







National Whale and Dolphin Watch 2019






27th July - 4th August

Facts and Figures



-  1406 hours of observation
-  2130 sightings reported
-  11864 individual animals
-  13 different species

-  135 land watch sites
-  63 vessels
-  UK sightings rate of 1.05 animals per hour of watching!

Memorable sightings include... Humpback whales in Cornwall and the Outer Hebrides, Northern bottlenose whales in the Inner Hebrides, *Mesoplodon* sp. off the Isle of Tiree in the Inner Hebrides, fin whales in the Outer Hebrides, and large pods of Atlantic white-sided dolphins off Freester in Shetland.

Introduction

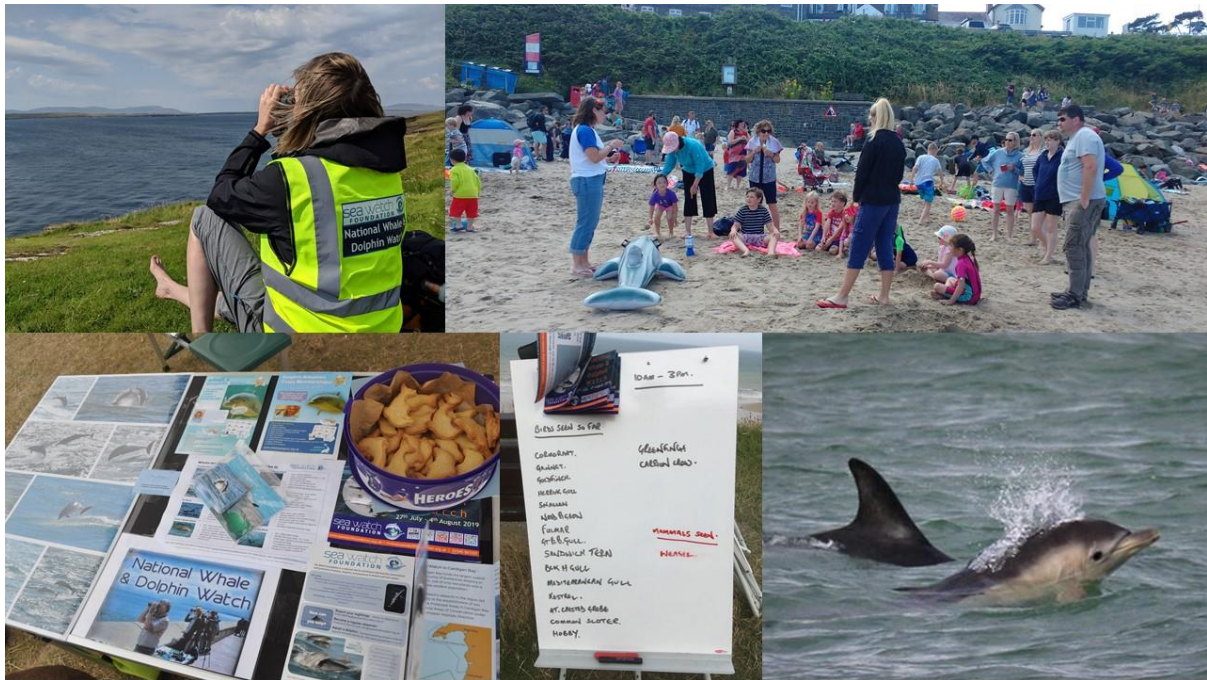
2019 marked the eighteenth year of Sea Watch Foundation's National Whale and Dolphin Watch event. Sea Watch Foundation has monitored whales, dolphins and porpoises in British waters for over forty years with the help of volunteer observers all around the country. For the past 17 years this has been spearheaded through an annual national recording event, the National Whale and Dolphin Watch (NWDW), which marks the long-lasting collaboration between citizen scientists, wildlife enthusiasts, the general public, and researchers alike.

The aim of the survey has been to obtain a snapshot picture of the status and distribution of some of the species of cetaceans (whales, dolphins and porpoises) recorded in UK waters through systematic watches from both land and sea, as well as casual watches, whilst also raising public awareness of the wealth of marine mammals we have around our coasts.

The use of 'non-scientific members' of the general public or 'non-specialist volunteers' to collect data on cetaceans to investigate their status, distribution, abundance and wellbeing has been pioneered in the UK by the Director of Sea Watch Foundation. This organisation, dedicated to marine research, conservation and education, established a nationwide citizen science project in the 1970s by creating a network of voluntary observers who report sightings of cetaceans from all around the UK, and whose help is vital to improve our knowledge of the health of the marine environment and its inhabitants. Sea Watch Foundation encourages observations and recording throughout the year, but it is during the NWDW event that everyone is given a unique opportunity to collect a large amount of scientifically valuable data over a concentrated time period, and to learn from each other at publicised sites.



Bottlenose dolphins off Berwick-upon-Tweed, ©Amber Thomas /SWF



A selection of photographs from this year's event: (left to right, top to bottom): A Sea Watch volunteer looking out for dolphins off Hoxa Head, Orkney, ©Jenni Kakkonnen / SWF. Sea Watch Interns involving local kids in a dolphin rescue exercise from New Quay harbour, Wales, ©SWF. Sea Watch ID Guides, leaflet and dolphin shaped biscuits for a land-watch in Portland Bill, ©Catherine de Bertrand. Board with list of cetacean and seabird sightings at Overstrand, Norfolk, ©Carl Chapman. A Mother and calf pair coming up to the surface to breathe off Torquai, Devon, ©Devon Sea Safari. Front Cover image: Pod of short-beaked common dolphins off Falmouth, Cornwall, ©Billy Heaney / AK Wildlife Cruises.

NWDW 2019 revealed striking biodiversity with an impressive thirteen species of cetaceans seen around the British Isles, a number which has only been recorded twice before in the history of the event. The total number of sightings collected exceeded last year's, and was the highest reported so far.

This year's NWDW marks also the great collaborations with thirty-four different conservation and recording organisations (a full list is provided in the acknowledgement section), including ORCA, Hebridean Whale and Dolphin Trust (HWDT), Yorkshire Wildlife Trust, MARINELife, and Whale and Dolphin Conservation (WDC), who have contributed data collected from boats (inshore and offshore) and from land stations in different parts of the UK.



Volunteer Sea-watchers at Rubha Hunish, Isles of Skye on July 28th.
Photo credit: Sylvia Porter.



Young volunteer Sea-watchers looking out Thurrock Thameside Nature Park, Essex on August 1st.
Photo credit: Tiffany Rogerson / Essex Wildlife Trust.

Results

Effort

During the 2019 NWDW, 753 volunteer observers all over the UK spent a total of 1,328 hours collecting effort-related data (including information on environmental parameters collected at regular intervals throughout each watch) stationed at 135 land watch sites and on 63 vessels around the British Isles (Fig.1). An additional 251 observers reported casual sightings both from land and at sea. A further 1,928 unnamed individuals were recorded attending the NWDW event, whilst many more people in reality may well have attended but not been counted.

