

Post-Doctoral researcher in AI simulation of European sea bass trajectories on French coastlines (F/M/X)

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The Institute France Energies Marines

France Energies Marines is an offshore wind energy research and innovation centre with a recognised industrial, economic and societal impact in France and internationally.

Its mission is to remove the obstacles facing the offshore wind energy sector. Backed by the French government and supported by a multidisciplinary team of more than 90 staff, a network of international experts and unique infrastructures,

the Institute conducts multi-partner research projects guided by excellence.

The results are transferred to the industry in the form of research and expertise services, operating licences, know-how transfer and participation in expert committees and networks.

These activities are structured around four complementary thematic programmes: site characterisation, systems design and monitoring, farm optimisation and environmental integration.

Context

The growing number of offshore wind farms raises critical environmental and societal questions about their impact on marine ecosystems. These questions are at the heart of the « Biodiversity & Monitoring » team of France Energies Marines and the [FISHOWF+](#) R&D project of which this position is a part. The [FISHOWF+](#) project aims to deepen knowledge of the interactions between fish and offshore wind farms. It proposes to improve the understanding of European sea bass seasonal movements (*Dicentrarchus Labrax*), their functional areas and the potential overlap with the areas where wind farms are located on French coastlines.

To do this, we propose to rely on a unique database of sea bass trajectories collected as part of the BARGIP project led by Ifremer (de Pontual et al. 2019, 2023). These trajectories provide information on both the seasonal migrations of the individuals monitored, but also the environmental conditions they went through. The development of movement models from this database could thus make it possible to (1) better characterize the way these individuals have interacted with their environment and (2) simulate their movements in other oceanographic conditions. A trajectory simulation tool could thus be strategic to better estimate the connectivity between the different wind farm development areas and the probabilities of occurrence of individuals in these areas.

Job description

The objective of this post-doctoral fellowship is therefore to develop movement models to simulate the migratory movements of fish on the French coastlines. We will thus focus on the classic tools of movement ecology (random walks, hidden Markov models, etc.) (Florko et al., 2025), but also generative artificial intelligence tools (Goodfellow et al., 2014). Indeed, in recent years, generative neural networks, such as GANs (i.e. Generative Adversarial Networks) and diffusion models, have shown promising ability to simulate human (Cao et al., 2019; Gao et al., 2020) and animal trajectories (Roy et al., 2022; Roy, 2022).

The simulation of realistic trajectories with regard to the description of a habitat will make it possible to:

- Estimate sea bass trajectories at sites where movement tracking by deploying archival tags has not been possible
- Estimate the spatial variations of sea bass distributions by simulating the trajectories of individuals at the population scale
- Estimate the probabilities of sea bass occurrence at current and future offshore wind farms

The candidate will collaborate at the European level (WUR, GEOMAR) on the development of these trajectory simulation methods within the framework of the European project DTOTRACK (<https://www.europeantrackingnetwork.org/en/dtotrack>). This project aims to map the movements and distribution of marine life in the North Sea, and then use this data to create a digital twin of the area. This digital twin can then be used to make more ecologically informed decisions in the blue economy and marine spatial planning sector.

References

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- de Pontual, H., Heerah, K., Goossens, J., Garren, F., Martin, S., Le Ru, L., ... & Woillez, M. (2023). Seasonal migration, site fidelity, and population structure of European seabass (*Dicentrarchus labrax*). *ICES Journal of Marine Science*, 80(6), 1606-1618.
- de Pontual, H., Lalire, M., Fablet, R., Laspougeas, C., Garren, F., Martin, S., ... & Woillez, M. (2019). New insights into behavioural ecology of European seabass off the West Coast of France: implications at local and population scales. *ICES Journal of Marine Science*, 76(2), 501-515.
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- Gao, N., Xue, H., Shao, W., Zhao, S., Qin, K. K., Prabowo, A., Rahaman, M. S., & Salim, F. D. (2020). Generative adversarial networks for Spatio-temporal data: A survey. arXiv preprint arXiv:200808903.
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- Roy, A. (2022). Characterization and multi-scale simulation of tropical seabird movements: a deep learning approach. University of Montpellier.
- Roy, A., Fablet, R. & Bertrand, S. L. (2022). Using generative adversarial networks (GAN) to simulate central-place foraging trajectories. *Methods in Ecology and Evolution*, 13, 1275–1287.

Profile and skills

Initial training

PhD in quantitative ecology, or deep learning

Specific knowledge

- Good knowledge of marine ecology
- Movement ecology
- Programming in Python and/or R
- Deep Learning tools (torch, lightning, hydra)

Professional qualities

- Ability to work in a team environment in an interdisciplinary research environment
- Autonomy, rigor, sense of organization
- Analytical and synthesis skills

The +:

Interest in environmental issues and marine renewable energies

Practical information

Type of contract	Fixed-term contract (CDD)
Duration of the contract	18 months
Status	Executive
Workplace	Plouzané (29), at Frances Energies Marines and Ifremer offices
Start date	09/03/2026
Application Deadline	10/02/2026
Supervision	Amédée ROY, researcher in deep learning for the monitoring of marine fauna, FEM, Plouzané Mathieu WOILLETZ, fisheries researcher, UMR DECOD - Ifremer, Plouzané

In accordance with the regulations, with equal skills, priority will be given to people with disabilities.

How to apply

- Applications must consist of a **CV** and a **cover letter**.
- In the case of a secondment of the candidate by a member of France Energies Marines, the application must mention the agreement of the current employer.
- To apply, go to the France Energies Marines website in the Join [us section](#).

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