EMFF Operational Programme 2014-2020

Marine Biodiversity Scheme

Marine Institute Cetacean Monitoring

Cetacean Distribution and Relative Abundance Survey

During the Western European Shelf Pelagic Acoustic Survey

5th July – 25th July 2022

Lead Agency: Marine Institute

Lead Partners: National Parks and Wildlife Service,

Authors: Irish Whale and Dolphin Group

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An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Foras na Mara
Marine Institute

IWDG Consulting

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Executive summary.

Irish waters represent one of the most important marine habitats for cetaceans in Europe and are utilized by a wide range of cetacean species. However, the abundance, distribution and conservation status of many of the species occurring in Irish waters remains poorly understood. Under the EU Habitats Directive, there is a requirement on member states to conduct surveillance of cetaceans occurring within their waters. The Irish Whale and Dolphin Group (IWDG), contracted by the Marine Institute Ireland, conducted a cetacean survey from the RV Celtic Explorer during Leg 2 of the annual Western European Shelf Pelagic Acoustic Survey (WESPAS) survey, running from 5th to 25th July 2021.

A single Marine Mammal Observer (MMO) was aboard the Marine Institute's research vessel 'Celtic Explorer' for 3 weeks, compiling both legs of the research cruise. The role of the MMO was to record any sightings of cetaceans during daylight hours of the survey. A standard, single platform line transect survey methodology was employed by the MMO with additional visual point sampling at oceanographic sampling stations. Survey transects were undertaken at speeds of 5-11 knots, with fishing activity being conducted at speeds of 3-5 knots. The MMO's survey effort was maximized during periods of sea state ≤6 and with visibility of ≥1km. A total of 17 days of surveying was possible, amounting to approximately 100 hours of survey time. Sea state was relatively good during survey days (≤3 at 77.9% of effort recordings) and visibility was also favourable (>5km at 82.2% of effort recordings).

A total of 30 separate sightings of cetaceans were recorded. Recorded species were: grey seal (*Halichoerus grypus*); short-beaked common dolphin (*Delphinus delphis*); bottlenose dolphin (*Tursiops truncates*); Risso's dolphin (*Grampus griseus*); minke whale (*Balaenoptera acutorostrata*); humpback whale (*Megaptera novaeangliae*); fin whale (*Balaenoptera physalus*). Other non-cetacean species recorded were: ocean sunfish (*Mola mola)*; porbeagle shark *(Lamna nasus)* and tuna species.

Introduction.

In the waters of Ireland's Exclusive Economic Zone (EEZ), 25 species of cetacean (whales, dolphins and porpoise) have been recorded to date. Eleven of these species are thought to calve in Irish waters. As such, the Irish government declared Irish waters within the EEZ as a cetacean sanctuary in 1991 (Rogan and Berrow, 1995). However, despite this designation there is limited knowledge on the distribution and relative abundance of cetaceans within the Irish EEZ (NPWS, 2013; Table 1). Under the EU Habitats Directive, there is a requirement on member states to conduct surveillance of cetaceans occurring within their waters. Marine mammals in Ireland are also protected under the EU Habitats Directive. All cetaceans are listed under Annex IV of the Directive as species requiring strict protection in their natural range (Article 12, EC Council Directive 92/43/EEC). The harbor porpoise (*Phocoena phocoena*) and bottlenose dolphin (*Delphinus delphis*), together with both seal species occurring in Irish waters, the grey seal (*Halichoerus grypus*) and the common seal (*Phoca vitulina*), are listed in Annex II and further protected under Article 3 of the Directive, as species whose conservation requires the designation of Special Areas of Conservation (SAC).

Since 1991, the Irish Whale and Dolphin Group (IWDG) have been monitoring cetacean distributions and abundances in Irish and Northern Irish waters. Surveys on board the Marine Institute's research vessel (Celtic Explorer) have been undertaken by IWDG since 2003 and these surveys have helped to provide vital data on cetacean density and distribution in Irish, UK and EU waters. These data will contribute to the identification of important habitats for European cetacean populations and to help devise programmes for their long term conservation and protection.

Table 1: Marine mammal species occurring in Irish waters and their conservation status (Sources: Wall et al. 2013; Whooley 2016; Temple et al. 2007)

Common name	Scientific name	Occurrence	Conservation Status (IUCN Europe)
Baleen whales			
Humpback whale	*Megaptera novaeangliae*	May-Aug	Least concern
Blue whale	*Balaenoptera musculus*	July-March	Endangered
Fin whale	*Balaenoptera physalus*	All year	Near threatened
Sei whale	*Balaenoptera borealis*	All year	Endangered
Northern minke whale	*Balaenoptera acutorostrata*	All year	Least concern
Northern right whale	*Eubalaena glacialis*	Vagrant	Critical
Bowhead whale	*Balaena mysticetus*	Data deficient	Not assessed
Toothed whales and dolphins			
Sperm whale	*Physeter macrocephalus*	All year	Vulnerable
Pygmy sperm whale	*Kogia breviceps*	Vagrant	Not assessed
Killer whale	*Orcinus orca*	All year	Data deficient
False killer whale	*Pseudorca crassidens*	June-Nov	Not assessed
Long-finned pilot whale	*Globicephala melas*	All year	Data deficient
Cuvier's beaked whale	*Ziphius cavirostris*	May-Aug	Least concern
Northern bottlenose whale	*Hyperoodon ampullatus*	May-Aug	Data deficient
Gervais' beaked whale	*Mesoplodon europaeus*	Vagrant	Data deficient
Sowerby's beaked whale	*Mesoplodon bidens*	All year	Data deficient
True's beaked whale	*Mesoplodon mirus*	All year	Data deficient
Beluga	*Delphinapterus leucas*	Vagrant	Not assessed
Risso's dolphin	*Grampus griseus*	March-July	Data deficient
Common bottlenose dolphin	*Tursiops truncatus*	All year	Data deficient
Short-beaked common dolphin	*Delphinus delphis*	All year	Data deficient
Striped dolphin	*Stenella coeruleoalba*	May-Sept	Data deficient
White-beaked dolphin	*Lagenorhynchus albirostris*	All year	Least concern
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	All year	Least concern
Porpoises			
Harbour porpoise	*Phocoena phocoena*	All year	Vulnerable
Seals			
Grey seal	*Halichoerus grypus*	All year	Least concern
Common (harbour) seal	*Phoca vitulina*	All year	Least concern

