PrePARED
Predators + Prey Around Renewable Energy Developments

MEASURING THE ENERGETIC CONTENT OF PREY AROUND OFFSHORE WIND FARMS

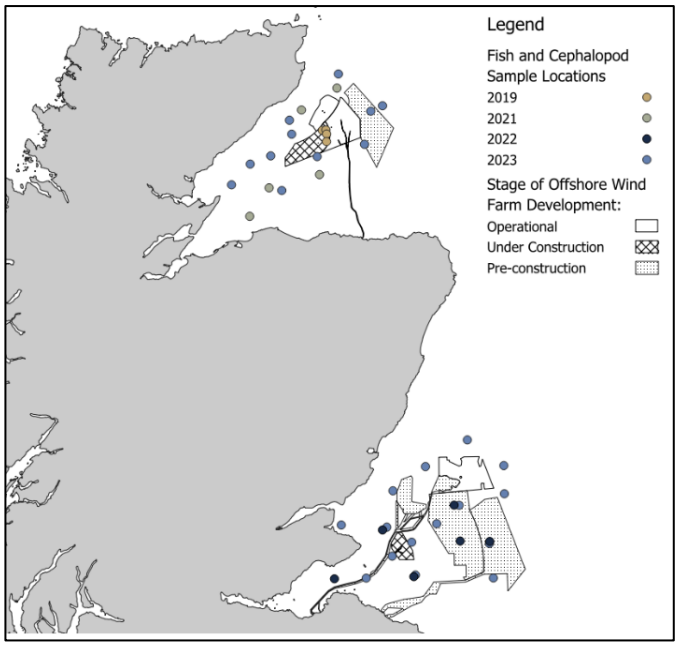
PrePARED Output Summary No. 5

Background

Understanding the energetic value of prey for marine predators is an important component to understanding their overall energetic balance and resilience to perturbations such as those associated with the development of offshore wind farms (OWFs).

Study Area

Fish and cephalopods were collected for the PrePARED project through dedicated surveys conducted in the Moray Firth and Firth of Forth by the Scottish Government Marine Directorate.



Study Aims

Within the PrePARED project, bomb calorimetry is being used to quantify the energy content of fish and cephalopod species in the northern North Sea around areas of OWF developments. These new data will improve our understanding of prey quality around OWFs, enabling an understanding of the potential value OWFs bring to marine predators such as marine mammals.

Scottish Government Riaghaltas na h-Alba · University of Aberdeen · SMRU Consulting · Sea Mammal Research Unit · University of Exeter · UK Centre for Ecology & Hydrology · BioSS · Aarhus University · NatureScot Scotland's Nature Agency Buidheann Nàdair na h-Alba · Natural England

PrePARED
Predators + Prey Around Renewable Energy Developments

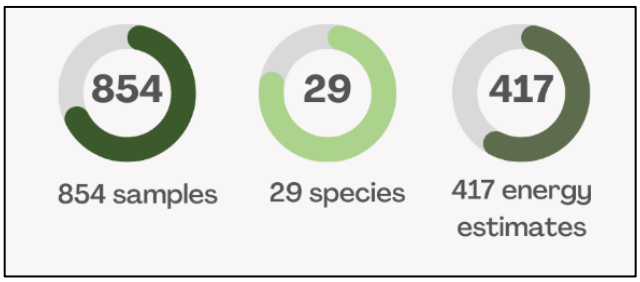
BOMB CALORIMETRY

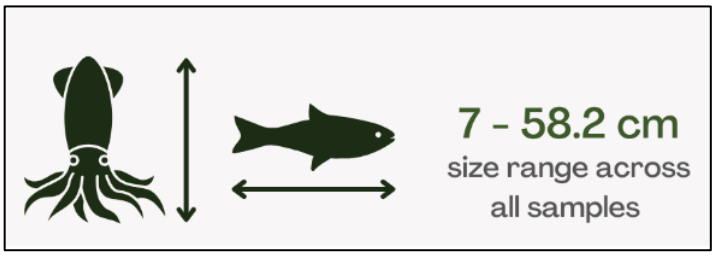
Bomb calorimetry is used to measure the energy density (kJ/g) of the prey item. Length and weight are recorded, then the prey item is dried, homogenised, compressed into a pellet, and ignited.

Wet weight energy density is calculated by adjusting for the dry-to-wet mass (% moisture content). Total energy content (kJ) is calculated by multiplying energy density by the prey item's mass.

Results

So far (November 2024), we have processed 854 prey samples from 29 of 37 collected species, ranging from 7 – 58 cm in length. Using replicate samples to ensure our analyses are robust, we have generated 417 new energy estimates, a valuable step to developing a database of energy density for fish and cephalopods in the northern North Sea.





NEXT STEPS

Continue processing:
As more samples are collected and new energy estimates derived, the PrePARED project we will develop an extensive database of prey quality to support future assessments.

Estimating energy of predator diet:
Applying new energy data to diet data to estimate the energy contribution of different prey species to top predators (incl. seabirds and marine mammals).

Further applications within PrePARED:
- 'Foodscape' maps using fish biomass and distribution data.
- Integrate with BRUV data to estimate energy of key prey species around OWF turbines and surrounding areas.

IMPACT

Cumulative impact assessments (CIAs):
These estimates can feed into bioenergetic models to improve cumulative assessment tools. These data can also be combined with BRUV outputs to enable more realistic CIAs.

Shifting the paradigm:
OWFs may have both positive and negative impacts on marine predators. These data will help characterise the impacts that individual sites may have on prey species and predators.

Marine Net Gain (MNG):
Energy available to predators is intrinsically linked to prey species available in OWFs. Improving knowledge of energy in prey enables a better understanding of MNG in relation to OWFs.

Scottish Government Riaghaltas na h-Alba · University of Aberdeen · SMRU Consulting · Sea Mammal Research Unit · University of Exeter · UK Centre for Ecology & Hydrology · BioSS · Aarhus University · NatureScot Scotland's Nature Agency Buidheann Nàdair na h-Alba · Natural England