



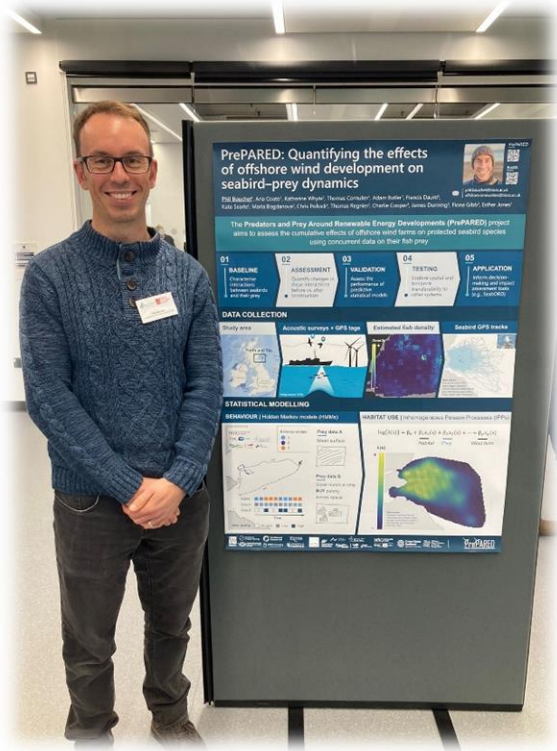
PrePARED
Predators + Prey Around Renewable Energy Developments

Quarterly Report: Q4 2024

Date: 23/12/2024

Project Overview

This quarter has focussed on data processing and analyses, and modelling of summer survey data. There were also a number of stakeholder engagement opportunities.



Summary of activities undertaken in Q4 2024

Task 1.1 Broadscale fish response to OWF in Firth of Forth: The acoustic survey data have been pre-processed and are now being analysed by Thomas Regnier. Point abundance estimates have been produced for the Forth and Tay (07/12/2024). The ones for the Moray Firth are expected for the first half of January. Whiting and haddock ages have been estimated from age length keys derived from length frequency distributions. Sandeel otoliths to be completed January 2025.

Task 1.2 Finescale fish response to OWF in Forth: RoxAnn analyses have been completed with all 2024 Alba na Mara surveys up to August 2024. The model was updated, and the seabed hardness and roughness layers were produced and are now in use in the Species Distribution Modelling. RoxAnn survey data from the second half of the year will be downloaded from the ship on 19/12/2024 then will be analysed.

Task 2.1 Seabird spatial distribution models in Forth: BioSS held an internal research day to discuss progress on PrePARED. They continued with the tasks from the previous quarter including drafting the spatial modelling comparison paper and have requested some additional historical tracking data from RSPB that may be helpful for investigating changing baselines.

Task 2.2 Seabird movement models in Forth: Work on 2.2 and 2.3 has been scaled down this quarter, as BioSS have been contributing to the seal foraging report in Task 4.1. BioSS finished their main contributions to this report, by finalising the updated analyses they developed on harbour seal and sandeel relationships, and writing an internal report which is now with UoA (preparations are underway to publish this as a PrePARED report in Q1 2025). Paper submitted on “Movement responses of harbour seals during pile driving at an offshore wind farm” (partially PrePARED-funded).

Task 2.3 Simulating realistic foraging tracks in IBMs: Meetings between BioSS and UKCEH to discuss developing frameworks for simulation-based approaches (simulating seabird foraging tracks). Task 2.3 work has been scaled down this quarter due to the delivery of the Task 4.1 report. Initial behavioural classifications are available for the 2023 tracking data to help inform simulation development.

Task 3.1 Large-scale fish distribution in Moray: Analytical routines required for analysis will be carried over from prior surveys. The previous acoustician made recordings of all data processing pipelines etc. Analysis of data resides within SGMD, with pre-processing having been completed and point abundance estimates expected to be produced in January.

Task 3.2: Fine scale fish distribution in Moray – Analysis of BRUV and AI camera datasets is underway. All BRUV data have been analysed using computer vision models and results obtained. Selected validation is now underway. AI camera system analysis pipeline is being developed with analysis emerging. Preliminary results to share with project are expected in Q2 2025.

