

# PhD scholarship in studies of the ecological role of marine top predators

A 3-year PhD fellowship in marine biology is offered by the Faroe Marine Research Institute ([www.hav.fo](http://www.hav.fo)) and the Greenland Institute of Natural Resources ([www.natur.gl](http://www.natur.gl)). The fellowship is part of the project *Marine top predators as ecosystem indicators in the central North Atlantic* (TOPLINK) funded by the Research Council Faroe Islands (<https://www.gransking.fo/en/>). It will be carried out in close cooperation between the GINR and FMRI. The successful candidate will be enrolled at the University of the Faroe Islands.

The position is available from 1st April 2022 or later.

## Background

The fellowship is part of a project that will use top-predators as indicators for the status and long-term trend of the North-Atlantic ecosystem, with focus on the Greenland-Iceland-Faroe-Scotland Ridge, and explore impact and feedback mechanisms manifested in the indicators. The project will study the ecological role of three common but overlooked top-predators, pilot whale, dolphin and killer whale, of major importance for the central North Atlantic ecosystem. The three whales consume millions of tons of prey every year but the impact from the predation has not been studied before, and the three species are showing signs of changes in distribution that are related to large scale oceanographic changes. Importantly, they are also simultaneously subject to opportunistic hunting activities in both East Greenland and the Faroe Islands, which call for new and updated knowledge. The migrations, stock identity, diving and feeding behavior will be studied with satellite telemetry and the information will be compared to remote sensing data of sea surface temperatures, chlorophyll concentrations and food availability. Samples of the hunt will be collected to estimate feeding habits, reproduction, age and growth, and tissue samples will be sampled for genetic and pollutant analyses. Teeth from historical collections and from modern hunting will be studied with laser ablation methods to identify elemental depositions in order to reveal traces of ecosystem changes over time.

The project is a research cooperation between Greenland Institute of Natural Resources and the Faroe Marine Research Institute (FAMRI), and it is part of a larger programme of ocean-climate research in the Faroe-Greenland area supported by the Research Council of the Faroe Islands <https://www.gransking.fo/en/funding-programmes/marine-research-in-the-north-atlantic-ocean/>. There will be excellent opportunities for networking, synergies and collaboration with other projects running in the program, including with other early-career scientists (e. g., Ph.d. students). This Ph.d. project will be supervised by experts from both GINR and FAMRI. You will be expected to be based for an extended period of time at FAMRI to facilitate scientific collaboration and extend your professional network.

## Objectives

Our overall aim is to understand the importance of top predators in the North Atlantic, with focus on the Greenland-Iceland-Faroe-Scotland Ridge, in relation to environmental changes. The project will address the following specific objectives:

- Study the movements of the whales and the drivers behind the movements
- Determine the short-term feeding habits and the longer-term changes and trends in prey consumption
- Distill the changes in life history parameters
- Assess the predation pressure exerted by the top predators
- Explore potential connections of toothed whales between Greenland and Faroe Islands along the Greenland-Iceland-Faroe-Scotland Ridge

## **Methods**

It is the plan to deploy a number of satellite transmitters on pilot whales, dolphins and killer whales in East Greenland and the Faroe Islands. The instrumentations will be done opportunistically when whales are within reach, with small boats rented from local hunters/fishermen or research boats. The technique is fully developed in other oceans and we have 30 years of experience with the methods. Tracks from instrumented whales will be used for habitat analysis based on remote sensing data of sea surface temperature, mixed layer depth, chlorophyll a concentration and, to the extent data are available, also with density distribution of prey items (fish and squid, including species of interest for fisheries).

Samples of whales will be collected from the ongoing hunt in the Faroe Islands and in East Greenland. The samples will include stomach content, reproductive material, teeth and a selection of tissue samples. The stomach samples will be used for determination of prey during the latest feeding event. Tissue samples will allow for more long-term detection of trophic level by stable isotope, or compound stable isotope analysis, as well as fatty acid analysis. Reproductive material will be used for assessing current and historic reproductive parameters that can be used for comparison with data from elemental analyses of tooth depositions. Teeth will be used for age estimation and for tracking signals of conditional changes in ecology and how it is manifested in the life history.