Studies on the presence, distribution and abundance of cetacean species have been conducted in Ireland since 1994 (e.g. Pollock et al. 1997; Ó Cadhla et al. 2004; Wall et al. 2013; O'Brien et al. 2016). Since 2003 the Marine Institute has facilitated the surveillance of cetaceans in Irish waters by accommodating marine mammal observers onboard national research vessels (RV Celtic Explorer and RV Celtic Voyager) during research surveys (Oudejans 2014). Fisheries acoustic surveys are particularly suited to the conduction of cetacean surveys as the vessel spends the majority of the survey travelling at a steady speed along pre-determined survey tracks (e.g. Figure 2).

The WESPAS survey is an amalgamation of two previously existing surveys: the Malin Shelf herring acoustic survey and the boarfish acoustic survey, with both species now targeted on a single survey across two legs. Originally, the Malin Shelf herring acoustic survey was carried out annually since 2008 between Scotland and the north and west of Ireland. The boarfish acoustic survey was carried out annually since 2011 between the west coast of France and Scotland. Since 2016, both surveys have been carried out on a single survey (WESPAS) aboard the RV Celtic Explorer culminating 42 days and covering continental shelf waters from 47°30'N northwards to 58°30'N.

Conducting marine mammal observations onboard the WESPAS survey presents a highly advantageous opportunity to record cetaceans in several key areas of Irelands EEZ (e.g. large areas of the continental shelf waters), and neighboring UK waters. The oceanic waters of Irelands EEZ are highly productive due to the upwelling of nutrient-rich waters which in turn support an array of species assemblages (Mackey et al. 2004). This, coupled with the complex bathymetry and hydrology of the Atlantic margin create rich habitats for cetaceans (Wall et al. 2006).

Methods.

During this survey cetacean observations were conducted by a single Marine Mammal Observer (MMO) during daylight hours between 06:00 and 21:30 BST (times adjusted on some days for environmental conditions and feasibility of surveying). On average (average taken over 'full days' available to survey), 7 hours and 21 minutes were spent watching for cetaceans each day (Figure 1). The area scanned during observations was from the ship's bow and 90° to either side. This area was constantly scanned during watch hours with roughly 60% of scans conducted using binoculars (Bushnell Marine 7x50 with compass and reticle) and the remainder by eye.