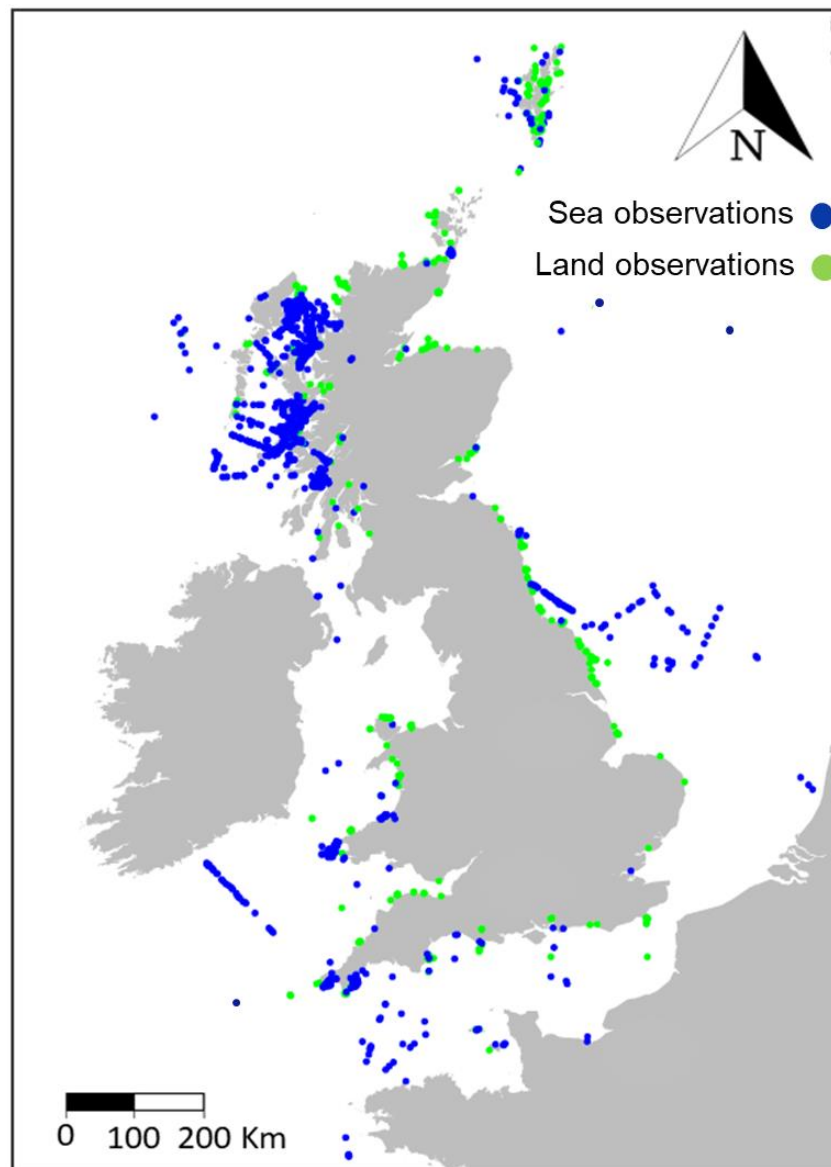


Figure 1. Watch locations for NWDW 2019 (n=198).
Blue are locations of boat watches, green of land watches.

The 2019 event totalled 1,406 hours of watches conducted, over 200 hours more than in 2016. Around thirty percent of the total amount of hours spent collecting effort-related data came from land-based locations. Around 222 hours were spent conducting offshore boat trips by volunteers during ORCA's Ocean Watch event which was arranged to coincide with the NWDW. AK Wildlife Cruises based in Falmouth, Cornwall, spent a total of 165 hours conducting wildlife trips, HWDT, a regional charity operating in the Inner and Outer Hebrides spent 119 hours of effort time conducting boat trips. Dolphin Spotting Boat Trips, a Recommended Boat Operator based in New Quay, spent a total of 23 hours conducting commercial dolphin watching tours.

With regards to the amount of effort hours spent collecting data in each region around the country, this varied widely, and was strongly linked to observer numbers, the presence of a regional coordinator, as well as links with other organisations which together produced the highest levels of effort data collection (Fig 2.).

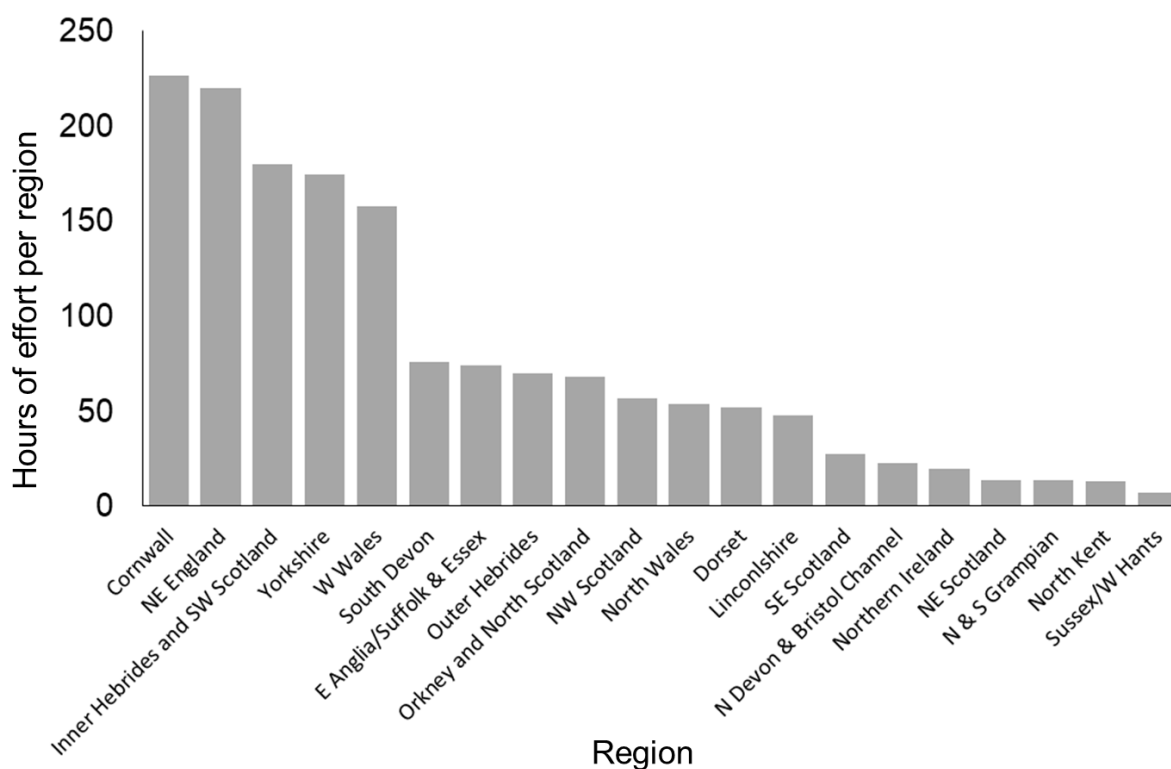


Figure 2. Number of hours of effort-related data collected by region.

