

PhD opportunity: Hindcasting to forecast. An archaeobiological approach to the European hake fisheries, starting October 2019, as part of the Marie Skłodowska-Curie Innovative Training Network "SEACHANGES: Thresholds in Human Exploitation of Marine Vertebrates" (ESR 10)

Deadline: 30 June 2019

Location and PhD registration: the successful candidate will be based at Instituto de Investigaciones Marinas (Institute of Marine Research) in Vigo, Spain, and will register for a PhD in the University of Vigo or Madrid Autonomous University.

PhD supervisors: **Fran Saborido-Rey** (Instituto de Investigaciones Marinas), Arturo Morales (Madrid Autonomous University). Additional supervisors will be appointed from within the network.

Project background: Understanding of European hake (*Merluccius merluccius*) population structure and resilience is challenged by the shallow temporal window that existing fisheries data provide. While historical data are finally being recognised as essential for understanding long-term impacts of sustained exploitation on fisheries productivity, historic landing records can nevertheless be inaccurate or incomplete, and are usually only available for the last few centuries. By contrast, marine fishing intensification in the NE Atlantic dates back to at least AD 1,000, with hake amongst the best-represented marine fishes on archaeological sites in SW Europe. Historical information from a relatively recent past may thus yield ecological baselines already far removed from 'pristine' or pre-industrial (i.e. non-intensive) conditions.

Project description: To explore long-term human impact on Iberian hake fisheries, ESR 10 will pair zooarchaeological and biomolecular analyses of bones from archaeological sites across Europe, dating back to the 5th century BC, with modern hake samples, to construct a baseline of changes in life-history, biology, and ecology. Analyses will include (a) bone morphometrics, allowing estimation of size and growth patterns; (b) ancient DNA analysis (via secondment in Bologna), identifying SNPs to reveal population structure and adaptation (resilience) in different historical times; and (c) historical records of landings, current knowledge on hake biology, and reconstruction of paleoclimatic changes. These tools will be combined to understand long-term impacts of sustained exploitation on fisheries productivity, adopting the 'hindcasting first to forecast after' approach to enhance our perception of hake biology and ecology, and improve population management. It is expected that the work will identify past regime shifts in productivity associated with environmental and exploitation factors, improving capacity to predict future changes in a key commercial species.

This project offers secondments (totalling up to 30% of the project period) with Università di Bologna for ancient DNA training, Universidad Autónoma de Madrid, for morphological identification of fish bones, as well as collaboration with Instituto Español de Oceanografía (IEO) for hake fisheries.

Additional training: the successful candidate will have access to doctoral courses at the University of Vigo as well as network training events and courses offered by other network partners.

Host institutions: *The Institute of Marine Research, Consejo Superior de Investigaciones Científicas (IIM-CSIC)* undertakes research on oceanography, global change, fisheries ecology, stock assessment, biodiversity, reproductive ecology, aquaculture, larval rearing, microbial ecology, marine pollution and conservation of marine endangered species. It runs long-term

projects on ecology of coastal and shelf ecosystems, studying organisms from phytoplankton to cetaceans, and the environmental (natural and anthropogenic) factors affecting their abundance, distribution and dynamics. **CSIC** is the largest public research institution in Spain and the third largest in Europe, hosting over 4000 doctoral and post-doctoral researchers across 138 institutes. Its mission is to foster, coordinate, develop and promote scientific and technological research, of a multidisciplinary nature, in order to contribute to advancing knowledge and economic, social and cultural development, as well as to train staff and advise public and private entities on this matter.

Funding: The PhD will be funded for 3 years, starting in October 2019, through the SeaChanges innovative training network. As an early stage researcher, the successful candidate will receive a 36-month employment contract based on a monthly allowance of around €3100 (gross, before deductions) plus €600 mobility allowance and, when applicable, a family allowance of €500 per month. The receiving institution receives an additional €1800 per month towards associated research, training and networking costs.

Entry requirements: applicants must hold a first degree and a master's degree in relevant subjects (for example, marine biology, archaeological science, environmental science, etc.), and should not have a PhD. According to the **eligibility criteria** (relating to residency and research experience) for Early Stage researcher positions within Marie Skłodowska-Curie Actions:

- Applicants must **not** have resided or carried out their main activity (work, studies, etc.) in the country of their host organisation (in this case, Spain) for more than 12 months in the three years immediately before the date on which the PhD contract starts.
- Applicants should be within the first four years (full-time equivalent) of the start of their research careers, measured from the date they obtained the degree formally entitling them to begin a doctorate. *University of Vigo and Madrid requires PhD students to have a master's degree so the clock starts when the master's degree is awarded. Periods of employment in non-research jobs and periods of unemployment do not count towards the four years. Periods spent doing part-time research count according to the % of time spent doing research. Thus, 2 years doing research with a 50% time contract counts as 1-year full-time equivalent. If in doubt, please contact us (e-mail addresses below).*

Relevant experience: some experience in one or more of the following subject areas would be advantageous: analysis of fish remains from archaeological sites; DNA sequencing (particularly if ancient DNA); statistical modelling; ecological modelling; systematic literature review. The work will demand good language skills (for example for reading historical documents in Spanish).

Application procedure: applicants should send their CV (no more than 4 pages) and a letter of motivation (no more than 2 pages) to Fran Saborido-Rey fran@iim.csic.es.

Information on other PhD opportunities in the SEACHANGES network, see:

<https://sites.google.com/york.ac.uk/seachanges/network>.