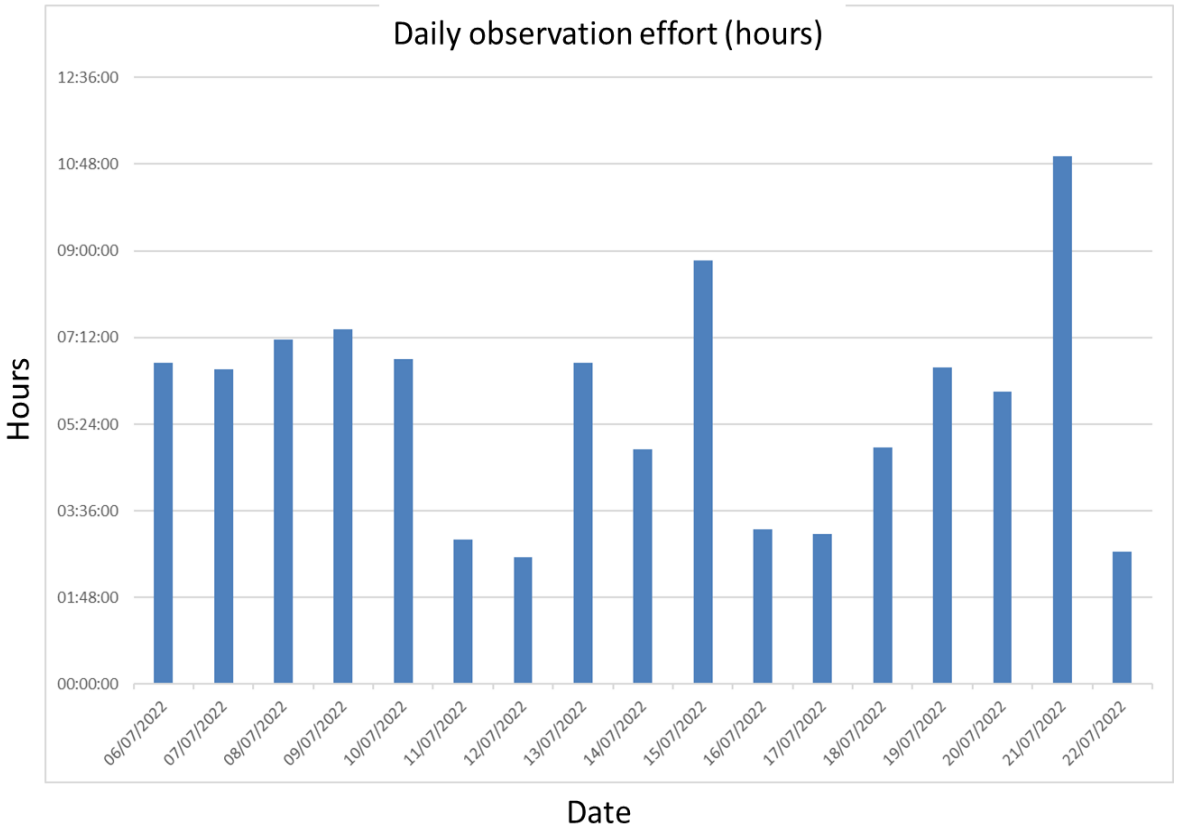

Figure 1. Daily observation effort during survey.

Observation platform.

Observations were conducted primarily from the ships crow's nest located at a height of 18 meters above sea level and access to this platform was possible up to sea state 6, moderate swell conditions and Beaufort 7. Where environmental conditions exceeded those outlined, access to crow's nest was restricted and further observations were conducted from the monkey island (13 meters above sea level) when safe to do so. When unsafe to do so, observations continued inside from the ship's Bridge as have done on previous surveys.

Data collection and recording.

Bearings to sightings were measured using an angle board and distances were estimated with the aid of distance measuring stick. Environmental data were recorded approximately every 30 minutes using Logger 2000 software (IFAW 2000). Sightings were also recorded using Logger 2000. Automated position data were obtained through a laptop computer linked to a GPS Receiver Unit.

Line transect survey methodology.

The vessel travelled at an average speed of 10 knots when steaming (except where restricted due to heavy weather). The vessel stopped on a regular basis to conduct CTDs or fishing trawl samples. During these times the vessel remained stationary for up to 1½ hours at a time (when in deep water) or reduced speed (3-5 knots) while trawling. As the focus of this vessel's survey was to sample fish stocks, surveys of cetaceans were conducted in 'passing mode' and cetaceans sighted were not approached. Sightings were identified to species level where possible, with species identifications being graded as definite, probable or possible. Where species identification could not be confirmed, sightings were downgraded (e.g. unidentified dolphin / unidentified whale / unidentified beaked whale etc.) according to criteria established for the IWDG's cetacean sightings database (IWDG 2022).

Results.

Environmental conditions.

The 2022 WESPAS survey's proposed survey transects spanned 4,986 nautical miles from the coast of France to the Outer Hebrides, Scotland (Figure 2). Environmental data was collected at 218 stations. A total of and 5 half days (i.e. 11th, 12th, 16th, 17th & 22nd July) surveying was lost due to unfavourable conditions. Mean wind speed during survey effort was 9 knots. Sea state was ≤3 at 77.9% of environmental stations (22.1% sea state 4-6). Visibility was good (>5km) at 82.2% of stations, moderate (1–5km) at 13.4% of stations and poor (<1km) at 4.4% of stations - discounting periods during which surveying was suspended due to dense fog or heavy rain (visibility <500m). A heavy swell (2m+) was recorded at 23.5% of stations. Rainfall was recorded at 0.8% of stations, and fog/mist at 35.2% of stations (Figures 3-6).