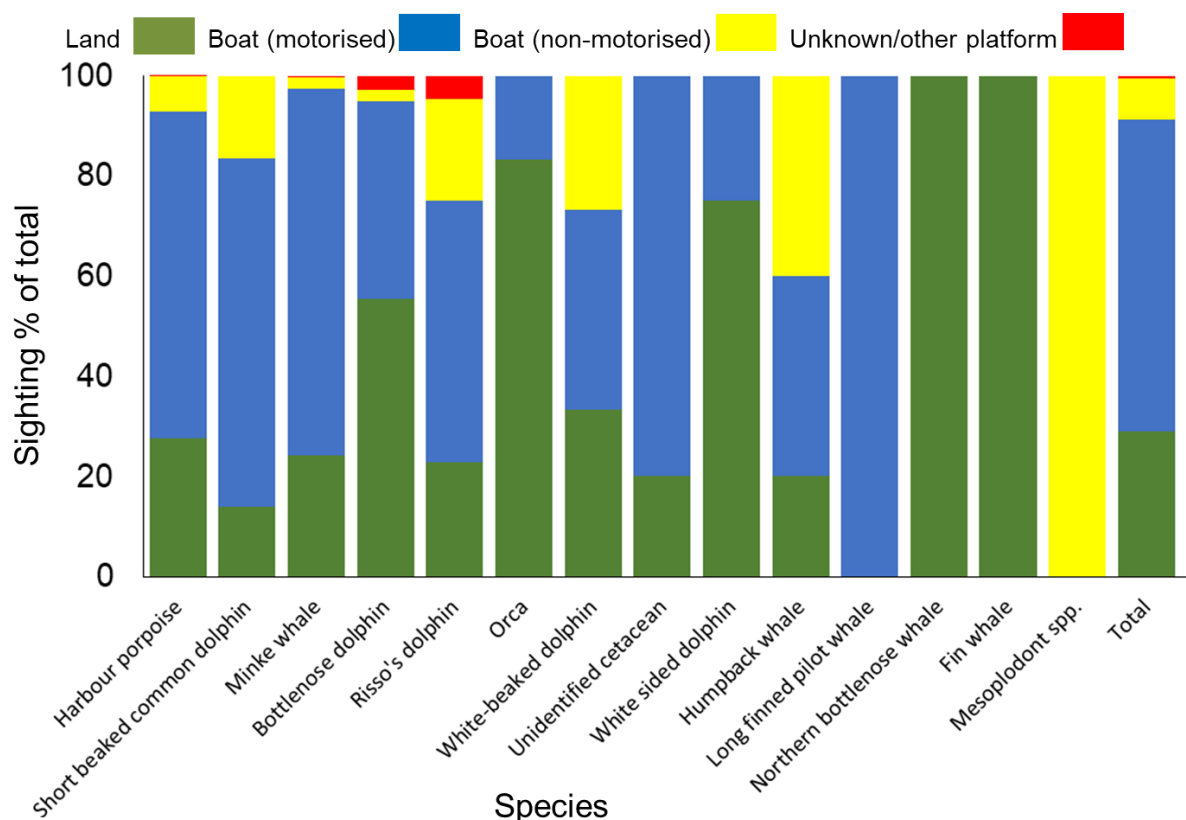


Figure 3. Proportion of sightings per species reported from land, boats (motorised and non-motorised), other (e.g. helicopter, rig), and unknown platforms

Twenty-nine percent of all sightings was recorded from the land during the 2019 event. Most sightings were from different types of platforms at sea. The type of platform from which whales and dolphins were sighted varied according to each species' distribution and habitat use (Fig.3).

Weather

The ability to detect cetaceans and collect sightings information is strongly affected by several weather parameters such as sea state, glare, swell height and visibility. When the weather deteriorates due to strong winds and/or heavy rain, watches may even be cancelled altogether as conditions are no longer suitable to collect presence and absence data. Taking this into account, every year NWDW is organized over a period of nine days to increase the chances of getting favourable weather conditions to conduct land and boat watches at different sites around the UK. This year, weather was changeable, with temperatures generally well above average. A summary of the weather conditions and daily sighting maps are provided in Appendices 1 and 2.



Sea Watch Dorset Regional Coordinator explaining how to identify dolphins during a boat trip (Royal Motor Yacht Club) off Weymouth, Dorset on August 2nd. Photo credit: Catherine de Bertrand.

Sightings

2,130 sightings of cetaceans totalling 11,864 individual animals were reported during NWDW 2019 (Fig.4). This number of sightings is the highest ever recorded. Thirteen different cetacean species were recorded around the UK, a number reached only twice before.



Land-watch station off Splash Point, North Wales, on August 4th.
Photo credit: Lorna Bointon.

