The eWHALE Project

The proposed research forms part of a wider project entitled "Combining environmental DNA sampling, whale watching & citizen science for stakeholder-driven marine biodiversity protection - NE Atlantic & Mediterranean". The project is funded through the 2021-2022 BioDivERsa + call for research proposals, with contributions from the national funders Irish National Parks & Wildlife Service and the Environmental Protection Agency.

We are applying under section c (10c) "In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment" as the proposed work will have *beneficial consequences of primary importance to the environment*.

Evidence that actions permitted by a derogation will not be detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range as is required under Section 54(2) of the European Communities (Birds and Natural Habitats) Regulations.

The overall eWHALE project seeks to use environmental DNA (eDNA) from water samples to help in area-based conservation. This is a developing area that is moving away from presence/absence of a species to examining in more detail genetic diversity, but due to relatively small sample sizes has yet to determine population structure (Dugal et al., 2021, Suarez-Bregua et al., 2021). To overcome this, in collaboration with industry, particularly whale watching companies, it is anticipated that over a number of spatial and temporal scales, we will be able to provide broader taxonomic resolution data for marine megafauna and associated prey. These efforts will generate an improved knowledge base for safeguarding marine megafauna and its genetic diversity.

The ***do nothing*** approach would eliminate the opportunity to develop an alternative monitoring technique that has enormous potential to monitor, protect and conserve a range of species and their prey, over a wide geographical range.

The ***alternative methods*** to examine population structure have traditionally relied on biopsy sampling (e.g. Mirimin et al., 2011, Nykänen et al., 2019) or through movement analysis using tag deployment (e.g. Pirotta & Thomas, 2025, Doherty et al., 2017), both of which could be considered invasive. Using water samples to extract eDNA, if successful, could revolutionise the way that we monitor marine megafauna, minimising invasive sampling. There are no other methods/alternatives that could be used.

Understanding the prey that these animals capture is also an important aspect of area based management. It is widely understood that many species, including large whales and basking sharks, occur in Irish waters at specific times of the year, whether "passing through" or foraging. In the case of basking sharks, understanding movement dynamics is inextricably linked with understanding the prey selection and dynamics. Similarly, many of the large baleen whales (and smaller cetaceans) co-occur with prey species. Using eDNA to monitor diet will allow us to understand timing of migrations, potentially help predict effects of changes in oceanography, water mass movement and climate change.

In Ireland, the work will attempt to examine the feasibility of monitoring a number of large whale species (minke, fin and humpback) and small cetaceans, such as common dolphins (*Delphinus delphis*) and their prey from whale watching boats using eDNA. This work will be carried out by a PhD student (Lorenzo DeBonis) and other team members which will involve fieldwork, including on board a whale watching vessel, laboratory work and data analysis. This work will be carried out from July 2023 to Dec. 2025. A second part of this work will involve using eDNA to monitor basking sharks (*Cetorhinus maximus*) and their prey. This work will involve an MSc student (Hayley O'Connell) and apart from work on the whale watching vessel will also involve dedicated surveys using a 6.5m Rigid Inflatable

Boat (RIB). This work will be carried out from April – October 2025 and will focus on the waters around west Cork but given the opportunistic nature of the work and also the short time window that basking sharks are in our coastal waters, we would like to sample elsewhere, should the opportunity arise.

As most of the work will be done from a licensed whale-watching boat, who operate under a code of conduct, taking water samples for eDNA analysis will not result in any additional stress to the animals involved. We have not witnessed any avoidance behaviour during previous fieldwork (done under license last year).

Explanation as to why the derogation sought is the only available option for works and no suitable alternative exists as per Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations.

All of these species are protected under the Wildlife Act and some are Annex II listed species under the Habitats Directive. We were advised by NPWS to apply via this mechanism.

Details of any mitigation measures planned for the species affected by the derogation at the location, along with evidence that such mitigation has been successful elsewhere.

On all sampling occasions, we will be very cautious around the animals and in some instances (when using the research RIB) will likely be within 10m of the animal. Where water samples are taken for eDNA, we will attempt to take the water samples approx. 3m behind the animal or in the animals' "flukeprint". Where possible, we will also collect whale/dolphin faeces.

For the large whales and basking sharks off west Cork/Kerry, given the whale watching boat code of conduct, as stated previously, we do not anticipate any detrimental effects by sampling water in their wake. Where we collect water samples (and take photographs) from the research RIB we will adhere to the photo-id protocol that we use in the Shannon estuary SAC, to minimise disturbance (e.g. Rogan et al., 2018) summarised below.

Sighted cetaceans/basking sharks will be approached slowly and carefully, minimising changes in speed and direction and trying to parallel the course of the boat with the course of the animals with the aim to reduce any disturbance to the animals. We will record the GPS coordinates at the beginning and at the end of the encounters and estimate the number of animals in the school/group as well as the presence of juveniles, calves and neonates (for cetaceans). We will also record and monitor the behaviour of the any species around the survey vessel and look out for any signs of stress or evasive behaviours. If strong avoidance behaviours (sudden changes in behaviour, course and speed related to the presence of the boat) are observed, the encounter will be suspended and approaches within 50m of individuals will be avoided for 5 minutes. If such avoidance behaviours continue after the suspension period, the encounter will be terminated.

References

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