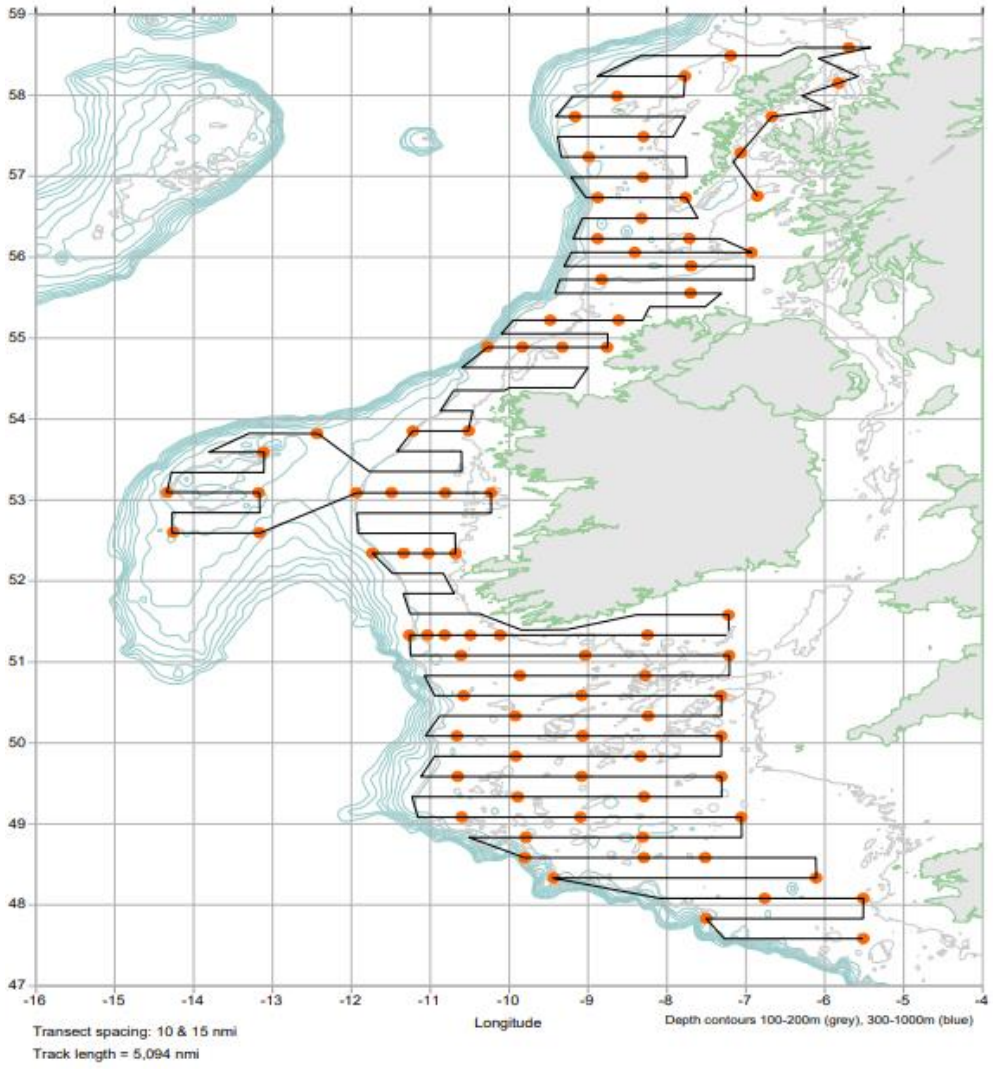

Figure 2. WESPAS 2021 proposed survey track with CTD stations.

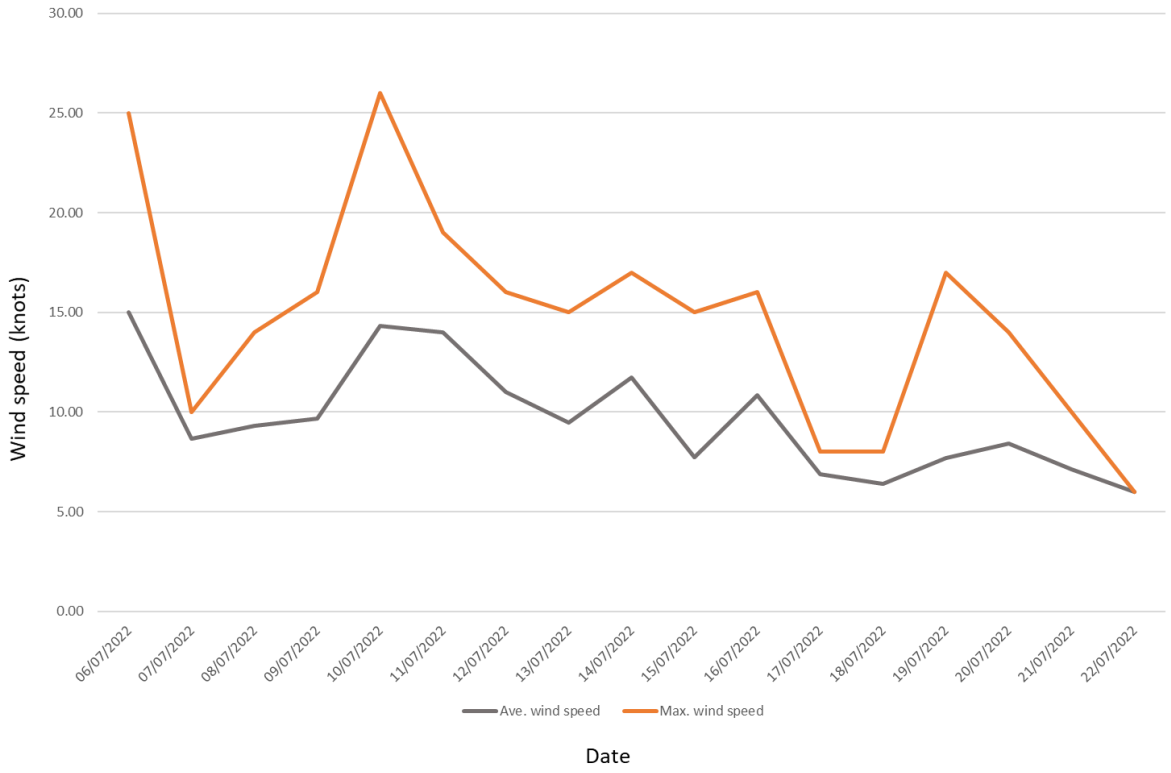

Figure 3. Average and maximum daily wind speed recorded during survey hours.