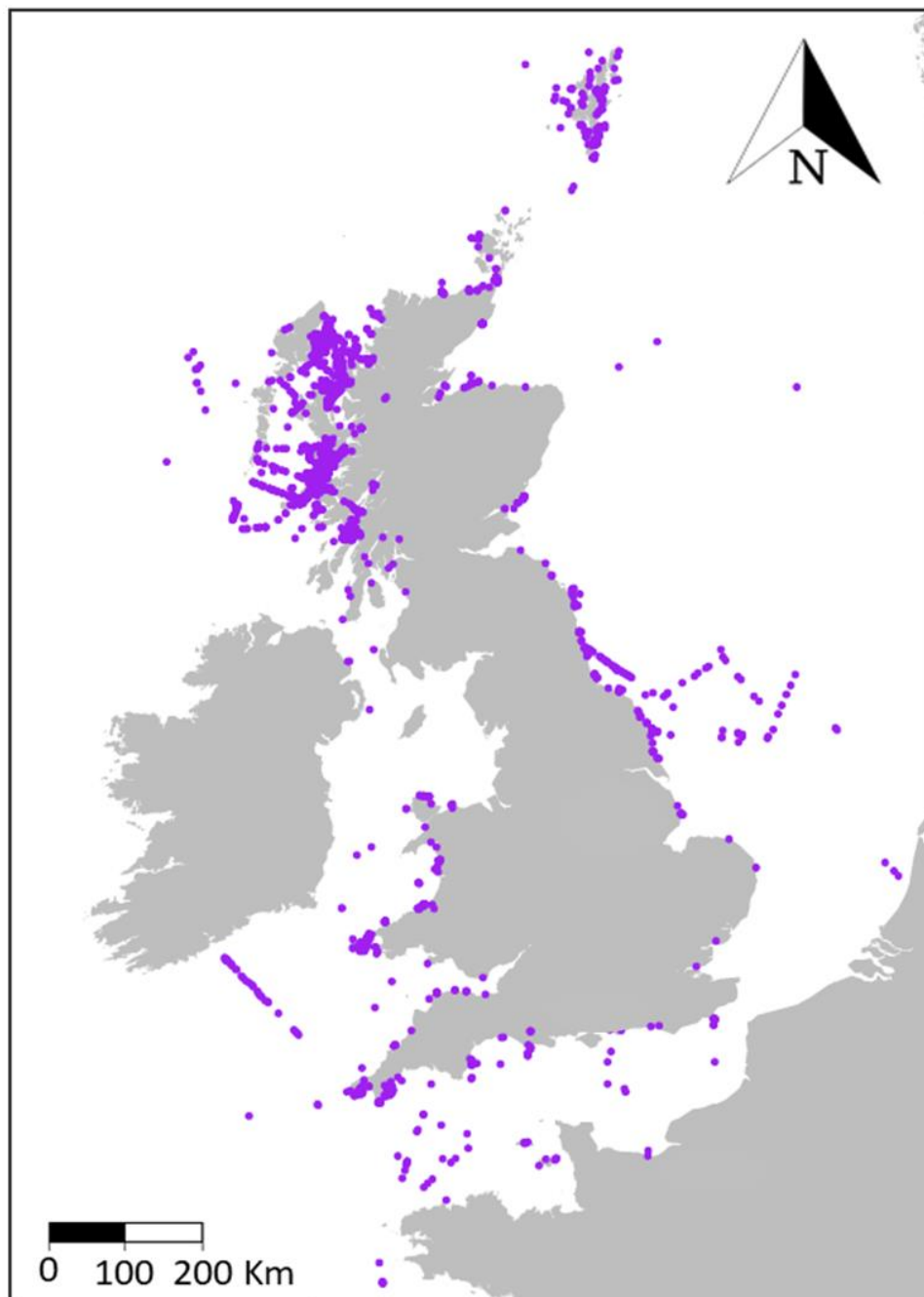


Figure 4. Sightings of cetaceans during NWDW 2019 (n=2130)

With regards to the distribution of cetacean sightings around the UK, this depends on various factors: the effort spent by each observer, the species distribution, and their sightability (how easily the animals can be detected). Scotland recorded the highest number of sightings (n=1420, 66.6% of all the records), closely followed by England with 539 sightings (25.3% of total records), then Wales with 166 sightings (7.8% of total sightings records). Five sightings were also recorded in Northern Ireland (0.2%).

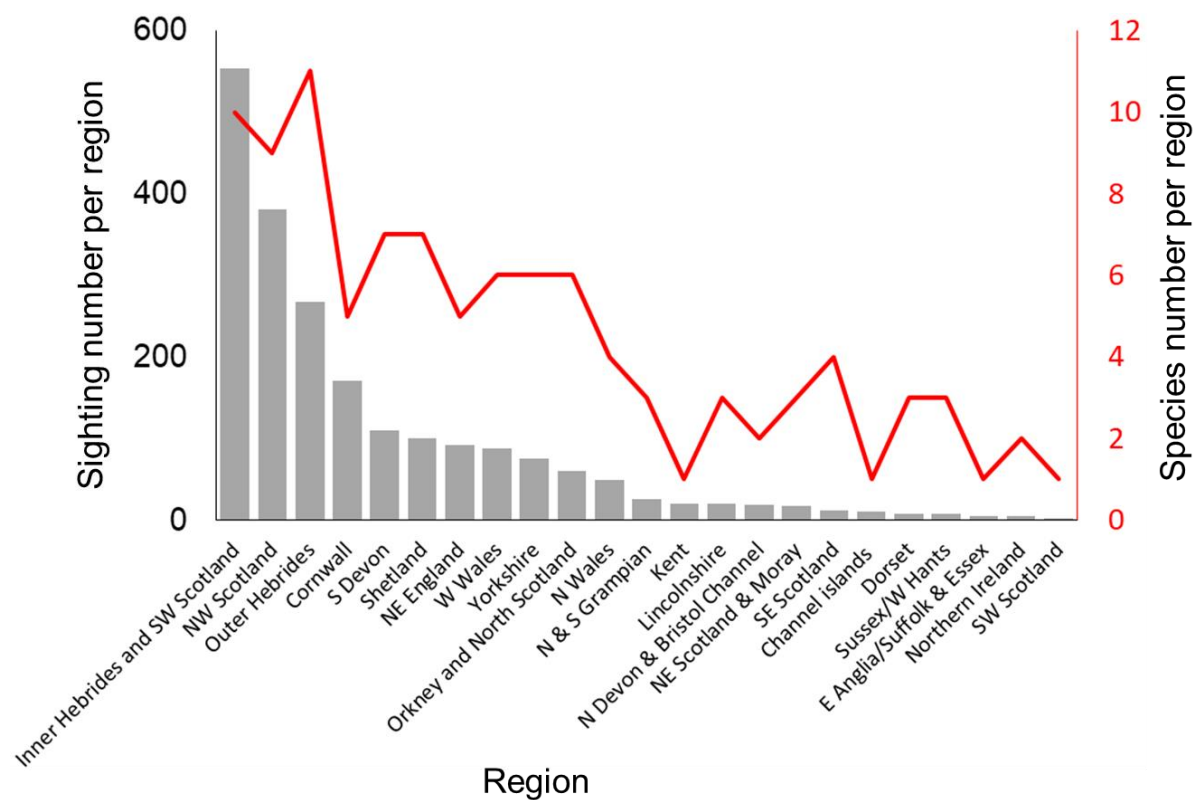


Figure 5. Number of sightings (casual and effort-related) and species per region during NWDW 2019

South-west Scotland and Inner Hebrides (n=553 sightings), North-west Scotland (n=381) and the Outer Hebrides (n=268) were the top three regions which collected the highest number of sightings. In England, the regions with the highest number of sightings were Cornwall (n=171), South Devon (n=110), and North-east England (n=92). In Wales, the highest number of sightings was collected on the West coast (n=117).

The proportion of “casual” sightings (without associated effort data) and “effort-related” sightings has changed compared to last year, with a larger number of effort sightings being collected, which accounts this year for 70% of all sighting records reported during the event. The casual sightings account for 30% (Figure 6).

