



# PrePARED

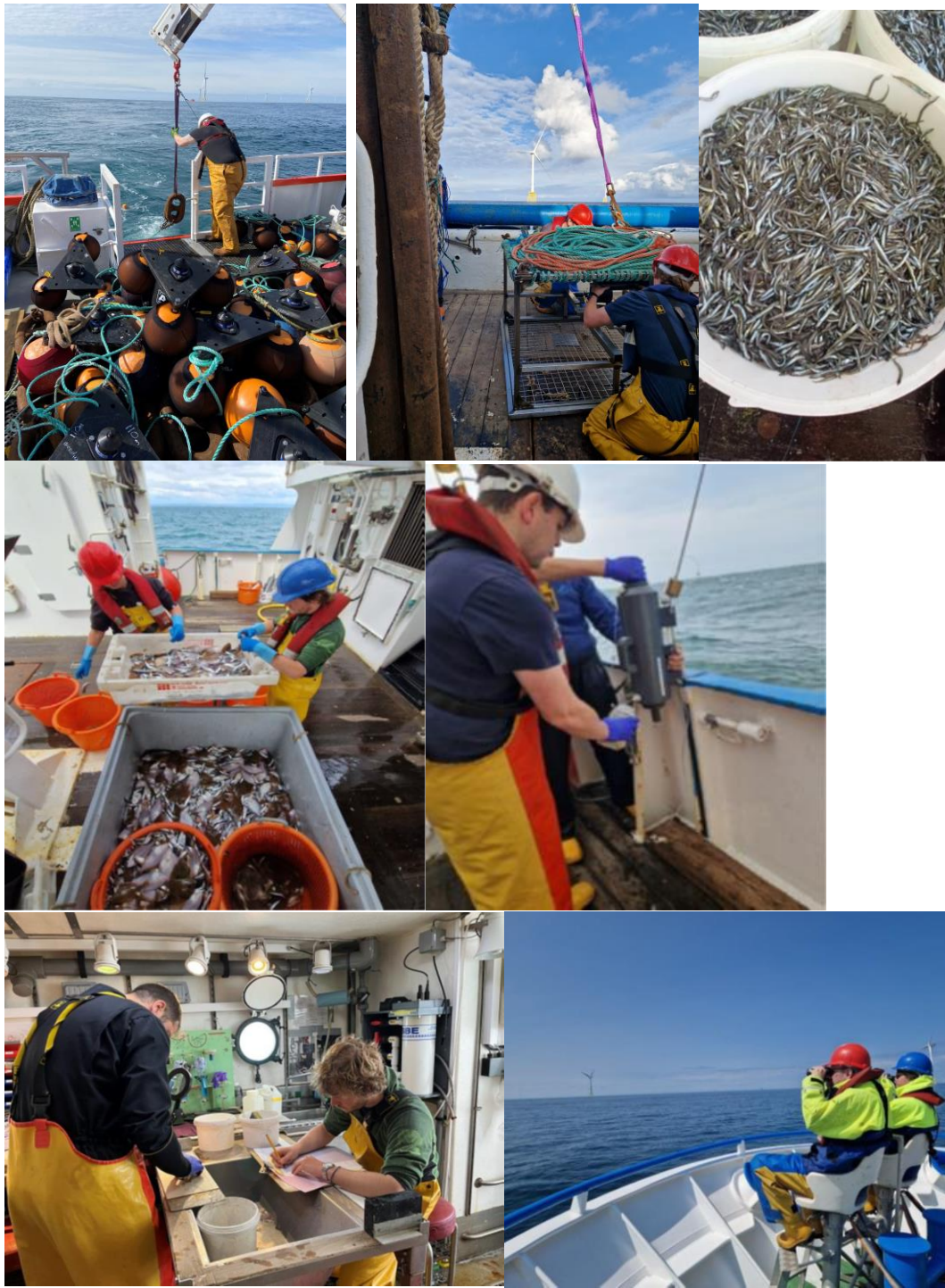
Predators + Prey Around Renewable Energy Developments

Quarterly Report: Q3 2023

Date: 02/10/2023

## Project Overview

The PrePARED project is progressing as expected with a successful summer of fieldwork.



## Summary of activities undertaken in Q3 2023

*Task 1.1 Broad-scale fish response to OWF in Forth:* Fisheries acoustic survey and seabird at sea survey were completed and generated a good amount of data. Sorting and selection of otoliths to analyse underway, to save time to catch-up with delays associated with the estimation of 2022 prey surfaces, length frequency distribution analyses were completed for haddock and whiting. The good predictive ability of this method saved significant analyses time in the laboratory. Processing of the acoustic data collected in 2023 is underway.