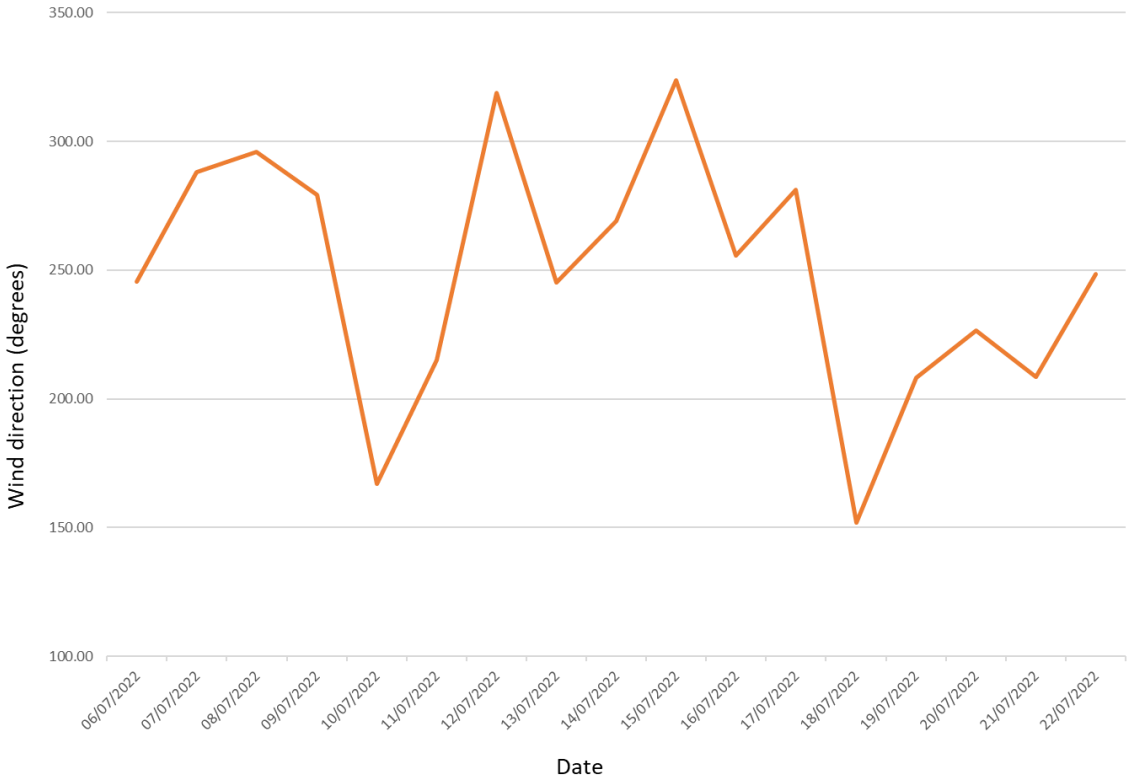

Figure 4. Average daily wind speed direction recorded during survey hours.

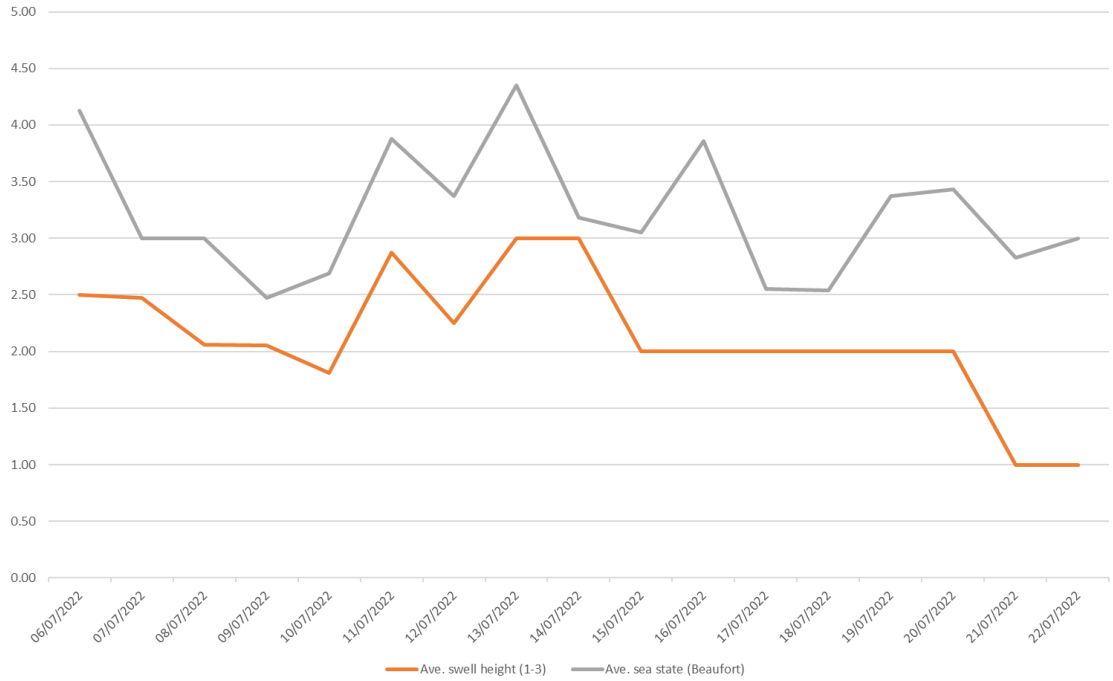

Figure 5. Average swell height and sea state recorded during survey hours.