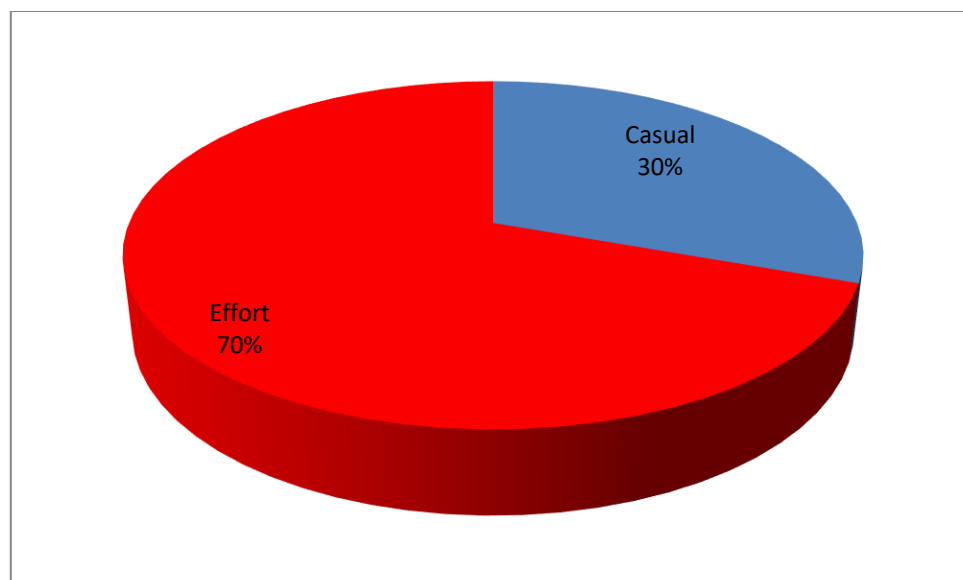


Figure 6. Proportion of effort related sightings (n=1481; 70%) and casual sightings (n=648; 30%) recorded during NWDW 2019.

Figure 7 shows that North-west Scotland, Outer Hebrides and Inner Hebrides and South-west Scotland are at the top of the list with sighting rates far superior to a value of “2” (indicating an average of two or more cetaceans seen per hour of watching). Based on this year’s results, the UK’s national average sightings rate shows a marginal decrease compared to last year (2019 average sightings rate = 1.22) although still exceeding one cetacean seen for each hour of watching.

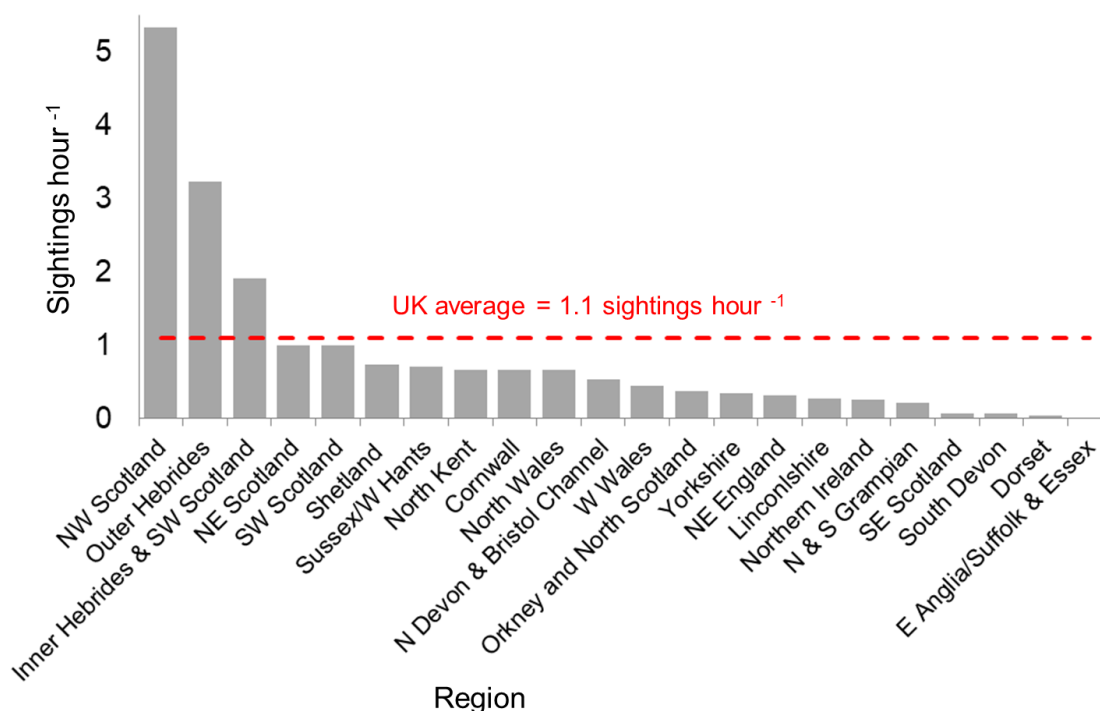


Figure 7. Sighting rates per region during NWDW 2019. The overall average UK sighting rate 1.05 sightings per hour

Harbour Porpoise



Harbour porpoises photographed off Point Lynas, Anglesey, on July 30th.
Photo credit: Ben Murcott.



Harbour porpoises photographed off Falmouth, Cornwall, on July 28th.
Photo credit: AK Wildlife Cruises.

Harbour porpoises are the most commonly seen species in most parts of the UK, which was reflected by this year's NWDW results with sightings all around the British Isles. The species was recorded 1200 times and made up almost half of all records for the event (56.3%). Figure 8 shows that sightings were distributed around the whole of the UK coastline and especially concentrated in Northeast Cornwall, the Inner and Outer Hebrides, North and West Wales. The size of groups of this species varied from a single individual to the largest aggregation of 40 animals which was seen at Bowinger, Cornwall (Table 1).

