



Biodiversity and seasonality of seaweed communities in a changing climate

A Sentinels of Change Alliance postdoctoral fellowship

Biodiversity change in the Salish Sea is a major ecological concern. The need to understand these changes, and their causes, is a primary research objective so that knowledge can be mobilized to inform conservation and policy actions in the region. The Sentinels of Change Alliance brings together Hakai Institute scientists, university scientists and local communities to deepen our understanding of Salish Sea biodiversity change at an unprecedented scale and resolution. The goals are to implement standard observation systems for biodiversity across a range of taxa, to conduct experiments to test hypotheses about the causes of diversity change, and to integrate knowledge from observation and experimental systems into a sustainable ongoing biodiversity observation system for the Salish Sea.

The Sentinels of Change Alliance project will train postdoctoral researchers and technicians to implement a series of globally recognized biodiversity monitoring programs (e.g. Sentinels light traps, ARMS, MARINe Biodiversity monitoring and other systematic observation and experimental systems). Project personnel will use state of the art data science and statistical approaches in the context of emerging frameworks for detecting and attributing biodiversity change. Sentinel Postdoctoral researchers will be co-advised by UBC professors and Hakai scientists to develop projects that synthesize the information coming in from the monitoring program, as well as provide complementary theory development, mechanistic experiments and monitoring.

Focal project

Macroalgae are central components of marine ecosystems, creating habitat, providing food, and mitigating environmental factors, such as flow and seawater chemistry. The coast of British Columbia is world renowned for its rich, diverse, and well-studied marine flora with hundreds of macroalgal species, representing a mix of northern and southern species. For more than a decade, field surveys along the BC coast have not only discovered new seaweed species – many of which require taxonomic description – but have also documented significant changes in local seaweed communities coinciding with marine heatwaves: some species becoming less abundant and some species with advanced, delayed, or failed annual recruitment. Ocean warming has a major impact on



seaweed growth, survivorship, reproduction, and seasonality, yet little is known about the thermal niche, reproductive timing, or successional dynamics of most seaweed species. Shifts in seaweed communities can have significant downstream effects on marine ecosystems. The Sentinels project offers an unprecedented opportunity to integrate field collections, recruitment methods, and molecular data (e.g., DNA barcoding, metabarcoding, eDNA) to investigate the seasonality, successional dynamics, and environmental tolerances of NE Pacific seaweeds.

The postdoc will be responsible for leading data synthesis, surveys, and/or experiments that advance one or more of the following goals.

- 1) How do seaweed recruitment and successional dynamics differ across sites and environments? This project will work with Hakai technicians to deploy ARMS (collected annually) and settlement plates (collected weekly or monthly) to investigate recruitment of seaweeds, competitive dynamics, and development of seaweed communities across environments. Data from previous ARMS deployments and pilot projects are available to inform this work. Possible comparisons include with and without kelp canopy, high flow vs. low flow, variable vs. stable thermal environments, or other areas of interest.
- 2) Linking sequence to seaweed. This project will integrate water column eDNA data (e.g., from spores) and settlement plate metabarcoding data (e.g., from recruits) with surveyed and barcoded seaweed communities. This integrated dataset will clarify the seasonality of reproduction and recruitment success of various seaweeds while also supporting ongoing taxonomic initiatives. Population genetics and current models may also be applied to assess population connectivity, dispersal capacity, and recovery potential of species at different locations.
- 3) Characterizing tipping points for reproduction, growth, and community assembly of NE Pacific seaweeds. This project will use a combination of lab and field experiments to unravel the impact of temperature and currents on seaweed communities and individual species. Lab experiments may isolate species and employ thermal gradient blocks to identify limits to reproductive success and productivity. Natural seaweed communities recruited to settlement plates may be transplanted across sites to explore the impact of environmental and biological drivers on succession. Communities may further be tested in growth flumes to isolate the impact of temperature and flow on community outcomes.



Post-doctoral research will complement ongoing research in the Martone Lab and the Hakai Institute focused on the biodiversity, physiology, and ecology of marine macroalgae.

Postdoctoral Responsibilities and Requirements:

The postdoctoral fellow will be responsible for collating macroalgal datasets from within the Hakai network and the Martone lab.

Work with the Hakai Sentinels research scientists and technicians to design and implement sampling strategies that promote the integration of eDNA and metabarcoding data into biodiversity monitoring.

Postdoc will design and implement experiments to test the impact of the climate stressors, especially temperature, and mitigating factors (e.g. high current) on seaweed communities and focal seaweed species.

Required experience in phycology. Experience applying molecular methods to analyze biodiversity data preferable. Experience with experimental approaches in marine ecosystems welcome. Experience conducting field work is an asset but not required.

Project advising team:

The successful candidate will be housed in Dr. Patrick Martone's lab at UBC, and co-supervised by Dr. Margot Hessing-Lewis and Dr. Matt Lemay of the Hakai Institute.

Additional details: Equity and diversity are essential to research excellence. We encourage applications from members of groups that have been marginalized on any grounds enumerated under the B.C. Human Rights Code, including sex, sexual orientation, gender identity or expression, racialization, disability, political belief, religion, marital or family status, age, and/or status as a First Nation, Metis, Inuit, or Indigenous person. Candidates of any nationality are encouraged to apply.

The position is based at the Vancouver campus of the University of British Columbia, which lies on the traditional, ancestral, and unceded territory of the Musqueam people. Hakai is an independent research organization based in British Columbia with many scientists studying the fish, invertebrates, microbes, and seaweeds of coastal ecosystems.



The postdoctoral fellow is expected to be able to travel within the Salish Sea Region to participate in experimental work, and accommodation at field stations will be provided.

The position is for two years with a performance review after one year. The expected pay for this position is \$55,000.00 per year, plus a UBC Postdoctoral Research Fellow benefits package, and a dedicated annual professional fund allowance. We hope to fill the position for a start date of September 1, 2024 (negotiable).

Please contact Patrick Martone with questions (pmartone@mail.ubc.ca).

To apply, please email the following to Michelle McEwan (sentinels@hakai.org)

- a cover letter
- CV
- Two reference letters directly submitted.
- a sample research publication
- Your cover letter should address your motivation to excel in this project, and the particular skills and experience you can bring to the work.