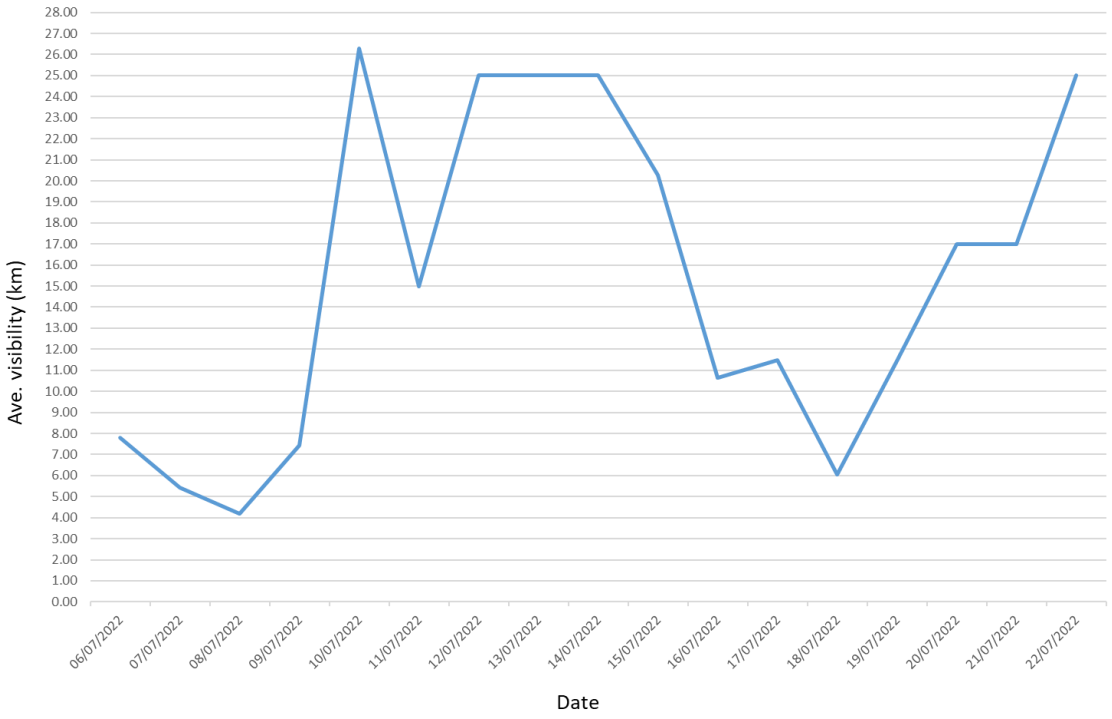

Figure 6 Average wind speed recorded during survey hours

Cetacean Survey Results.

In total, 17 days were spent surveying with 301 hours of survey time logged (Figure 7). Sea state varied between 1 and 6 across the survey duration with <5 accounting for 93.5% of surface conditions.