Most of the methods for analysis of biological samples are standard methods but new experimental methods for examining growth deposition in teeth of whales will also be applied. Teeth are metabolically inert once formed and provide an archive of isotopic signatures. The annual deposition of dentine and cementum in the teeth may act as chemical markers reporting on the surrounding habitat of the owner of the tooth. The toothed whales thus provide a unique possibility to study past environmental changes due to their long age and their large distribution range. The detailed examination of tooth deposition will be compared with present and historical changes in oceanographic conditions in the North Atlantic.

## **Responsibilities and qualifications**

For this project we are looking either for a student with a good data science background who will be trained by the supervisors in conducting field work, sampling hunted whales and tagging whales with satellite transmitters.

You must have a two-year master's degree (120 ECTS points) or a similar degree with an academic level equivalent to a two-year master's degree.

This project will provide the student with a wide range of skills in studies of marine mammals and their functioning in the marine environment. The student will be trained in analyses of samples of biological material from marine mammals as well as with field work

on tagging marine mammals. The student will also benefit from close collaboration with the group at GINR and Aarhus University that study life history in dental material from toothed whales.

The student will be a member of the biologist group at both the Faroe Marine Research Institute and the Greenland Institute of Natural Resources. The student will also have the opportunity to take a number of courses during the fellowship.

Through project collaborators/supervisors the student will also have the opportunity to develop a network of national and international collaborators in the general study area. The student will also attend and contribute to the program of regular departmental seminars and discussion groups as well as National and International conferences to support the general development as a scientist. The student will be encouraged to write scientific papers for publication during the PhD. This will be a major benefit to their career and they will be well supported through this process by the experienced supervisory team.

### **Approval and Enrolment**

The scholarship for the PhD degree is subject to academic approval, and the candidate will be enrolled in a general degree program at University of the Faroe Islands.

### **We offer**

The Faroe Marine Research Institute and the Greenland Institute of Natural Resources are leading technical institutes studying and monitoring living marine resources in the North Atlantic. They are recognized for the excellence of their research, education, innovation and scientific advice. We offer a rewarding and challenging job in an international environment. We strive for academic excellence in an environment characterized by collegial respect and academic freedom tempered by responsibility.

### **Salary and appointment terms**

The appointment will be based on the collective agreement with the Danish Confederation of Professional Associations. The allowance will be agreed upon with the relevant union. The period of employment is 3 years.

Starting Date will be mutually agreed with the successful candidate in the first half of 2022.

The PhD candidate will be working from the Faroe Marine Research Institute with extensive field trips to East Greenland and shorter training trips to Denmark. It is assumed that the candidate will be living in the Faroe Islands during the fellowship.

### **Further information:**

Is available from [Professor Mads Peter Heide-Jørgensen](#), GINR, [mhj@ghsdk.dk](mailto:mhj@ghsdk.dk), or Head of Department for Birds and Mammals, GINR, biologist [Fernando Ugarte](#), [feug@natur.gl](mailto:feug@natur.gl)

## **Application procedure**

Your complete online application must be submitted no later than **1 March 2022 at 12:00 (Danish time)**.

**The application should be submitted to [helu@natur.gl](mailto:helu@natur.gl).**

Applications must be submitted as **one PDF file** containing all materials to be given consideration. To apply, please forward your application to and attach **all your materials in English in one PDF file**. The file must include:

- A letter motivating the application (cover letter)
- Curriculum vitae
- Grade transcripts and BSc/MSc diploma
- Excel sheet with translation of grades to the Danish grading system
- Two letters of recommendation

You may apply prior to obtaining your master's degree but cannot begin before having received it.

All interested candidates irrespective of age, gender, race, disability, religion or ethnic background are encouraged to apply.