Post-Doc position

Integrated models for meta-population dynamics of fish populations. Assessment of the impact of multiple stressors and spatial management.

We are seeking an enthusiastic and motivated researcher to join our group for a 2-years post-doctoral fellow (starting late 2017-early 2018) based in the Fisheries Ecology group, research unit Ecology and Ecosystem Health, Agrocampus Ouest (Rennes, France).

The researcher will develop integrated population dynamic models to explore the meta-population dynamics of nursery-dependent flatfish in the Eastern Channel, and its consequences on stock assessment and for spatial management.

The research will be developed in an attractive collaborative scientific environment in the context of two funded research projects: SMAC (https://wwz.ifremer.fr/smac/) and CHOPIN (http://www.seine-aval.fr/projet/chopin/).

Project

The post-doctoral research project aims at building-up a spatialized integrated life-cycle population modelling framework for fish populations (Rochette et al. 2013; Archambault et al., 2016), to infer metapopulation dynamics, to assess the consequences of metapopulation dynamics on stock-assessment, and to derive probabilistic forecasts under various scenarios of spatial management and habitat restoration.

The case study is the common sole (*Solea solea*) in the Eastern Channel. The common sole is a coastal and estuarine nursery-dependent flatfish species which population dynamics is shaped by the drift of eggs and larvae from spawning habitats to coastal nurseries and by the productivity of coastal nurseries where juveniles grow before being recruited in the population. Population dynamics then depends upon the contribution of the different nursery sectors to the recruitment. The Eastern Channel sole is currently managed as a single, well-mixed and spatially homogeneous population and is heavily harvested.. However, there is growing body of evidence pointing at the existence of a metapopulation structure formed by set of subpopulations with contrasted productivity and low connectivity cannot be ruled out. The degree to which subpopulations are connected is critical to correctly infer population dynamics, assess stock status and ultimately setting up appropriate management measure. Ignoring metapopulation structure in stock assessment models could result in local over/under exploitation and in suboptimal spatial allocation of the fishing pressure. Also, accounting for metapopulation dynamics is critical to appropriately assess the consequence of scenarios of nursery habitat preservation and/or restoration..

The project aims at developing an integrated (meta)population modeling framework to integrate various sources of data and information to infer the meta-population dynamics of the common sole in the Eastern Channel. It will built on recent modelling work that revealed how inferences on population dynamics and stock assessment are highly sensitive to changes in hypotheses on the connectivity between subpopulations (Archambault et al., 2016). Two research axes will be developed.

First, all available information (including existing and newly collected tag recapture data) will be integrated to infer the connectivity between subpopulations and its consequences on population dynamics, stock assessment and forecasting scenarios. The model will integrate various sources of data series including catch-at-age, survey at age, and an extensive tagging data set and other ancillary data. The tag-recapture data set consist of more than 40000 fish tagged from the 50's to 2018 (last tagging campaign of the SMAC project). There will also be rooms for collaboration with a PhD (2017-2019; Marine Randon; SMAC project) developing a multi-maker approach (otoliths micro-chemistry, genetics, …) to infer connectivity along the life cycle.

Second, a meta-analysis of available knowledge and data will be carried out to improve modelling juveniles' survival rate on nursery grounds and improve the understanding of the impact of anthropogenic pressures on survival. Collaborations with partners of the Chopin project will allow benefiting from data to estimate consequences of nursery habitat degradation at the scale of individual juveniles.

The model will serve as a basis for probabilistic forecasts under various scenarios including coastal nursery habitat restoration and spatial fisheries management (Archambault et al., in press).

References

Archambault, B., Le Pape, O., Baulier, L., Vermard, Y., Véron, M., & Rivot, E. (2016). Adult-mediated connectivity affects inferences on population dynamics and stock assessment of nursery-dependent fish populations. Fisheries Research, 181, 198–213.

Archambault, B., Rivot, E., Savina, M., & Le Pape, O. (in press). Using a spatially structured life cycle model to assess the influence of multiple stressors on an exploited coastal-nursery-dependent population. Estuarine, Coastal and Shelf Science. https://doi.org/10.1016/j.ecss.2015.12.009

Rochette, S., Le Pape, O., Vigneau, J., & Rivot, E. (2013). A hierarchical Bayesian model for embedding larval drift and habitat models in integrated life cycles for exploited fish. Ecological Applications, 23(7), 1659–1676.

Location and collaborations

The postdoc researcher will work in a stimulating research group at Agrocampus Ouest (research Unit on Ecology and Ecosystem Health, Rennes, France), with a focus on fisheries ecology that uses a broad range of modelling technics ranging from populations to the ecosystem levels, with expertise in Bayesian statistics, statistical inference for stochastic models and hierarchical models, and connection between demographics, population dynamics and ecosystems.

https://www6.rennes.inra.fr/ese_eng/ABOUT-US/Research-Groups/equipe/(idstructure)/1/(idlang)/uk

There are also rooms for collaborations with many other scientists involved in marine ecology, modelling, biostatistics. The researcher will also work in close collaboration with the research community of the SMAC *(https://wwz.ifremer.fr/smac/) and CHOPIN (http://www.seine-aval.fr/projet/chopin/)* projects. In particular, close collaborations are planned with French scientists from Ifremer (Nantes, Boulogne, Lorient, Brest), and other research structures (e.g. Irstea and Bordeaux University).

Rennes is a vibrant town, with attractive surrounding in Britany and only 1.5 hour from Paris by train.

Requirements

We are looking for candidates with (i) a doctoral degree in quantitative ecology and/or fisheries sciences or a related field, (ii) experience with demographic models, meta-population models; (iii) an experience in Bayesian modelling will be appreciated ; (iii) and the ability to work well both collaboratively and independently and to publish in well-rated international scientific journals.

Duration, appointment and salary

This is a 2-years full time position, starting date is flexible between late 2017 and early 2018.

The fixed term contract provides a net salary ~ 1600 euros per month during the first 6 months and ~2100 euros after the 7th month.

Contacts to apply

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Closing date for application: 30 sept. 2017

Application preferentially by email, enclosing CV + motivation