Delayed task from Q1 2023: Broadscale prey fields for 2022 were produced for: Common dab, Long-rough dab, Flounder, Plaice, Lemon sole, Norway pout, Poor cod, Grey Gurnard, Haddock (age 0 and age 1+), whiting, Lesser sandeel, Sprat and Herring. Note that the difference in format between historic and 2022 data resulted in pelagic surfaces not being integrated by age and depth at the moment, but work is underway to achieve this.

*Task 1.2 Fine-scale fish response to OWF in Forth:* BRUV/Fish trap surveys in the Firth of Forth have been completed and after refining the sampling strategy from 2022 and with no technical issues, generated a lot more data this year (traps: 62 deployments against 41 in 2022, BRUVs 70 deployments against 42 in 2022). The main species were also a lot more abundant this year (e.g. haddock captured in 71% of the traps in 2023 against 36% in 2022, whiting captured in 75% of the traps in 2023 against 2% in 2022), therefore we expect to be able to produce fine-scale distributions for a greater diversity of fish this year. Surveys were designed according to developer's requirements and reviewed by them. SBRUV data have been compiled and edited to allow the maxN analyses to start in the next quarter. RoxAnn data (replacing PSA) from PrePARED and other 2022-2023 surveys have been compiled and will be used to update

the seabed hardness/roughness layers. Update on delayed tasks: A fine-scale distribution has been produced for Common dab, however, the lack of sufficient data for other fish in 2022 precluded fine-scale distribution analyses for 2022 but the abundance of data collected in 2023 is promising.

*Task 2.1 Seabird spatial distribution models in Forth:* Broad-scale prey data received from SGMD on 22/09/23. Seabird tracking data received from UKCEH in Jul-23. BioSS are processing these data and will begin integrating them into the spatial and movement modelling frameworks shortly.

*Task 2.2 Seabird movement models in Forth:* No targets this quarter

*Task 2.3 Seabird displacement rates in Forth:* No targets this quarter.

*Task 3.1 Large-scale fish distribution in Moray:* Grab samples were not collected as part of the fisheries acoustic survey. However, in mitigation, RoxAnn data was collected and will replace the particle size analysis (PCA) that would have been conducted using the grab data to assess seabed habitat. Post-processing of fisheries acoustic and trawl data from the 2023 survey is underway and should be completed by the end of Q4.

Update on Q2 delayed task: Data analysis of BRUV footage has been completed for demersal fish abundance, biomass, richness, length, and community composition. Processed abundance and biomass data has been made available for use in downstream predator models (UoA). Discussions are ongoing as to when the latter analysis will be possible given the staff changes. It is hoped this can be started in Q4.

*Task 3.2 Fine-scale fish distribution in Moray (reef effects):* Target was not achieved. The delivery of the unbaited camera systems has been delayed due to parts and design issues at manufacturer.



Surveys have been delayed until 2024 due to late delivery, winter weather conditions not conducive for surveys and they need to be completed in the same season as BRUV cameras surveys for comparability. Update on Q2 delayed task: Data analysis of BRUV footage has been completed for demersal fish abundance, biomass, richness, length and community composition. Processed abundance and biomass data has been made available for use in downstream predator models (UoA). Discussions are ongoing as to when the latter analysis will be possible given the staff changes. It is hoped this can be started in Q4.

*Task 3.3 Fish acoustic telemetry in Moray:* Servicing of acoustic array and downloading of data from all receivers was completed in September. A further servicing of the array is planned for November (weather dependant). Tagging of fish has completed for 2023 with the next tagging trip planned for spring 2024. Analysis of the fish detection data has started.

*Task 4.1 Drivers of broadscale marine mammal distribution in Moray:* Analyses exploring the extent to which variation in harbour porpoises and harbour seal foraging activity can be explained by broad scale predictions of sandeel density have been completed, and draft reports are at an advanced stage. Data from both species highlight the value of incorporating sandeel density estimates in these analyses.

Harbour porpoise data were based on passive acoustic monitoring in both pre-construction (2009-2011) and post-construction (2022) periods. As well as showing a general pattern of increased occurrence and foraging in relation to sandeel density, there is an indication that this pattern may be moderated by the presence of windfarm structures; a result that could result from changes in the availability of alternative prey. This will now be explored further with additional post-construction data and incorporated in **a report to be delivered in Q4.**

Harbour seal data were based on pre-construction GPS tracking studies (2014-2017). These data also highlight that the average foraging distribution of harbour seals in the Moray Firth is related to predicted sandeel densities. However, this relationship appears to vary both by sex and individual, meaning that predicted overall distributions may be influenced by non-representative selection of individuals for tagging. This finding will be outlined in **a second report to be delivered in Q4** which will also outline proposed work to explore the implications of these findings within a revised Task 6.1.

