

International Year of the Salmon postdoctoral positions in zooplankton ecology and food web ecology of the North Pacific

The **International Year of the Salmon** (IYS - <https://yearofthesalmon.org/>) is a multi-nation initiative working towards a vision of salmon and people being resilient in a changing world. To achieve this goal the IYS is working to enable projects that inform:

Status of Salmon: The present status of salmon and their environments is understood.

Salmon in a Changing Salmosphere: The effects of natural environmental variability and human factors affecting salmon distribution and abundance are understood.

New Frontiers: New technologies, methods, ideas and approaches to salmon research are applied to salmon. In addition, research to fill gaps in poorly studied regions of the salmosphere.

Human Dimension: Communities, Indigenous Peoples, youth, harvesters, scientists and resource managers across the Northern Hemisphere share knowledge and collaborate in the development of new tools and approaches to restoring, managing and sustaining salmon.

Information Systems: Information systems that house and mobilize historic and current data about salmon and their environment are made freely available.

The high seas life phase of Pacific salmon is a critical area of concern in their overall survival. It is here that most Pacific salmon species do the majority of their growth, and mature before returning to freshwater ecosystems to spawn. However, significant knowledge gaps remain around the conditions experienced by salmon on the high seas, and the implications of these conditions for their growth and survival. In an effort to fill these knowledge gaps the IYS Program has instigated a series of research expeditions in the North Pacific that aim to update and advance understanding of high seas salmon ecosystems (<https://yearofthesalmon.org/high-seas-expeditions>). The 2019 and 2020 expeditions have already provided significant new datasets for the Eastern Pacific (Gulf of Alaska), with planned multi-ship surveys across the entire North Pacific in 2022 set to build on these existing data significantly. We are seeking postdoctoral fellows (PDFs) to work on two key and related aspects of high seas Pacific salmon ecosystems 1) Zooplankton ecology and 2) food web dynamics.

PDF 1: North Pacific Zooplankton Ecology

All Pacific salmon are dependent on zooplankton resources for growth, health, and survival, consuming them both directly or indirectly via micronekton. The biomass, composition and distribution of zooplankton are therefore contributing factors in changing salmon productivity. We are seeking a PDF to investigate key aspects of zooplankton ecology in the North Pacific and develop zooplankton resources in support of salmon research, through the following sub-objectives:

1. Multivariate analysis of the zooplankton communities for the winter 2019 and 2020 IYS expeditions in the Eastern Pacific, resolving spatial variability and its relationship to oceanographic features defined using physical, chemical, and satellite data. Zooplankton

biomass and species level taxonomic analyses have already been completed and are immediately available.

2. Consolidation, curation, and standardization of available historic data on zooplankton for the North Pacific, combining Canadian, US, Russian and Japanese sources, for analysis of long-term change in the North Pacific. Database consolidation will be supported by a UBC co-op student.
3. Inter-comparison of core net sampling gears (Bongo Net vertical & oblique, MOCNESS, JUDAY) used by NPAFC member nations, using existing data sets from US, Canada, Japan and Russia; coordination of strategy for additional inter-comparisons among participating nations in 2021/22.

The PDF is expected to play a lead role in organizing the zooplankton sampling for the 2022 IYS expeditions in the North Pacific, and to participate in at least one of the expeditions; to interface with the IYS database development team in producing open access data products; to contribute to outreach activities communicating IYS research and findings.

Ideal qualifications: A PhD (completed by the time of appointment) in biological oceanography or related discipline. Expertise in multivariate analyses, handling of oceanographic data, and zooplankton ecology; field oceanography experience.

Technical skills required: Programming (R, MATLAB®, python), statistical analysis, analysis of multi-dimensional large data sets, data management, field oceanography techniques.

PDF 2: North Pacific Food Webs

We are seeking a PDF to research the winter feeding ecology of Pacific salmon and the food webs that support them using biogeochemical approaches (stable isotopes and fatty acids). Foraging ecology is a critical factor in salmon growth and survival on the high seas, and the winter period is expected to be particularly stressful since this is when ocean productivity is at its lowest. Although the high seas feeding ecology of Pacific salmon has been sporadically researched since the 1950's, little if any data have been collected on whole food web dynamics. Since 2013 we have entered into uncharted waters in the North Pacific, with intense heat wave activity potentially leading to wholesale shifts in the structure of the food webs that support salmon. The IYS expeditions in 2019 and 2020 enabled the collection of extensive sample sets for stable isotopes and fatty acid analyses in the Eastern Pacific for the entire pelagic food web, using a combination of plankton and trawl nets. The stable isotope data for these surveys are already available for analysis. Additional surveys are expected to be conducted in 2022. These combined data sets provide the opportunity to develop a comprehensive understanding of overall food web structure and salmon specific feeding biology in the North Pacific, and to relate these to salmon health. This PDF's objectives will include:

1. Development of an empirical framework for North Pacific pelagic food web structure, using a combination of stable isotope and fatty acid trophic markers. The established trophic structure will provide a framework for ecosystem model development.
2. Analysis of spatial and temporal dynamics of Pacific salmon species dietary overlap and competition, and life history changes in these interactions. Interpretation through stable isotope and fatty acid analysis, augmented by comprehensive stomach content data sets.

The PDF is expected to play a lead role in organizing the food web sampling for the 2022 IYS expeditions in the North Pacific, and to participate in at least one of the expeditions; to interface with the IYS database development team in producing open access data products; to contribute to outreach activities communicating IYS research and findings.

Ideal qualifications: A PhD (completed by the time of appointment) in biological / fisheries oceanography or related discipline. Expertise in stable isotope and / or fatty acid analyses, food web and pelagic ecology; experience in developing and applying multi-source mixing models, experience in Ecopath with Ecosim.

Technical skills required: Programming (R, MATLAB®, python), statistical analysis, data management, field methods.

Parameters for PDFs

Location: The candidate will be based at the Institute for the Oceans and Fisheries (<http://oceans.ubc.ca/>), University of British Columbia.

Collaborations: All research will be completed in collaboration with research partners at Department of Fisheries and Oceans Canada, University of Victoria, and within NPAFC member nation agencies.

Application closure date: February 15th, 2021.

Start date: As soon as possible

Position Length: Two years, pending annual review

Salary: \$50,000 + benefits

Applicants must submit:

- A CV, including the e-mail and phone number for three references;
- A short cover letter explaining the applicant's motivation for working on the project and how previous experience qualifies them for this position;
- A copy of the PhD thesis;
- Reprints of 3 published papers, if available;
- Confirmation of ability to work in Canada.

Equity and diversity are essential for 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 Nations, Metis, Inuit, or Indigenous person.

Submit applications to:

Brian Hunt (b.hunt@oceans.ubc.ca) and Evgeny Pakhomov (epakhomov@eoas.ubc.ca)