Task 3.3 Fish acoustic telemetry in Moray: All data now received from array service, including those units that were stuck on the seabed, which required ROV retrieval. The data warehouse (ETN) hosting all acoustic data is experiencing some technical difficulties regards sensor data (depth and temperature) from the tags, which has delayed some elements of analysis, though we can quickly catch-up once those technical issues with data handling have been resolved. The future of the array from the end of Q1 onwards is under discussion within the project Management Group. There is opportunity to gather additional data on flatfish behaviour around turbines, to better understand the predator-prey dynamics of this ecologically and commercially important species. This need has arisen based on findings from PrePARED funded work on haddock and whiting around turbines. However, no funds exist with SGMDs PrePARED budget to support the acoustic array beyond end of Q1 2025. Exeter is assessing its existing PrePARED budget to better understand whether it may be able to absorb the array service costs (which would need an approved CRF from TCE) if SGMD would continue to loan the equipment to the project.

Task 4.1 Drivers of broadscale marine mammal distribution in Moray: Finalisation of harbour seal report has been delayed. BioSS have developed a new analysis to account for autocorrelation when using tracking data to explore how sandeel occurrence drives harbour seal foraging distribution, and this has been documented in an internal report for project partners. Further discussion of results between project members required before report can be finalised. Estimated completion in Q1 2025.

Task 4.2 Finescale marine mammal distribution in response to OWF and prey fields in Moray:

Delivery of final report on relationship between porpoises and prey around OWF is delayed. After presenting the initial results on the relationship between porpoises and prey around OWF at the ICES conference, UoE and UoA have decided to refine the prey covariates derived from BRUV sampling, to investigate whether porpoise foraging activity varied with length-specific biomass estimates. During Q4, UoE estimated prey biomass by length bin of 10 cm increment and UoA re-run the analyses. The Task of Q4 was consequently not achieved, but progress to finalise the analyses will be made in Q1 2025 to deliver the report later that year, revised delivery date tbc.

Task 4.3 Dose response curves in Moray:

completion of dose response analyses delayed. Emerging policy need for outputs relevant to other UK regulators has required additional analysis and outputs from Moray Firth studies to extend results presented in PrePARED report 4. Work in Q4 has provided this additional data to 3rd party contractors (SMRUc) for inclusion in a new DEFRA/JNCC funded review of Effective Deterrence Ranges (due early 2025). In addition, work to develop Dose-Response analysis has progressed. Received levels at all PAM locations used at Beatrice, Moray East and Moray West have been re-modelled using the same acoustic propagation methods, and data have been obtained from developers to validate these predictions against field measurements made during construction. These data are now being incorporated into the dose-response analyses to compare variation in porpoise responses between the three windfarms.

Task 4.4 Fish nutritional value:

In Q4, analysis of the Moray Firth and Firth of Forth surveys continued – analyses are now complete for the PrePARED 2023 samples, with over 500 new energy density estimates in progress across 29 prey species (out a total of 37 species we have samples for). A full-time technician is now in post, to allow Philippa Wright to focus on Task 5.2 (Generalities in marine mammal response to OWF, focus on seals in her PhD). The technician is currently focused on sandeel samples from NE Scotland to bolster a key gap for a species of critical importance.

Task 5.1 Generalities in fish response to OWF:

Data preparation for transfer to SMRU Consulting / St Andrews is near complete (this mostly represents completing of body length measurements etc. from fish detected in

BRUV data gathered in 2024). Analysis of all fish body lengths will be completed in January 2025.

Task 5.2 Generalities in marine mammal response to OWF: A position paper has been prepared on how to ensure Transferability via an Evidence Bridge process – this is a key need to advance transferability and was developed by the SMRUC and SMRU team. Work on manuscript on the effect of PAM array design on dose response functions for harbour porpoises is now almost complete. Analysis is focusing on establishing rules for truncation distances for the functions (i.e. the range from the source at which to truncate the data) have been completed using data from Beatrice and Moray East wind farms (and this can be replicated for other sites). This paper is planned for submission early in Q1 2025. Work on seals is advancing, via Philippa Wright's PhD – exploring overlap with prey data and expanding on Whyte et al response to noise studies. Collaboration with the UoA team continues to streamline these efforts and maximise impact. This work highlights the importance of survey design in using PAM stations for dose-response estimation (and the benefits and challenges of PAM stations at large distances from the source). This ties into Task 6.4. A position paper has been prepared on how to ensure Transferability via an Evidence Bridge process – this is a key need to advance transferability and was developed by the SMRUC and SMRU team.

