Marine Biodiversity Change: Connectivity and Multiscale Biodiversity Processes

A Sentinels of Change Alliance postdoctoral fellowship

Project: Biodiversity change is occuring in every ecosystem on earth, reflecting the interplay of local and regional ecological processes, habitat change and climate change. Understanding the relative effects of local and regional drivers on the processes that maintain biodiversity is a primary research objective so that knowledge can be mobilized to inform conservation and policy actions at local, federal and international levels.

The Sentinels of Change Alliance targets biodiversity change in the Salish Sea. The project 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.

Location: 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 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: Biodiversity Change Across Scales. This Postdoc will work to advance biodiversity change science building on the current knowledge and tools available in the Sentinel's project. The Postdoc will develop and test hypotheses based on ecological (community ecology, population ecology, etc) and biodiversity theory (metacommunity theory, community assembly, etc) to explain biodiversity patterns, biodiversity change and habitat change in coastal marine ecosystems. The habitats and taxa of interest are seagrass and associated microbiota, fish and invertebrates, rocky shores (seaweeds and invertebrates) and pelagic coastal communities. The postdoc will be encouraged to conduct new analyses, draw upon existing data of recent biodiversity patterns involving multiple taxa, environment conditions and human activities to develop frameworks and model biodiversity and future scenarios. This framework will be used to quantify spatially structured risks to coastal biodiversity. The postdoc will join a collaborative team of postdocs, technicians, PIs and community-based partners and will have access to historical datasets, ongoing field-based monitoring and collaborations, experimental facilities and a regional ocean circulation model. We are seeking candidates who can combine empirical, data science and models with theoretical approaches to lead innovative, collaborative and field-advancing scientific research. Recent publications on this project theme include:

Tekwa, E. W., M. A. Whalen, P. T. Martone, M. I. O'Connor. 2023. Theory and application of an improved species richness estimator. *Philosophical Transactions of the Royal Society B.* 378: 20200187

Cristiani, J., E. Rubidge, C. Forbes, B. Moore-Maley, and M. I. O'Connor. 2021. A biophysical model and network analysis of invertebrate community dispersal reveals regional patterns of seagrass habitat connectivity. *Frontiers in Marine Science:* 8: 717469.

Postdoctoral responsibilities and requirements:

- Use state of-the-art-practices, methods and models to test hypotheses about biodiversity change in spatially structured biodiversity and environmental data
- Apply an expert knowledge of biodiversity processes (dispersal, species interactions, stochasticity, metacommunity dynamics) to hypothesis development and result interpretation.
- Develop and test a spatial framework that makes use of ecological theory (e.g., of biodiversity processes), ocean circulation and habitat models to predict and validate biodiversity change
- Collaborate with the Sentinels team of scientists, postdocs, field and data technicians.
- Publish results in peer-reviewed scientific journals in a timely fashion

- Employ excellent communication skills with colleagues, collaborators and mentors about all aspects of the projects (design, interpretation, challenges, solutions, timelines and progress)
- Be curious and engaged with the project and the work, willing to learn and grow.
- Preferred: experience leading field ecological work on biodiversity and/or marine systems, academic background in marine ecology and biodiversity, and analyzing spatially structured data, and modeling.

Project advising team:
Mary O'Connor, Professor UBC Zoology. The O'Connor lab (oconnorlab.weebly.com) would be the host lab, and the postdoc would be co-advised by a Hakai scientists (Gehman, Lemay, Hessing-Lewis) and collaborate with colleagues at DFO.

Additional details: Equity and diversity are essential to academic excellence. An open and diverse community fosters the inclusion of voices that have been underrepresented or discouraged. 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.

Applications will be accepted until 11:59pm PST May 8, 2024. We hope to fill the position for a start date between May and August, 2024 (negotiable). The position is for two years, with a performance review after one year.

To apply, please send the following to Michelle McEwan (sentinels@hakai.org):
- A cover letter
- CV
- Two reference letters
- Two sample research publications including those relevant to the project
- A 1-page research statement that outlines a ~2-year program to advance biodiversity change science. In the 1-page statement, state clearly the general research problem your research addresses, express a clear research objective or hypothesis, and briefly outline how these might be addressed or tested to produce new scientific knowledge.
- Your cover letter should address your motivation to excel in this project, and the particular skills and experience you can bring to the work.