Regarding the update on the Q2 Stakeholder Workshop, we propose that this is reviewed in the context of the results of Task 8.1 and 8.2, and Management Group discussion on the best approach to maximise the impact of future workshops.

*Task 4.2 Finescale marine mammal distribution in response to OWF and prey fields in Moray: A report outlining the results of the 2022 PAM surveys* conducted around constructed windfarms in the Moray Firth has now been drafted. This fieldwork has been funded by developers as part of their pre- and post-construction consent monitoring programmes, and results include a BACI analysis to explore potential broad and fine-scale changes in porpoise occurrence. The draft has been presented to MFRAG-MM as part of the developers consent monitoring in September 2023, and is awaiting review by members of MFRAG-MM. Outputs will then be available for integration with those on prey from Tasks 3.2 and 3.3.

*Task 4.3 Dose response curves in Moray:* PAM devices were set up in Cromarty and transported to Buckie Harbour in July ready for deployment. Regular meetings were held between PrePARED researchers and Moray West to liaise over planned piling schedules, procedures for deploying monitoring equipment and plans for developer-led collection of piling noise data that will be required to

place PrePARED PAM data in context. In late August, Moray West contracted Moray First Marine to deploy the array of 65 CPODs in a gradient design through Moray West, where piling will be undertaken in Q4, and through existing windfarms at Beatrice and Moray East.

*Task 4.4 Fish nutritional value:* In Q2 of 2023, we received the PrePARED 2023 samples from the Moray Firth surveys and now have samples from the Forth and Tay surveys from July. Currently, analyses are focused on the PrePARED 2022 samples, with the following species having been processed: Mackerel, Viviparous eelpout, Bull-rout, Lemon sole, Long rough dab, Flounder, Whiting, Common dab, Grey gurnard. Our analysis of the PrePARED 2022 samples will continue throughout Q4. Additionally, we are developing resourcing solutions to support analysis through 2023-2026 - and engaging with PrePARED partners on sampling.

*Task 5.1 Generalities in fish response to OWF:* No targets this quarter

*Task 5.2 Generalities in harbour porpoise response to OWF:* In Q3 of 2023, SMRUc have continued refining the analyses of the effects of array designs on porpoise dose response studies to pile driving using acoustic loggers. They had meetings with the St Andrews and UoA teams to present the results and discuss their implications for future studies. Preparation of a draft manuscript will continue throughout Q4.

*Task 6.1 Minimum data requirements for seabird distribution and movement models:* No targets this quarter

*Task 6.2 Minimum data requirements for marine mammal distribution models:* The target (complete collation of digital aerial survey datasets for English waters) has not been met but has now been reviewed and re-focussed. Please see 'CHANGES' section.

### *Task 6.3 UK EEZ marine habitats similarity assessment for OWF sites:* No targets this quarter

*Task 6.4 Survey design for predator-prey studies:* Work has continued with SMRUc engaging with the UoE team to align with Task 6.3. Data on offshore wind farms around the North Sea has been expanded and plotting is underway in GIS. Meetings are planned for Q4 with UoE to explore overlaps and guide where surveys could be designed (and what surveys provide the greatest return on investment). Work from Task 5.2 also informs this task by guiding the number of PAM stations required to produce suitable survey design requirements.

*Task 7.1 IPCoD and DEPONS integration of new data and testing:* Discussion and collaboration are ongoing with SMRUc and the UoA and Aarhus teams. This work likely will occur in 2024-2025 due to developments of the DEPONS model coming out in late Q4 2023 and resourcing changes required for Aarhus and UoA. These instances have resulted in unforeseen delays on this task in 2023. A benefit of delaying this work to 2024-2025 is the re-development of the iPCoD model (Scottish Government funded) which will allow for closer comparison of cumulative impact assessment tools (as the redevelopment involves an energetic engine, as in the DEPONS model).

*Task 7.2 Adding biological realism to SeabORD and testing:* UKCEH have developed methods for integrating both the sandeel habitat suitability map and new PrePARED prey maps into the Individual-based Model (IBM) SeabORD. UKCEH are using spatial smoothing to facilitate the use of the raw data products within the IBM and are currently refining methods for calibrating behaviour and energetics of the IBM to fit with the new prey surfaces and current bird distributions (from the Marine Scotland Cumulative Effects Framework, CEF, project). We expect to have completed integration of the IBM with the new prey maps by the end of the year (Dec 2023).