Task 6.1 Minimum data requirements for seabird distribution and movement models: BioSS have liaised with Rebecca Langton (SGMD), who has now produced uncertainty layers for the sandeel map (Langton et al., 2021). BioSS plan to use these sandeel uncertainty layers to improve the linkages between seabirds and prey, in particular with respect to transferability (as the sandeel map covers the largest spatial area of all available prey data).

Task 6.2 Minimum data requirements for marine mammal distribution models: This task is on hold pending completion of Task 4.1

Task 6.3 UK EEZ marine habitats similarity assessment for OWF sites: The report is now complete and has been reviewed by the Management Group and the PAG. Discussions are underway as to when this should be released to stakeholders (end of January).

Task 6.4 Survey design for predator-prey studies: The Task 6.3 report is being reviewed internally. Once finalised we will prepare a report – in consultation with Task 5.1 and 6.3 (and other PrePARED leads). A report is intended to be finalised by end of Q1 2025.

Task 7.1 IPcoD and DEPONS integration of new data and testing:

Updates to the DEPONS model are being made and work from Task 4.3 and 5.1 will feed into this analysis. The updated version of iPCoD (called iPCoD+DEB v1.0) is being finalised currently. SMRUc are engaging with Aarhus University to progress the DEPONS updates. Test simulations are being prepared to run in Dec-Jan 2025 and further simulations will be run in early 2025. The Moray Firth is the case study for the DEPONS simulations.

Task 7.2 Adding biological realism to SeabORD and testing: UKCEH

have code in place for developing movement simulations, with some reproductions of foraging tracks which at this stage have only been visually assessed. The next step is to work closely with BioSS in Task 2.3 to determine which parameters are best extracted from empirical data to compare our simulated data to. This will formalise assessment of simulated tracks by creating a quantitative and reproducible framework. This framework will then be applied consistently across our four exemplar species (kittiwake, guillemot, razorbill, puffin) with the goal of obtaining foraging tracks which adequately represent the characteristics seen for the respective species, while being as parsimonious as possible with how this is achieved. Due to delays in acquiring the data to make predator-prey maps this task has been postponed to Q3 2025.

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. SMRUc intend to engage with Pathways to Growth in Q1 2025 to ensure further access to CIA parameters from as built windfarms. Further updates are being made to the iPCoD model (v6.0) and this will be used for simulations in Q1-Q2 2025. A PrePARED report on improving CIA Assessments to streamline consenting has been prepared under this task and will be circulated internally (and is expected to be finalised in Q1 2025).

Task 8.2 Communications Plan: No changes to communications plan necessary. There will be updates required following agreement on targeted webinar process.

Task 9.1 Annual Knowledge Exchange Workshops: Agreement that PrePARED will not host a large event in Q1 2025. Instead, there will be a focus on targeted webinars following each project output, to ensure key stakeholders are receiving information in a digestible manner with opportunities to ask questions. These targeted webinars will begin in Q1 2025, replacing the AKEM. The team will review their effectiveness and request stakeholder feedback to determine if this should be used moving forward. We plan to return to the AKEM format again in the future.

Task 9.2 Dissemination of project findings: Dissemination of PrePARED reports through project website, blog, social media, and email distribution. The Management Group (MG) met to discuss dissemination to ensure a plan is in place for successful uptake of PrePARED outputs. Initial steps are in place to begin targeted engagement with key stakeholders and the MG will meet again to discuss next steps.

Task 9.4 Website and social media: Webpage analytics show a positive increase in website use over the past year with approximately 250 more page views and 160 more users per month compared to Q4 2023. Social media posts continue to see good engagement with posts reaching ~100 likes and up to 16 reposts. SGMD communications team have also supported the project to undertake a social media 2024 rundown of PrePARED reports.

Summary of activities to be undertaken in Q1 2025

Task 1.1 Broad scale fish response to OWF in Forth: 1) Produce a map of sandeel point abundance in the sand per age class; 2) Broadscale prey fields from acoustic transects (pelagic prey); 3) Completion of RoxAnn analyses

Task 1.2 Fine scale fish response to OWF in Forth: Process BRUV and AI camera video footage from 2022 camera surveys – completion of video processing from surveys

Task 2.1 Seabird spatial distribution models in Forth: Preparation of journal article

Task 2.2 Seabird movement models in Forth: Applying movement models to Forth and Tay prey data collected within project

Task 3.1 Large-scale fish distribution in Moray: 1) Completion of fisheries acoustic and trawl data processing & downstream provision. 2) Process BRUV and AI camera video footage from 2024 camera surveys – completion of video processing from surveys

Task 3.2 Fine-scale fish distribution in Moray (reef effects): Complete processing of BRUV and AI camera video footage from 2024 camera surveys.

