

**Post-doctoral Fellowship in evaluating the effects of environmental conditions on pelagic fish  
distributions in marine waters of British Columbia.  
Canadian Government Laboratory Visiting Fellow program**

**POST-DOCTORAL POSITION**

We are seeking a talented individual for a Visiting Fellowship at the Pacific Biological Station (PBS) in Nanaimo, British Columbia (BC), Canada. The successful applicant will participate in a research project funded through the Fisheries and Oceans Canada's (DFO) Strategic Program for Ecosystem-Based Research and Advice (SPERA) to apply recently developed spatio-temporal methods to estimate pelagic fish distribution in relation to environmental conditions and prey availability for the WCVI (especially the highly productive La Perouse area). The Principal Investigators of the project are Drs. Jennifer Boldt (DFO), Jim Thorson (U.S. NFMS), Robyn Forrest (DFO), and Stephane Gauthier (DFO); key DFO collaborators include: Jaclyn Cleary, Jackie King, Ian Perry, Chris Neville, Andrew Ross, Linnea Flostrand, and others.

**PROJECT OBJECTIVES**

This project will identify impacts of physical, chemical, and biological variability on pelagic fish distribution. We will examine spatial and temporal variation in fish density (biomass per area) and decompose the variation into patterns that are stable over time ("spatial variation") and patterns that change between years ("spatio-temporal variation"). Variation in fish density will be related to physical, chemical, and biological indices while also accounting for residual spatio-temporal variation in density (e.g., Thorson 2015). We will then estimate the portion of variation in fish density attributable to measured indices or otherwise unexplained variation. This will be the first time that data sources ranging from physical to biological and from multiple surveys will be assembled into a compatible format and empirically analyzed on a whole ecosystem scale. While other approaches, such as ecosystem models are also valuable tools for examining the effects of environmental drivers and trophic interactions on fish productivity, to date the empirical approach of using spatio-temporal models has not been conducted in BC. Furthermore, results from this project can also provide important empirical information on relationships among species for calibration of ecosystem models.

Specific objectives of this project will be to use spatio-temporal models to improve ecosystem analyses through estimating:

- Covariation in species productivity, primary production and the physical environment to empirically quantify responses of key species to changing environmental conditions;
- Spatial overlap among predators, prey and competitors, needed for inferring trophic parameters used in ecosystem models.

In addition, we will use results to evaluate:

- Potential impacts on recovery of depleted prey populations (e.g., Pacific Herring, juvenile salmon);
- Impacts of ecosystem variability on biological reference points of key commercial species (required under the Sustainable Fisheries Framework);
- Ecosystem impacts and drivers of natural mortality, a critical parameter in stock assessments used to deliver sustainable harvest advice.

## **ESSENTIAL ASSET QUALIFICATIONS**

Applicants must have completed a PhD in fisheries science or a related discipline within the past five years. Candidates with experience in applying spatio-temporal tools, such as those developed by Dr. Jim Thorson ([www.FishStats.org](http://www.FishStats.org)), will be given priority. These tools include R packages SpatialDeltaGLMM (Thorson 2015) and VAST (“Vector-Autoregressive Spatio-Temporal” model, Thorson and Barnett 2017), MIST (“Multispecies interactions Spatio-Temporal” model; Thorson et al. 2017; <https://github.com/James-Thorson/MIST>). Experience using R programming languages and GIS (or similar open-source mapping tools) is desirable. Successful candidates will have a proven capacity to publish in peer-reviewed journals. Those who are not Canadian citizens or permanent residents of Canada must satisfy Canadian immigration requirements.

## **POSITION DETAILS AND HOW TO APPLY**

This fellowship is available to start prior to January 31, 2018, and is renewable until March 31, 2020 with a salary of \$62,710 CAD per annum. The Canadian Government Laboratory Visiting Fellow program is administered by the Natural Sciences and Engineering Research Council of Canada (NSERC). More details about the program can be found at: [http://www.nserc-crsng.gc.ca/Students-Etudiants/PD-NP/Laboratories-Laboratoires/index\\_eng.asp](http://www.nserc-crsng.gc.ca/Students-Etudiants/PD-NP/Laboratories-Laboratoires/index_eng.asp)

All candidates must meet NSERC eligibility requirements

[http://www.nserc-crsng.gc.ca/NSERC-CRSNG/Eligibility-Admissibilite/students-etudiants\\_eng.asp](http://www.nserc-crsng.gc.ca/NSERC-CRSNG/Eligibility-Admissibilite/students-etudiants_eng.asp)

## **CONTACT**

Interested applicants should email: 1) CV; and 2) cover letter outlining the experience and skills they bring to the project to Jennifer Boldt ([Jennifer.Boldt@dfo-mpo.gc.ca](mailto:Jennifer.Boldt@dfo-mpo.gc.ca)), Jim Thorson ([James.Thorson@noaa.gov](mailto:James.Thorson@noaa.gov)), and Robyn Forrest ([Robyn.Forrest@dfo-mpo.gc.ca](mailto:Robyn.Forrest@dfo-mpo.gc.ca)).

Short-listed applicants will be invited to develop a full application through the NSERC system. CVs will be accepted until the position is filled.

## **REFERENCES**

- Thorson, J.T. 2015. Spatio-temporal variation in fish condition is not consistently explained by density, temperature, or season for California Current groundfishes. *Marine Ecology Progress Series*, 526: 101–112.
- Thorson, J. T., and L.A.K. Barnett. 2017. Comparing estimates of abundance trends and distribution shifts using single- and multispecies models of fishes and biogenic habitat. *ICES Journal of Marine Science: Journal du Conseil*: fsw193.
- Thorson, J.T., Munch, S.B., and Swain, D.P. 2017. Estimating partial regulation in spatiotemporal models of community dynamics. *Ecology* 98(5): 1277–1289. doi:10.1002/ecy.1760.