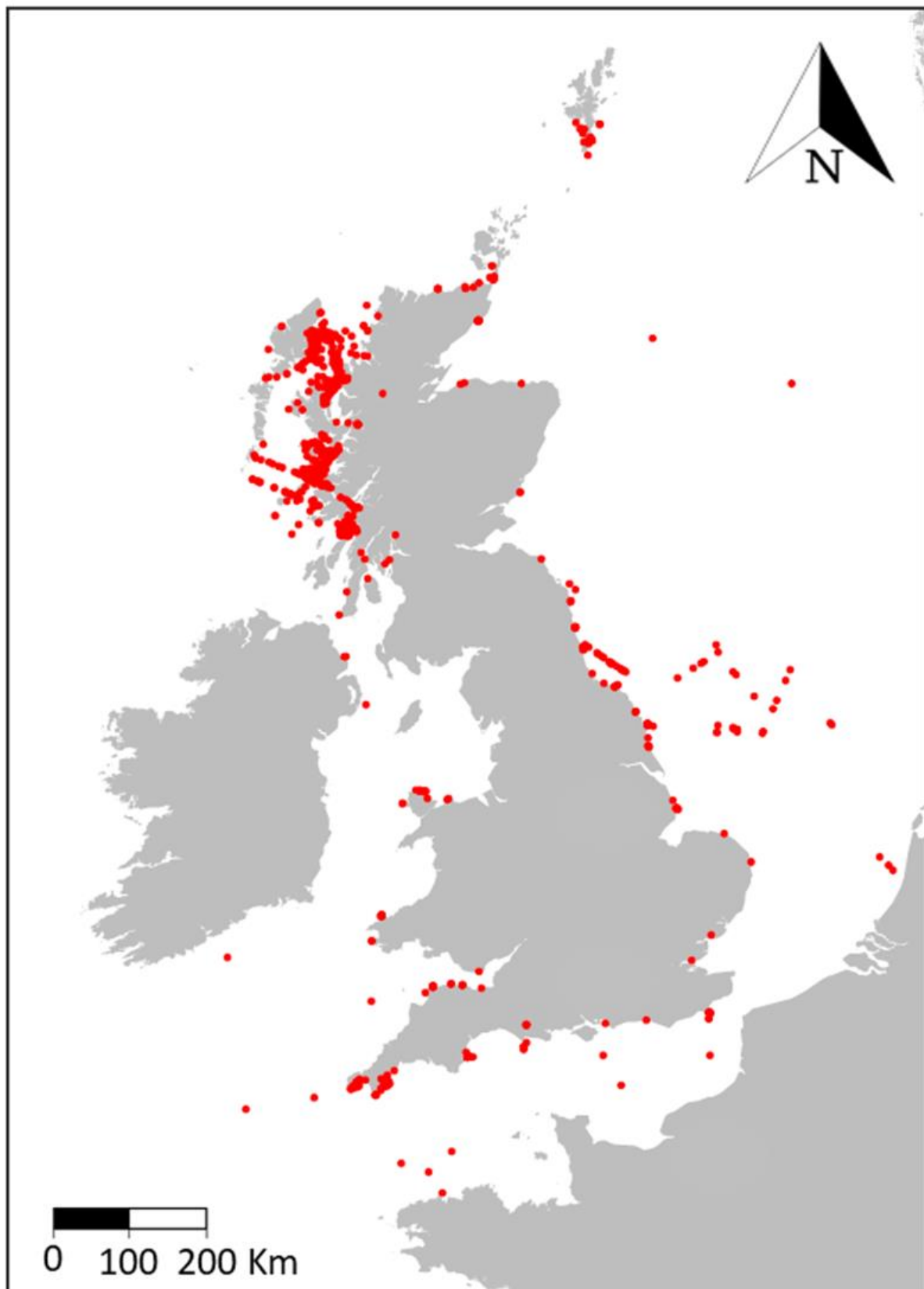


Figure 8. Sightings of harbour porpoise during NWDW 2019 (n=1200; 56.3%)

Short-beaked common dolphin



Short-beaked common dolphins photographed off Falmouth, Cornwall, on July 28th.
Photo credit: Billy Heaney / AK Wildlife Cruises.

Common dolphins were the second most abundant species recorded during the 2019 NWDW event, with 308 sightings being made, accounting for 14.5% of all records. The species showed a predominantly westerly distribution (Figure 9). The largest group (300) was recorded off Lundy Island, Devon (Table 1).

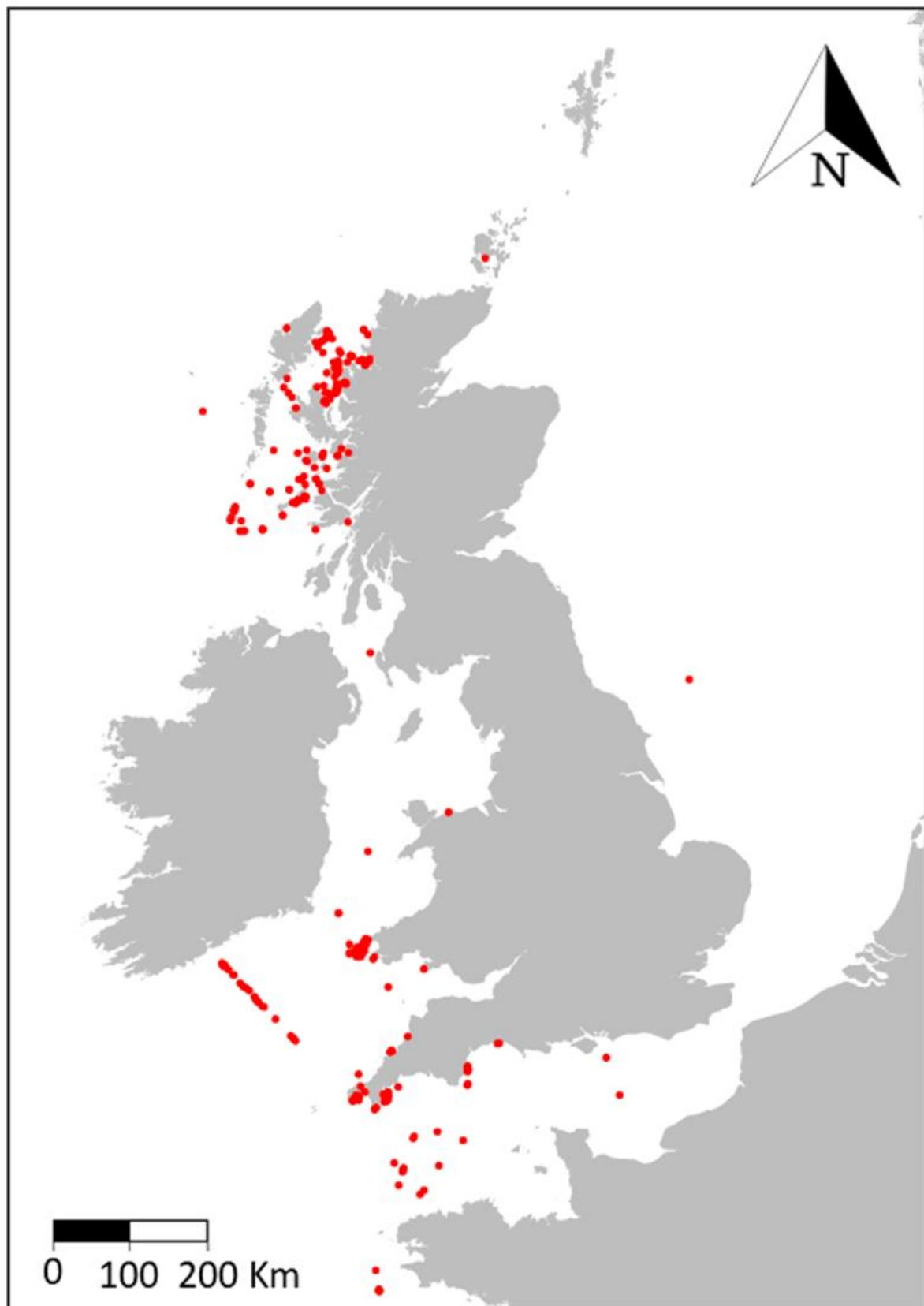


Figure 9. Sightings of short-beaked common dolphin during NWDW 2019 (n=308; 14.5%)

Bottlenose dolphin

Bottlenose dolphins were the fourth most frequently reported species during NWDW, with 117 sightings (8.3%). Two large semi-resident populations of bottlenose dolphins occur in UK waters: one in Cardigan Bay, West Wales, and the other in the Moray Firth, Northeast Scotland. Dolphins from both these populations were recorded during the event, as shown in Figure 11. A total of 1,095 individual bottlenose dolphins were recorded during this year's event, although we cannot be sure that they were of different individuals since photo-ID images were not collected from all sightings. There is therefore the likelihood that several individuals were spotted more than once. The largest group of 50 individuals was seen off Loch Slapin, on the Isle of Skye, an unusually high number for coastal sightings during summer months (Figure 10, Table 1).



