2023-2024 **PhD Award**. Chancellor's Graduate Student Award, University of Wisconsin-Milwaukee ($5,000)

2023-2024 **PhD Scholarship**. Peter J. Salamun Scholarship, University of Wisconsin-Milwaukee ($1,000)

2022-2025 **Research Fellowship**. Research Affiliate and Collaborator, Hakai Institute. (in-kind funding)

2022-2023 **Illumina Research Grant.** Illumina Pilot Grant, Great Lakes Genomics Center. Co-written with Dr. Filipe Alberto ($7,000)

2022-2023 **PhD Award**. Clifford H. Mortimer Scholarship, University of Wisconsin-Milwaukee ($5,000)

2021-2022 **PhD Award**. Chancellor's Graduate Student Award, University of Wisconsin-Milwaukee ($5,000)

GOVERNMENT, COMMUNITY AND INDIGENOUS COLLABORATIONS

2017-present **Heiltsuk and Wuikinuxv First Nations**. Involved in collaborative research efforts in addition to the production of the Annual Research Report to present to Heiltsuk and Wuikinuxv First Nations on ongoing research within their unceded territories on the Central Coast of British Columbia.

2021-present **Kelp Node**. Involved in collaborative research and data sharing for coast-wide monitoring and conservation efforts of kelp habitat in the Northeast Pacific.

2017-2021 **Marine Life Sanctuaries Society**. Howe Sound, British Columbia, Canada: Community-backed initiative that aided in the designation of Howe Sound as a UNESCO Biosphere Region. Involved in a community engagement initiative to advocate for policies that protect rare deep-sea glass sponge reefs and sensitive rockfish habitat. This position involved leading citizen science diving programs,

where individuals were trained in scientific surveying, collection, and instrument deployment.

OTHER PROFESSIONAL AND ACADEMIC QUALIFICATIONS

Scientific and Commercial SCUBA diving (1000+ dives)
Diving Control Board of Canada occupational diver (#20210189)
Canadian Association for Underwater Science (CAUS) Level 2
PADI Specialty SCUBA Instructor (#302316)

Boat driving (vessels under 10 tons)
Transport Canada Canadian Small Vessel Operator (boating captain: CDN #1834071)
Transport Canada Radio Restricted Operator's Certificate (ROCm 890 184 LIG) Transport Canada MED A3 maritime Emergency Response Protocols (CDN #1834071)

Wilderness First Aid (Canadian Red Cross)First Aid & CPR/AED level C (#102054556)