

MSc and BSc projects or special courses:

Marine biology projects at the Technical University of Denmark ([DTU Aqua](#)) in 2019 - 2020

General information

Students are welcome to join ongoing research projects or start their own independent project. Students are expected to collect, analyse and interpret data and produce a manuscript draft that describes the study findings. All projects are designed to produce data for a peer reviewed publication that students will either first-author or co-author. Students are welcome to work in groups. Projects may be expanded, or combined, in case a single project (see below) provides insufficient work for a complete student project. In addition, most projects are flexible and may be modified (e.g. scope reduction) to meet student needs.

The work location is the [Technical University of Denmark campus](#), north of Copenhagen in Denmark. Field work, however, is carried out in a diversity of locations, including the estuary [Roskilde Fjord](#) and the bay [Sønderborg Bugt](#) (see picture below). Student guidance covers study planning, data collection/acquisition, statistical analyses, results presentation and writing of the thesis/manuscript. In addition to the student guidance, the university offers a study location (desk, PC, access to library, software etc.), laboratory space, transportation, research equipment (boats, underwater cameras etc.) and a friendly and international work environment. Depending on the project, direct financial support may be available. The university will ensure that students learn how to carry out a research project and report the findings.

Projects are available at: <https://projektbank.dtu.dk/en-us/Pages/default.aspx>.



Field work in Sønderborg Bugt in 2018. Students are from the Faroe Islands, the Netherlands, the UK and France.

PROJECT 2: The effects of cobble reefs on fish abundance and diversity: implications for marine fisheries and conservation of harbour porpoises

Aim:

The aim of this study is to examine to what extent cobble reefs affect abundance and diversity of fish and harbour porpoises (*Phocoena phocoena*) in coastal areas. The project will reveal if cobble reefs benefit marine fisheries and conservation of harbour porpoise.

Background:

Cobble is extracted in coastal areas in Denmark, but the effects of the extraction on fish abundance and diversity are unknown. While many coastal fish populations have been in decline in recent years, the possible relationship between cobble extraction and declining fish populations remains uncertain. Using underwater video footage, this project examines fish abundance and diversity on natural cobble reefs, artificial cobble reefs and on sandy sea beds. Project videos are available [here](#) and [here](#). The project is carried out in the bay Sønderborg Bugt (see picture above). Related papers are available [here](#), [here](#) and [here](#).

Content:

Fish abundance and diversity will be quantified using footage available from underwater GoPro cameras positioned on the sea bed. Camera deployments involve both baited and unbaited cameras. Data collection will cover three types of areas: 1) control areas with sandy sea beds, 2) areas with natural cobble reefs, and 3) areas with artificial cobble reefs. The study design will be based on the Before-After-Control-Impact (BACI) approach. Specifically, the study will test the hypotheses that 1) reef restoration has led to an increase in fish abundance and diversity, and 2) artificial cobble reefs may facilitate Atlantic herring spawning activities. Because Atlantic herring is an important prey species for many larger species, cobble reefs are expected to support several trophic levels in the marine environment. In addition to the underwater video recording, abundance of harbour porpoise is measured in the three study areas (1-3). These data are collected using automatic listening stations that record sounds produced by harbour porpoise.



Atlantic herring (*Clupea harengus*) is an important prey species for Atlantic cod (*Gadus morhua*) and harbour porpoise (*Phocoena phocoena*) and may utilize cobble reefs for spawning.

Duration:

Video analyses of the available footage will take 1-4 months. Statistical analysis will take 1-4 months, and write-up is expected to take another 2-4 months. Baseline data (i.e. without artificial reefs established) have already been collected, and the student will have access to those data. The baseline data will be combined with data collected after the artificial reefs were established.

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