Bottlenose dolphins photographed off Berwick-upon-Tweed, Northumberland, on July 29th.
Photo credit: Amber Thomas

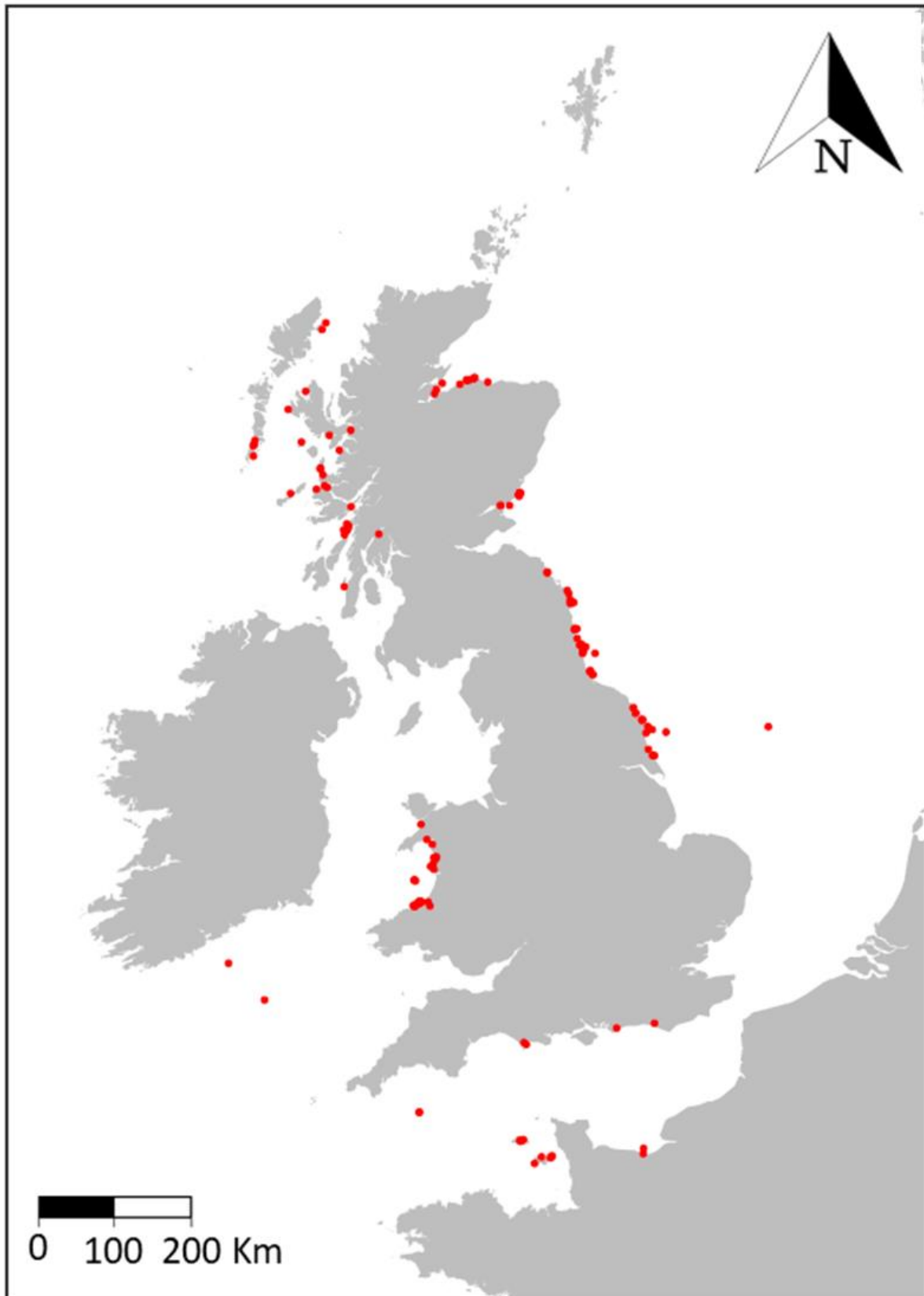


Figure 10. Sightings of bottlenose dolphins during NWDW 2019 (n=117; 8.3%)

White-beaked dolphin



White-beaked dolphins photographed off Seaton Sluice, Northumberland, on July 28th.
Photo credit: Martin Kitching / www.northernexperiencepelagics.co.uk.

White-beaked dolphins were reported 30 times (1.4% of total sighting reports) and were seen off Northumberland, Caithness, and Orkney. The maximum observed group size for this species was 65 animals, seen off Scrabster, Caithness (Figure 11, Table 1).