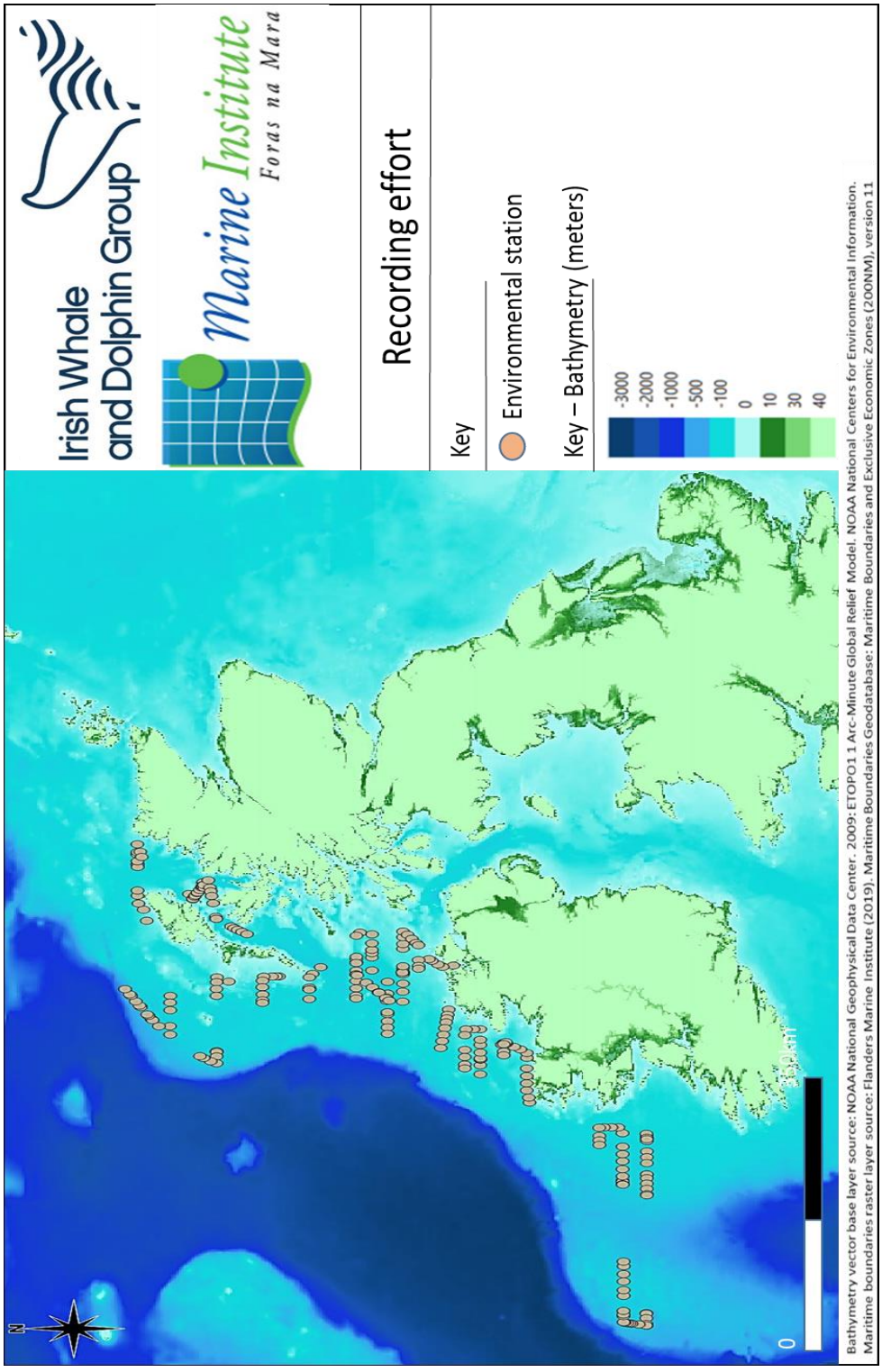

Figure 7. Survey effort from 05/07/2022 – 25/07/2022

A total of 30 separate sightings of cetaceans were recorded. 7 species were observed consisting of: grey seal (*Halichoerus grypus*); short-beaked common dolphin (*Delphinus delphis*); bottlenose dolphin (*Tursiops truncates*); Risso's dolphin (*Grampus griseus*); minke whale (*Balaenoptera acutorostrata*); humpback whale (*Megaptera novaeangliae*); fin whale (*Balaenoptera physalus*). Other non-cetacean species recorded were: ocean sunfish (*Mola mola)*; porbeagle shark *(Lamna nasus)* and tuna species. Additional sightings were made of unidentified dolphins and whales (thought to be various dolphin species) at various locations on the continental shelf as well as at the shelf edge. Sightings of dolphin species, humpback and minke whales occurred on the continental shelf whereas fin whale sightings occurred at the continental shelf edge, which is considered one the preferred habitats for this species.

Table 2: Summary of all sightings recorded on the survey, including primary, auxiliary and incidental sightings of all megafaunal groups.

Common name	Scientific name	No. of sightings	No. of individuals	Group size range
Common dolphin	*Delphinus delphis*	12	213	3-50
Bottlenose dolphin	*Tursiops truncatus*	2	15	7-8
Risso's dolphin	*Grampus griseus*	1	7	7
Minke whale	*Balaenoptera rostrata*	6	7	1-2
Humpback whale	*Megaptera novaeangliae*	1	2	2
Fin whale	*Balaenoptera physalus*	2	3	1
Grey seal	*Halichoerus grypus*	1	1	1
Unidentified dolphin		5	7	1-4