### *Task 7.3 SeabORD for the FFC SPA: No targets this quarter*

*Task 7.4 Integration of PrePARED findings for harbour porpoise CIA:* Data collation of wind farm data for UK OWF has continued to support CIA assessments. Additionally, discussions of the elements of the CIA which can be considered here and how to achieve project objectives have been discussed among the project team and with developer representatives. Due to the re-development of the iPCoD model (Scottish Government funded) which will allow for closer comparison of cumulative impact assessment tools (as the redevelopment involves an energetic engine, as in the DEPONS model), we intend to delay this work to Q2-Q4 2024 to capitalise on the new version of iPCoD being available. By delaying this work, it also ensures the CIA undertaken is as realistic as possible.

*Task 7.5 Integration of PrePARED findings for seabird CIA: No targets this quarter*

*Task 8.1 Stakeholder and network analysis:* The Stakeholder and Network Analysis contract has now been completed and a report, communications plan and stakeholder contact list has been produced and circulated to all project partners. Actions are being identified through the report and communications plan and these will be implemented throughout Q4 and for the duration of the project.

*Task 8.2 Communications Plan:* The Stakeholder and Network Analysis contract has produced a communications plan which will be implemented during Q4 and throughout duration of project.

*Task 9.1 Annual knowledge exchange workshops:* The Annual Knowledge Exchange Meeting will be held at Dynamic Earth, Edinburgh from 27-28 February. Invitations to key stakeholders will be sent in due course once an agenda has been finalised for the

event, however, it is expected that Day 1 will be a wider event with external stakeholders and Day 2 will be an opportunity for internal discussion with the Programme Advisory Group.

*Task 9.2 Dissemination of project findings:* There have been no research outputs e.g. publication this quarter. Instead, general project updates have been disseminated via the monthly blog and social media posts. In addition to this, project members have presented PrePARED overviews at ICES, CWW and workshops.

*Task 9.3 PrePARED project scientific symposium:* No targets this quarter – for last year of project

*Task 9.4 Website and social media:* Webpage Analytics have now been introduced and will be included in quarterly reports moving forward. As of 28/09/2023 the month of September saw 302 page views with a total of 112 users. 89% of visitors are new to the site with majority from the UK followed by USA and Europe. Sessions spiked on 13 September showing a correlation between page views and social media posts. The Project Manager has been working in collaboration with the SGMD Communications team and a timeline of scheduled posts on social media has been agreed with an average of 2 posts per month on both X and LinkedIn.

## Summary of activities to be undertaken in Q4 2023

*Task 1.1:* Produce point biomass estimates of pelagic fish from acoustic transects and completion of otolith analysis.

*Task 1.2:* Completion of RoxAnn analysis

*Task 2.1:* Working distribution models using prey data from Forth-Tay.

*Task 2.2:* Initial development of movement modelling framework

*Task 2.3:* No target this quarter

*Task 3.1:* Completion of RoxAnn analysis (subject to lab availability) and completion of post-processing of fisheries acoustic and trawl data for 2023 survey.

*Task 3.2:* Work to resolve delay on unbaited camera systems with manufacturer. Update at next quarter.

*Task 3.3:* No target this quarter

*Task 4.1:* Deliver final report

*Task 4.2:* Draft report to be finalised following review by MFRAG-MM. Internal project meeting to discuss prey field results from 2023.

*Task 4.3:* Initiate collation of engineering data from developers

*Task 4.4:* Processing of summer 2023 prey samples

*Task 5.1:* No target this quarter

*Task 5.2:* Convene quarterly meetings to discuss progress on data collection and coincidental analyses.

*Task 6.1:* No target this quarter

*Task 6.2:* Decision on thinning the data approach

*Task 6.3:* Evaluate potential modelling approaches and collate available data for biotic and abiotic variables to use in assessment.

*Task 6.4:* Collate and review data from English and Welsh OWF, other marine mammal monitoring projects.

*Task 7.1:* Assessment of how integration of PrePARED project outputs into populations models helps improve models.

*Task 7.2:* Development of initial model parameterisation to work with sandeel suitability estimates.

*Task 7.3:* No target this quarter

*Task 7.4:* Convene quarterly meetings to understand progress on CIA components (which PrePARED will update and improve upon)

*Task 7.5:* No target this quarter

*Task 8.1:* All targets completed

*Task 8.2:* Implement Comms Plan

*Task 9.1:* Complete planning of Year 2 AKEM

*Task 9.2:* Support for technical and non-technical dissemination of project findings

*Task 9.3: No target – for last year of project*

*Task 9.4: Maintain project website and social media communications*