Fishing practices and the risk of incidental catches: the case of the common dolphin in the Bay of Biscay

Context: since the end of the 1980s, France has regularly experienced significant dolphin mortality in winter, leading to peaks in strandings on the Atlantic coast. Most stranded dolphins show marks caused by fishing gear, indicating that they have been victims of accidental captures[1]. Since 2016, the number of strandings of small cetaceans with capture marks has reached record levels. It is estimated that 3,000 to 20,000 dolphins have been captured yearly along the French Atlantic coast, mainly in the Bay of Biscay[2]. This level of incidental catches could eventually threaten the North-East Atlantic population of common dolphins[3]. In this framework, the DELISS project (DEveLoppement d'une gestion Intégrée deS interactionS entre pêche et dauphins communs dans le Golfe de Gascogne) aims to improve current knowledge on this species (distribution, prey distribution, etc.) and its interaction with fisheries, to implement adapted management scenarios.

Objectives: the post-doctoral contract is part of task 3 of the DELISS project entitled "Mapping of fishing practices and risks of incidental catches". This task aims to characterise the interactions between dolphins and fisheries through a detailed description of incidental catches and fishing activity in time and space. Although the map is not the territory, the cartographic representation of complex processes (e.g. fishing effort and bycatch) significantly to a better understanding of a system and how its components relate to each other (e.g. how do the spatial dynamics of fleets relate to bycatch events?) Although the elaboration of a map may seem simple, the complexity of the information on fishing activities and bycatches (different information flows, complementary or not, qualification of the data, etc.) requires the implementation of lengthly preliminary analytical procedures, to limit the subjectivity inherent to the choice of parameters. More specifically, the objectives of this post-doctoral contract are:

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[1] ICES, "Workshop on Fisheries Emergency Measures to Minimize BYCatch of Short-Beaked Common Dolphins in the Bay of Biscay and Harbor Porpoise in the Baltic Sea (WKEMBYC)," 2020, https://doi.org/10.17895/ICES.PUB.7472.

[2] Hélène Peltier et al., "Bilan 2020 Des Évènements d'échouages de l'hiver et de l'été, Cartographie Des Mortalités et Corrélation Spatiale Avec Les Pêcheries" (bservatoire PELAGIS – UMS 3462, La Rochelle Université / CNRS, 2020), https://www.observatoire-pelagis.cnrs.fr/wp-content/uploads/2021/05/2020_Rapport_EchouagesHiver2020_Pelagis-1.pdf; Hélène Peltier et al., "Identifier La Co-Occurrence Spatio-Temporelle Des Captures Accidentelles de Dauphins Communs et Des Pêcheries Dans Le Golfe de Gascogne de 2010 à 2019" (bservatoire PELAGIS – UMS 3462, La Rochelle Université / CNRS, 2020), https://www.observatoire-pelagis.cnrs.fr/wp-content/uploads/2021/05/2020_Rapport_ZonesMortalite_ZonesPeche.pdf.

[3] ICES, "Workshop on Fisheries Emergency Measures to Minimize BYCatch of Short-Beaked Common Dolphins in the Bay of Biscay and Harbor Porpoise in the Baltic Sea (WKEMBYC)."

- Deploy the methods for estimating the risk of accidental catches developed in ICES areas for trawlers in the fleets concerned[4].
- Set up an analytical framework (reproducible workflow) to document and map fine-scale fishing practices and bycatch events in the Bay of Biscay, using all the databases available at Ifremer and La Rochelle University from 2000 to 2021.
- Identify on this basis the interannual changes in fishing practices observed over the period under consideration including gear (type and size) and vessels, the species targeted, the fishing areas, etc., and analyse the links with the observations of bycatch events in the Bay of Biscay.

The data include information flows linked to the activities of the French fishing fleets (AIS, VMS, logbooks and cross-auction sales), and observations made on board vessels (observation of catches at sea, by an on-board observer or by video) since 2000.

Profile: PhD in ecology, fisheries or applied statistics with interest in (1) the analysis of multi-source, incomplete and complex data and (2) research topics at the interface between fisheries management and conservation of protected species. Knowledge of R is essential. Knowledge of Stan or nimble preferred.

Location and working environment: the position is based at the Ifremer station in Port-en-Bessin (Normandy, France). Travelling between project members will be required (La Rochelle, Brest and, Nantes in France). The contract duration is 18 months, and the annual salary is approximately 36,000 euros gross (this salary will be adjusted according to the professional experience and include a meal allowance and a contribution to the health insurance scheme). Telework possibilities can be implemented after six months of contract and are established by the enterprise agreement (maximum of two days of telework per week). The project finances the working environment (computer, travel, publication expenses). The post-doctoral fellow will interact primarily with Laurent Dubroca (Orcid 0000-0002-1861-0507) and Matthieu Authier (Orcid 0000-0001-7394-1993) and all members of the consortium.

Application: send a cover letter and *curriculum vitae* to laurent.dubroca@ifremer.fr and matthieu.authier@univ-lr.fr. The contract should start during the 4th quarter of 2022, ideally before the 1rst of December 2022. Applications will be accepted until the candidate is selected.

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[4] Matthieu Authier, Etienne Rouby, and Kelly Macleod, "Estimating Cetacean Bycatch From Non-Representative Samples (I): A Simulation Study With Regularized Multilevel Regression and Post-Stratification," *Frontiers in Marine Science* 8 (2021): 1459, https://doi.org/10.3389/fmars.2021.719956; Etienne Rouby et al., "Estimating Bycatch From Non-Representative Samples (II): A Case Study of Pair Trawlers and Common Dolphins in the Bay of Biscay," *Frontiers in Marine Science* 8 (2022), https://www.frontiersin.org/articles/10.3389/fmars.2021.795942.