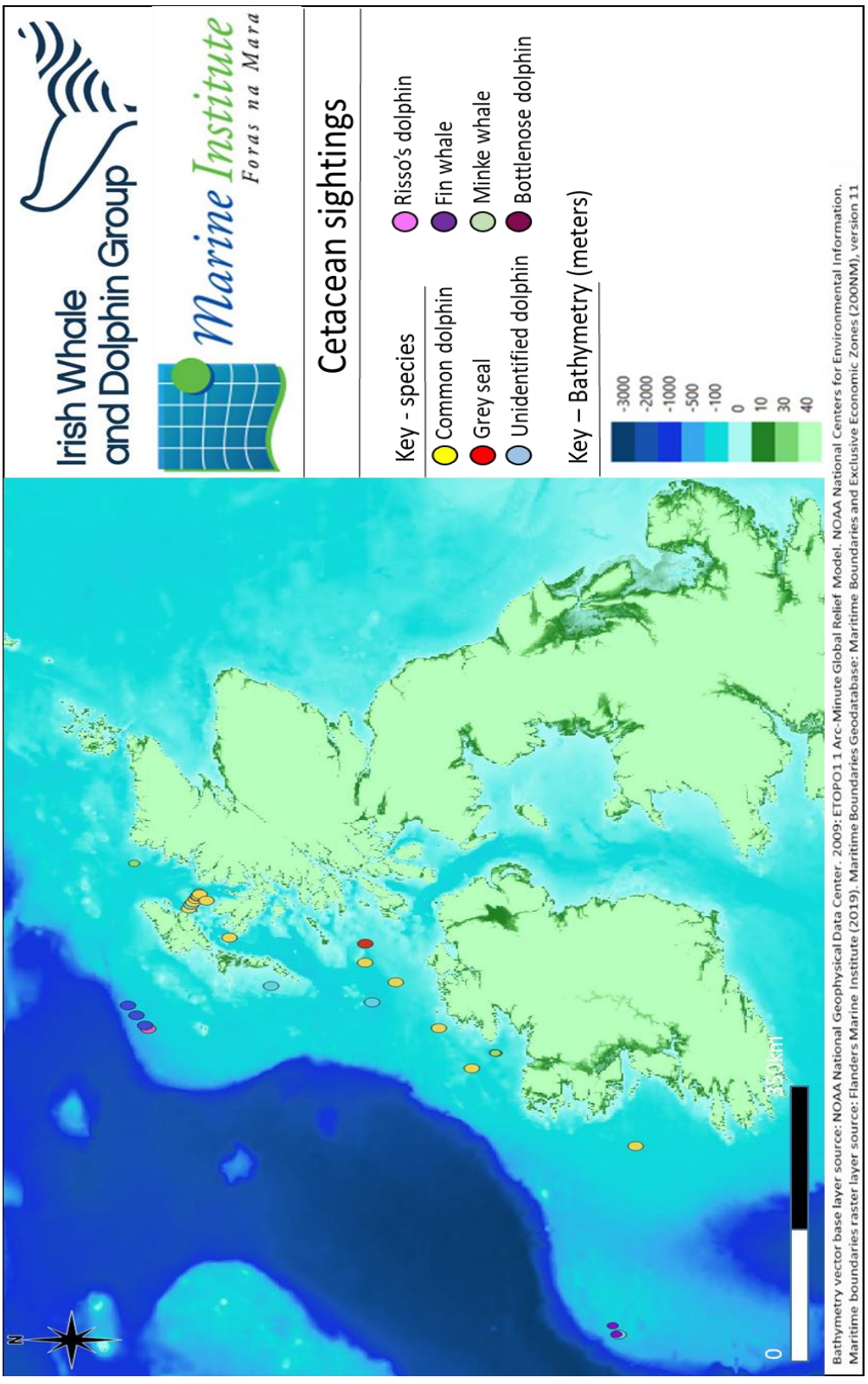

Figure 8. Locations of cetacean sightings during WESPAS survey leg 2.

Common dolphins (*Delphinus delphis*) were the most abundant species recorded on the survey (170 animals recorded accounting for 79.1% of all animals counted across all species). Sightings of common dolphins and occurred primarily in coastal waters with the furthest record from the coast logged at 60km. The observed group size for common dolphins ranged from 3 to 50 individuals.

Figure 9. Common dolphins

The second most frequently observed species was the bottlenose dolphin (*Tursiops truncates*) accounting for 7% of recordings (2 recordings of the species totalling 15 animals). Sightings of bottlenose dolphins occurred primarily in offshore habitats at various locations off the west of Ireland.

Figure 10. Bottlenose dolphins

Unidentified dolphins made up 4.7% of all sightings with 10 animals recorded. These observations were all logged offshore in excess of 50km from coastal areas. Animals could not be identified due to their brief surfacing behaviour or because they were at too far distances.

Risso's dolphins (*Grampus griseus*) and minke whales (*Balaenoptera rostrate*) made up 3.3% of sightings each, in terms of individual animals sighted. A total of 7 Risso's were seen in a single pod, whereas 7 minke whales were seen at individual sightings (with the exception of a single pair).

Figure 11. Risso's dolphins

Fin whales (*Balaenoptera physalus*) made up 1.4% of sightings with 3 individual records. These records were made in the same area, along the continental shelf edge suggesting the animals were congregating.

Figure 12. Fin whale

A single sighting of two humpback whales (*Megaptera novaeangliae*) made up 1% of sightings. These observation was recorded in shelf waters, close to an area where humpbacks have regularly been seen – Stanton Banks.

Figure 13. Humpback whale

A single grey seal (*Halichoerus grypus*) was observed offshore during the survey, making up 0.5% of sightings.

Figure 14. Grey seal

Discussion.

The cetacean distribution survey carried out on board the R.V. Celtic Explorer for Leg 2 of the 2022 WESPAS yielded 30 sightings of cetaceans. 205 individual animals of 7 identifiable species were recorded. During days of high sea states and heavy swells of the survey, this may have negatively affected the detection rate of cetaceans by the MMO, particularly those species with inconspicuous surfacing behaviors (Ryan et al. 2012; Cominelli et al. 2016). Periods of high winds and swell also hindered the MMO's ability to identify some animals to species level.

The WESPAS survey differs from other annual acoustic surveys in that it is covers a much wider area of the continental shelf and shelf edge regions. As such, it provides a unique opportunity for data collection and surveillance of cetaceans across a large latitudinal gradient, which can be difficult to cover by other means. The majority of species recorded on this survey were done so in areas of upwelling, banks, continental shelf edges and nearshore where migrating fish populations congregate. Therefore, these dynamic areas are likely important habitats for these higher tropic species (Wall et al. 2006).

The WESPAS survey provides an excellent opportunity for the collection of data on the abundance, distribution and behaviour of cetaceans in Irish waters. However, the amount and quality of data collected is confounded by factors such as environmental conditions and cetacean survey design. Poor weather, e.g. low visibility due to fog or high winds raising sea state, reduced the total number of cetacean survey hours undertaken but also likely affected the detection probability of many species, particularly those with inconspicuous surfacing behaviours (Cominelli et al. 2016). To remedy this issue, the additional use of PAM could have a positive effect on the detection rate and could help overcome some of the issues surrounding the visual detection of some cetaceans in poor sea states (MCR 2011; Ryan et al. 2012).

Acknowledgments

I would like to extend a special thank you to Captains Denis Rowan, and Chief Scientist Michael O'Malley, along with the crew of the Celtic Explorer for their support and professional conduct during the survey.

I would also like to thank the galley crew for their hospitality, and also the marine crew for providing me with access to the crow's nest.

Finally, I wish the ship's crew and the Marine Institute staff all the best for future surveys. Both, the Explorer crew and the Marine Institute staff have been a pleasure to work with I look forward to working with them again.

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Further details available on www.emff.marine.ie

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