Task 3.3 Fish acoustic telemetry in Moray: Process acoustic ping data. Depending on weather and site accessibility, service / retrieve acoustic array (see above comment about future of array). This activity would occur in Q2 2025.

Task 4.1 Drivers of broadscale marine mammal distribution in Moray: Delivery of second report under the Task, highlighting how harbour seal foraging distribution is related to sandeel distribution.

Task 4.2 Finescale marine mammal distribution in response to OWF and prey fields in Moray: Continue PAM-BRUV extended analyses.

Task 4.3 Dose response curves in Moray: 1) Dose-response analyses combining existing datasets from the three Moray Firth OWFs. 2) Develop additional report comparing observed responses of porpoises during Moray West Piling with EIA predictions [see PrePARED Outcomes-Impacts-Actions].

Task 4.4 Fish nutritional value: Processing of summer 2024 prey samples.

Task 5.1: Generalities in fish response to OWF: Collate and compare Moray Firth and Firth of Forth acoustic and camera footage processed data. Work for this task will span Q1 to Q3.

Task 5.2 Generalities in marine mammal response to OWF: Present results at stakeholder workshop; Delivery of draft report.

Task 6.1 Minimum data requirements for seabird distribution and movement models: Evaluation of benefits of local prey data when predicting spatial distributions of seabirds.

Task 6.2 Minimum data requirements for marine mammal distribution models: Review scope of this Task in relation to progress on Task 4.1 and re-prioritisation of additional outputs required under Taks 4.3 to maximise wider UK impact.

Task 7.3 Testing and validating SeabORD in the FoF and at UK SPAs: Analysis of local GPS tracking data to derive a seabird utilisation distribution for validation of joint predator-prey distribution predictions

Task 7.4 Integration of PrePARED findings for harbour porpoise CIA: Updated CIA analyses.

Task 7.5 Integration of PrePARED findings for seabird Cumulative Impact Assessment: Review article summarising and assessing the evidence arising from PrePARED on prey and seabirds to provide a comprehensive overview. The article will summarise the application of the new inference within cumulative assessment frameworks for seabirds (e.g., MS CEF project), and identify areas of development of new research.

Task 9.1 Annual knowledge exchange workshops: Begin new engagement strategy of dedicated report based webinars.

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

Task 9.3 PrePARED project scientific symposium: Begin organisation of scientific symposium.

Task 9.4 website and social media: Maintain project website and social media comms.

External Communications and Engagement

In Q4 2024:

- North-East Scotland Ecology Network (NESEN): Phil Bouchet (BioSS) attended the NESEN Annual Science Day in Aberdeen on 8th October, and presented a poster on “Quantifying the

effects of offshore wind development on seabird-prey dynamics”.

- BOU Birds and Net Zero conference, York: Katherine Whyte (BioSS) gave a presentation on “Understanding predator-prey interactions in the context of offshore wind farm development”.
- BOU Birds and Net Zero conference, York: Presentation on “How do cumulative effects of offshore wind farms scale with increasing exposure to breeding seabirds” Pollock, Mobbs, Butler, Leedham, Daunt, Searle
- SMM 2024, Perth, Australia: work from the PrePARED Task 4.2 and 4.3 was presented at the workshop "Marine Mammals and Offshore wind; sharing experience across regions" highlighting harbour porpoise responses to offshore windfarm construction and operation in Scottish waters.
- UoA meeting with Australian regulators at NOPSEMA and OIR: PrePARED overview.
- Seabird Group Conference, Coimbra, Portugal: Presentation (poster): "How do cumulative effects of offshore wind farms scale with increasing exposure to seabird breeding colonies?" Pollock, Mobbs, Butler, Leedham, Daunt, Searle.
- MASTS Annual Science Meeting, Glasgow: Presentation (talk): “Predicting the cumulative effects of offshore wind farms on seabird demography and consequent population viability” Pollock, Mobbs, Butler, Leedham, Daunt, Searle.

Predicting the cumulative effects of offshore wind farms on seabird demography and consequent population viability

Chris Pollock, Deena Mobbs, Adam Butler, Oliver Leedham, Francis Daunt, Kate Searle

MASTS asm 5th November 2024

BioSS

UK Centre for Ecology & Hydrology

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