18 months postdoc position: Survey design for data collection and spatialization of marine fishing activities: state of play and improvements
Level of diploma required: PhD thesis or equivalent
Expected level of experience: Young graduate
Gross monthly salary: around 2660 euros
Location: Laboratoire de Mathématiques Jean Leray (LMJL) et LETG – Nantes University, Nantes (France).

Keywords: Spatial sampling, survey theory, maritime spatial planning, spatialization of fishing activities.

Scientific environment and context

In the framework of the IMPT 2022 SPLAsh project (for "Sampling PLAn for fiSHeries"), we are recruiting a post-doctoral fellow from autumn 2022 (start date to be discussed). This project is part of the scientific framework of the statistical research work carried out within the GIS VALPENA (ÉVALuation des pratiques de PEches au regard des Nouvelles Activités). Since 2014, the GIS VALPENA has formalised a partnership between scientists from Nantes University (LETG-Nantes UMR 6554 CNRS and LMJL UMR 6629 CNRS) and representatives of French professional fishers in order to improve knowledge on the spatialisation of fishing grounds. VALPENA thus proposes an original methodology for collecting and processing unpublished data on the distribution of fishing grounds to meet the challenges of marine spatial planning (Trouillet et al., 2019). The data are collected each year by the regional observatories (held by fisheries committees), taking shape of individual semi-directive interviews with fishers, in order to reconstruct their activity during the previous year. On the basis of an interoperable spatial reference system, the meshes that were the subject of fishing activity are filled in for each month of the year, specifying the gear used and the species targeted. At the launch of each observatory, two years of exhaustive surveys are carried out, followed by three-year cycles consisting of two years of surveys according to a sampling design (SD) and one year of surveys with exhaustive data collection.

The SD data are collected according to a stratified random sampling with proportional allocation (Ardilly, 2006; Tillé, 2001) whose statistical unit is the vessel. In 2015, the research work carried out within the GIS VALPENA showed that this sampling design made it possible to obtain the most accurate estimates (Bellanger et al., 2015). However, since then, the available VALPENA data have been considerably enriched and the needs in terms of data processing have become more complex (longitudinal estimates, spatio-temporal analyses). Thus, it is now essential to take stock of the limits of the current sampling design for the spatial analysis of fishing activities and to carry out an in-depth reflection on possible methodological improvements.

Ardilly, P. (2006). Les techniques de sondage (nouvelle édition), Paris : Editions Technip.
Bellanger, L., Plissonneau, E., Tillier, I. & Trouillet B. (2015). Construction et mise en œuvre de plans d'échantillonnage adaptés aux données issues de l'observatoire VALPENA sur les activités de pêche professionnelle. *XXIIèmes rencontres de la société Francophone de Classification (SFC*), Nantes., 9-11 septembre.
Tillé, Y. (2001). Théorie des sondages - Échantillonnage et estimation en populations finies. Paris :Dunod.
Trouillet B., Bellanger L., El Ghaziri A., Lamberts C., Plissonneau E. & Rollo N. (2019). More than maps: Providing an alternative for fisheries and fishers in marine spatial planning. *Ocean and Coastal Management*, Elsevier, 2019, 173, pp.90-103. https://doi.org/10.1016/j.ocecoaman.2019.02.016

Main goals

The postdoc will have to answer in an objective and documented way to the following scientific questions:

- **Improving the quality of spatial correlation estimation:** The use of SD data may lead to an underestimation of the spatial correlation. The postdoc will propose methodological improvements of the current sampling design based on existing spatial sampling methods and spatial information contained in the VALPENA data collected in previous years.

- **The possibility of estimating VALPENA indicators at different scales:** In order to harmonize data processing methods, seven VALPENA indicators have been constructed to map and describe fishing activities at different spatial and temporal scales, but also for different population groups. One axis of methodological development is therefore to obtain estimates at different scales, without loss of precision.
- **Minimisation of data collection costs and survey pressure:** The postdoc will propose methodological improvements to the survey design in order to (i) optimise the number of surveyors and their movements in the different fishing ports, (ii) limit the number of consecutive surveys for a single fisher.

Skills

The candidate must:

- hold a PhD in Mathematics and Applications of Mathematics or equivalent
- be skilled in statistics with a background in survey theory
- have good experience in writing papers and communicating research in conferences
- will have good programming skills in R
- have a taste for teamwork and interdisciplinarity

Candidature

The position will remain open until filled. However, in order to be fully considered, applications must be submitted by July 15 2022. The start date is flexible, but no later than early 2023. To apply, send to Lise Bellanger (lise.bellanger@univ-nantes.fr) and Nicolas Rollo (nicolas.rollo@univ-nantes.fr) :

- a CV summarising training, positions held, details of academic work, teaching and administrative experience and other qualifying activities
- a letter of motivation
- the names & contact details for two references.

A video conference interview with the successful candidates will be scheduled for July 19 or 20 2022.