PrePARED
Predators + Prey Around Renewable Energy Developments

# MEASURING THE ENERGY CONTENT OF PREY SPECIES AROUND OFFSHORE WIND FARMS

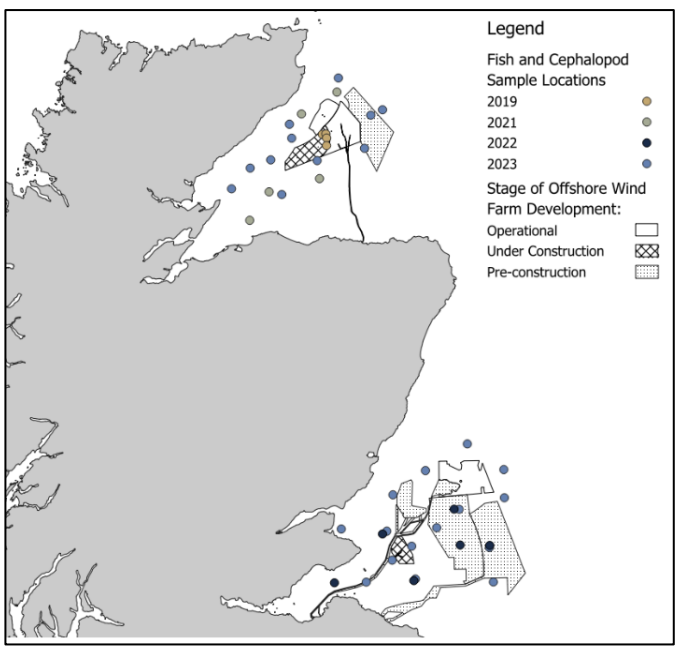
PrePARED Output Summary No. 5 V2 (Updated May 2026)

## 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 was used to quantify the energy content of fish and cephalopod species in the 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.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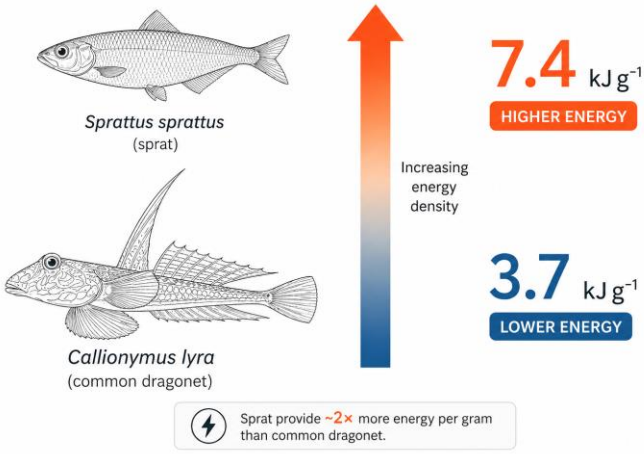
## BOMB CALORIMETRY

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

The energy has been calculated for prey samples from 36 collected species, ranging from 6 – 58 cm in length. Using replicate samples to ensure the analyses are robust, a total of 601 new energy density estimates have been generated; this represents major progress towards developing a database of energy density for fish and cephalopods in the North Sea.




## APPLICATIONS

**'Energyscape maps':**
Combining fish biomass data from fisheries acoustics surveys with energy density data to create spatial maps of prey energy across OWFs.

**Estimating energy of predator diets:**
Applying energy data to diet data to estimate energy contribution of different prey species to predators (marine mammals and seabirds).

**Energy around OWF turbines:**
Integrating energy data with BRUV data to characterise energy profiles of prey species around OWF turbines

## 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.

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