

**Title:** Development of selectivity models to infer on fish escapement processes in a trawl

### **The Institute and the recruiting department**

French Research Institute for Exploitation of the Sea, Ifremer, through its research work and expert advice, contributes to knowledge of the oceans and their resources, to monitoring of marine and coastal environments and to the sustainable development of marine activities. To these ends, Ifremer conceives and operates tools for observation, experimentation and monitoring, and manage the oceanographic databases.

### Presentation of the department/direction, research unit or laboratory/service:

The main challenges are to contribute to changes leading to the exploitation of ecologically sustainable and socio-economically profitable fishery resources. They are part of the implementation of the ecosystem approach to fisheries in a renewed regulatory context (MSFD, CFP). The research themes of the STH (Fisheries Science and Technology) unit revolve around three axes: improving knowledge of the biology and ecology of exploited species, the study of uses / ecosystem interactions and development of stock assessment methods in the context of the ecosystem approach to fisheries.

### Introducing the job description, indicating the work position in the organizational chart:

This position positioned within the Laboratory of Fisheries Technology and Biology (LTBH) in Lorient is in line with the objectives of the Common Fisheries Policy: while maintaining the food supply and the economic balance of the fisheries, improving the selectivity of fishing gears to reduce discards is an important and complex issue, particularly for mixed fisheries. Numerous studies have been carried out in partnership between fishing professionals and scientists and have made it possible to develop and test new devices from an operational point of view on different fleets and fishing zones around the world.

These studies are generally based on experiments at sea in which the catches of a standard commercial gear are compared to those of a new tested gear. This kind of protocol enable to directly estimate the gains in selectivity and the potential commercial losses associated with the device tested compared to the standard commercial device for the use and acceptance of the selectivity devices by professionals. Therefore a protocol directly comparing the two devices (in 'paired hauls') is often preferred, but not always possible (independent hauls), and a relative size selectivity curve is estimated (Holst and Revill, 2009; Wileman et al., 1996). While these protocols for collecting selectivity data are well known and established, the inference of these data is not trivial and still raises a certain number of questions which call for potential avenues for improvement (L. A. Krag et al., 2014; Millar et al., 2004; Millar and Fryer, 1999; Miller, 2013; Veiga-Malta et al., 2018).

In addition, these experiments, though collecting aggregated and indirect data, can inform on the underlying fish escapement behaviour (Ludvig Ahm Krag et al., 2014).

### **Bibliography:**

Holst, R., Revill, A., 2009. A simple statistical method for catch comparison studies. *Fish. Res.* 95, 254–259.

Krag, L. A., Herrmann, B., Karlsen, J.D., 2014. Inferring Fish Escape Behaviour in Trawls Based on Catch Comparison Data: Model Development and Evaluation Based on Data from Skagerrak, Denmark (vol 9, e88819, 2014). *Plos One* 9, e100605. <https://doi.org/10.1371/journal.pone.0100605>

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Miller, T.J., 2013. A comparison of hierarchical models for relative catch efficiency based on paired-gear data for US Northwest Atlantic fish stocks. *Can. J. Fish. Aquat. Sci.* 70, 1306–1316. <https://doi.org/10.1139/cjfas-2013-0136>

Veiga-Malta, T., Feekings, J., Herrmann, B., Krag, L.A., 2018. When is enough, enough? Quantifying trade-offs between information quality and sampling effort for fishing gear selectivity data. *PLOS ONE* 13, e0199655. <https://doi.org/10.1371/journal.pone.0199655>

Wileman, D.A., Ferro, R.S.T., Fonteyne, R., Millar, R.B., 1996. *MANUAL OF METHODS OF MEASURING THE SELECTIVITY OF TOWED FISHING GEARS (ICES COOPERATIVE RESEARCH REPORT No. 215)*. International Council for the Exploration of the Sea, Copenhagen.

### General areas of responsibility (principal missions)

This project aims to review and compare the usual selectivity models to develop new ones that increase the estimates precision and our understanding of the underlying fish escapement processes from fishing gear.

### Principal activities

- Make a review of the existing models, identify their limits and propose improvements using case studies (selectivity data will be provided from our past projects CELSELECT and REJEMCELEC). We propose to adopt a more mechanistic approach to account for escapement processes and account for the aggregated nature of such data. The combination with other kind of data (e.g. environment, “fall-through”, video) could also be investigated.
- A simulation approach based on commonly encountered experimental conditions could be used to compare the performance of the selectivity models, as well as different sampling protocol. These results will help to optimize the precision of future experiments.

### Collaborative work environment

Internal collaborative relationship: Fisheries and Technology units of the institute

External collaborative relationship: ICES group WGTFB and WGSSE

### Required knowledge, skills, and characteristics

- Knowledge, skills, and abilities:
  - Ability to independently carry out research
  - Data analysis and modeling
  - Experience in R or other computing language is mandatory
  - Redaction of scientific papers in English

- Human qualities:
  - Organization, autonomy and rigor
  - Teamwork
  - Ability to take initiative and communicate

### Required education and experience

Ph.D. in Marine ecology, quantitative ecology, fisheries, natural resource management (or related fields) with strong interest and skills in data analysis and modeling approaches

Or

Ph.D. in Statistics or applied mathematics with strong interest in marine environment and fisheries sciences

Furthermore, the candidate should have spent **at least 18 months outside France since May, 2016.**

### Specific working conditions

Full time in Lorient. The position can start as soon as possible and until **June 2021.**

Trips to participate to working groups or research conferences, opportunity to take part to at-sea experiments aboard fishing or scientific vessel.

### How to apply for this position

Informal enquiries may be made to [marie.morfin@ifremer.fr](mailto:marie.morfin@ifremer.fr) or [marianne.robert@ifremer.fr](mailto:marianne.robert@ifremer.fr).

Formal applications are processed exclusively via our website:

<https://ifremer-en.jobs.net/en-GB/job/post-doctoral-research-position-in-fisheries-modeling-m-f/J3V7VF77TGKTYLBQ6DK>

They should include:

- A cover letter detailing your research interests, experience and motivation for applying;
- Your CV
- The names and email of two or three referees

Interested candidates can apply by clicking the **“Apply”** button. If you are unable to apply online please contact us at [grh@ifremer.fr](mailto:grh@ifremer.fr)

**Deadline for applications:** March 29, 2021