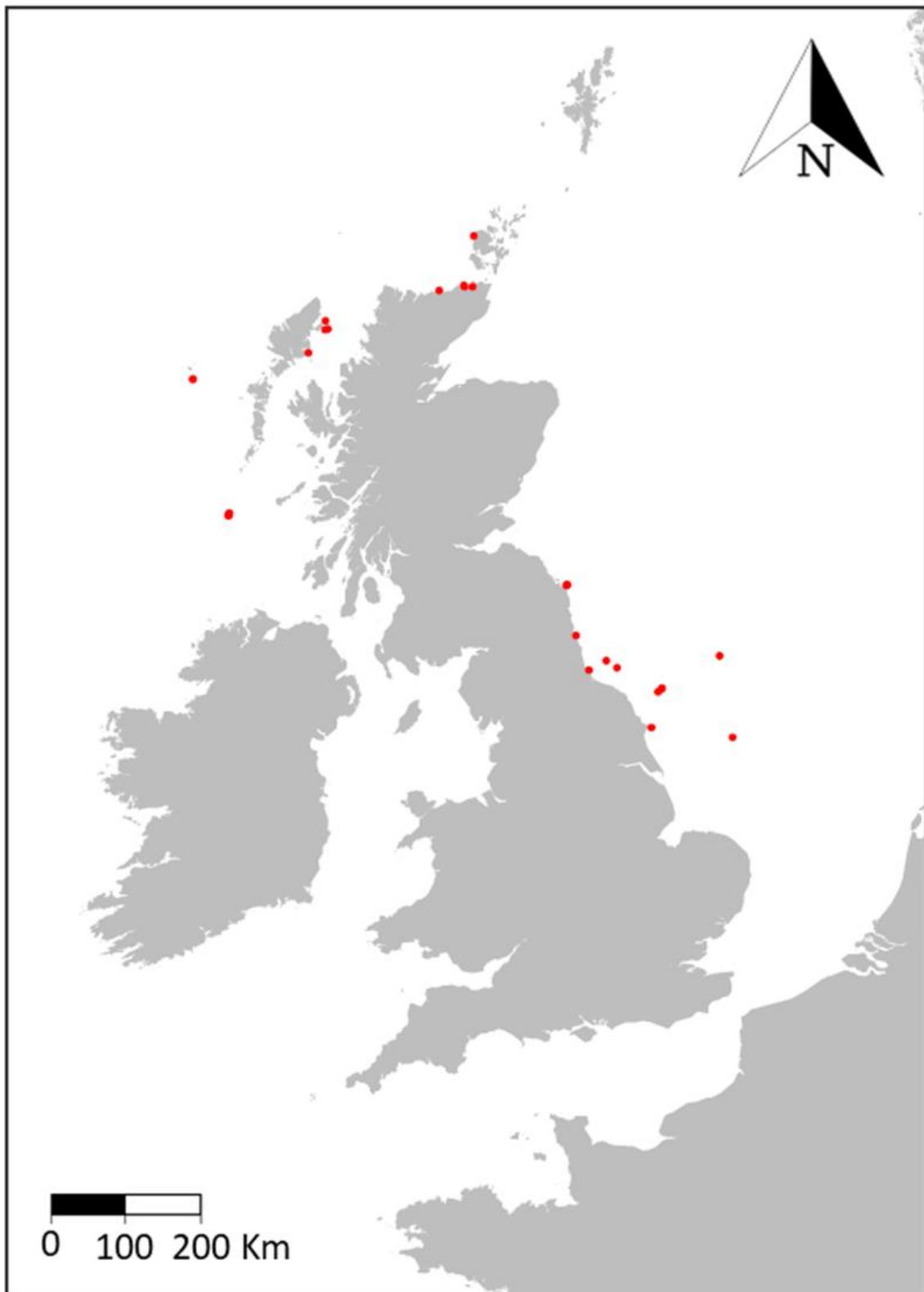


Figure 11. Sightings of white-beaked dolphins during NWDW 2019 (n=30; 1.4%)

Risso's dolphin



Risso's dolphins photographed off Brough of Birsay, Orkney, on August 4th.
Photo credit: Robert Foubister.

Risso's dolphins were recorded around the Isle of Man, Anglesey Orkney and Shetland. This species appeared 44 times (2.1% of all sightings). Group size varied from one animal to a maximum of 25 seen off Cromore, Isle of Lewis (Figure 12; Table 1).



Risso's dolphin calf photographed with its mother off North-west Anglesey, on August 2nd.
Photo credit: Peter Evans

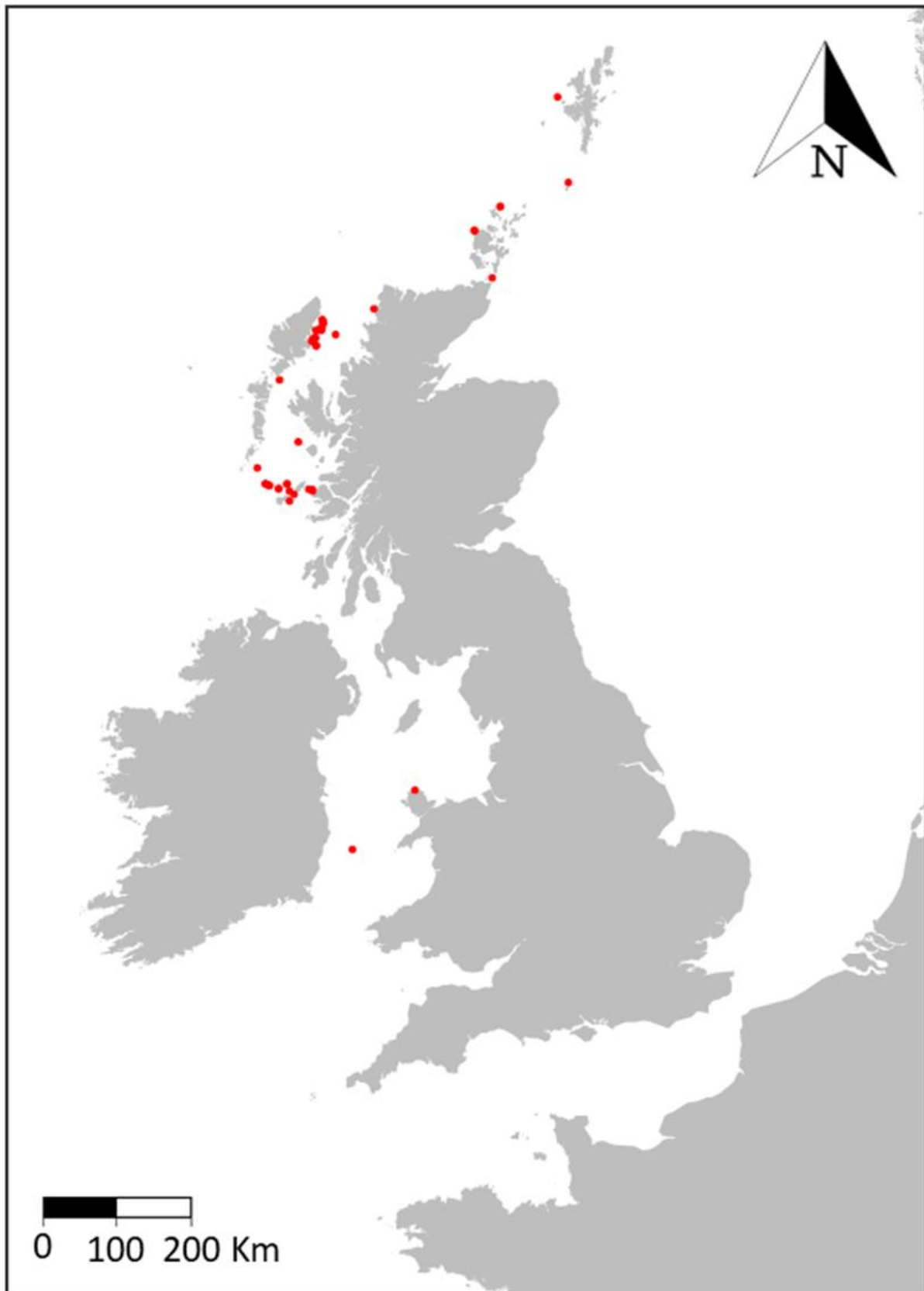


Figure 12. Sightings of Risso's dolphins during NWDW 2019 (n=30; 1.4%)

Orca



Orcas photographed off Shetland, on July 29th. Photo credit: Hugh Harrop / Shetland Wildlife

Orcas were reported 36 times during the event, all in North Scotland, in the waters around Shetland, Orkney, and the Pentland Firth. The largest group consisted of eight animals in Shetland (Figure 13; Table 1).



Figure 13. Sightings of orcas during NWDW 2019 (n=36; 1.7%)

Minke whale

The minke whale was the third most frequently reported species (n=265), accounting for 12.4% of all sightings. The species was mainly seen in the Outer Hebrides, but with several sightings also around Shetland, in the Inner Hebrides, Southeast Scotland, Yorkshire, Northumberland, and Cornwall (Figure 14). The largest group of three minke whales was seen in Aberdeenshire and Northumberland (Table 1).



Common minke whale photographed off Marwick Head, Orkney, on August 3rd.
Photo credit: Robert Foubister.

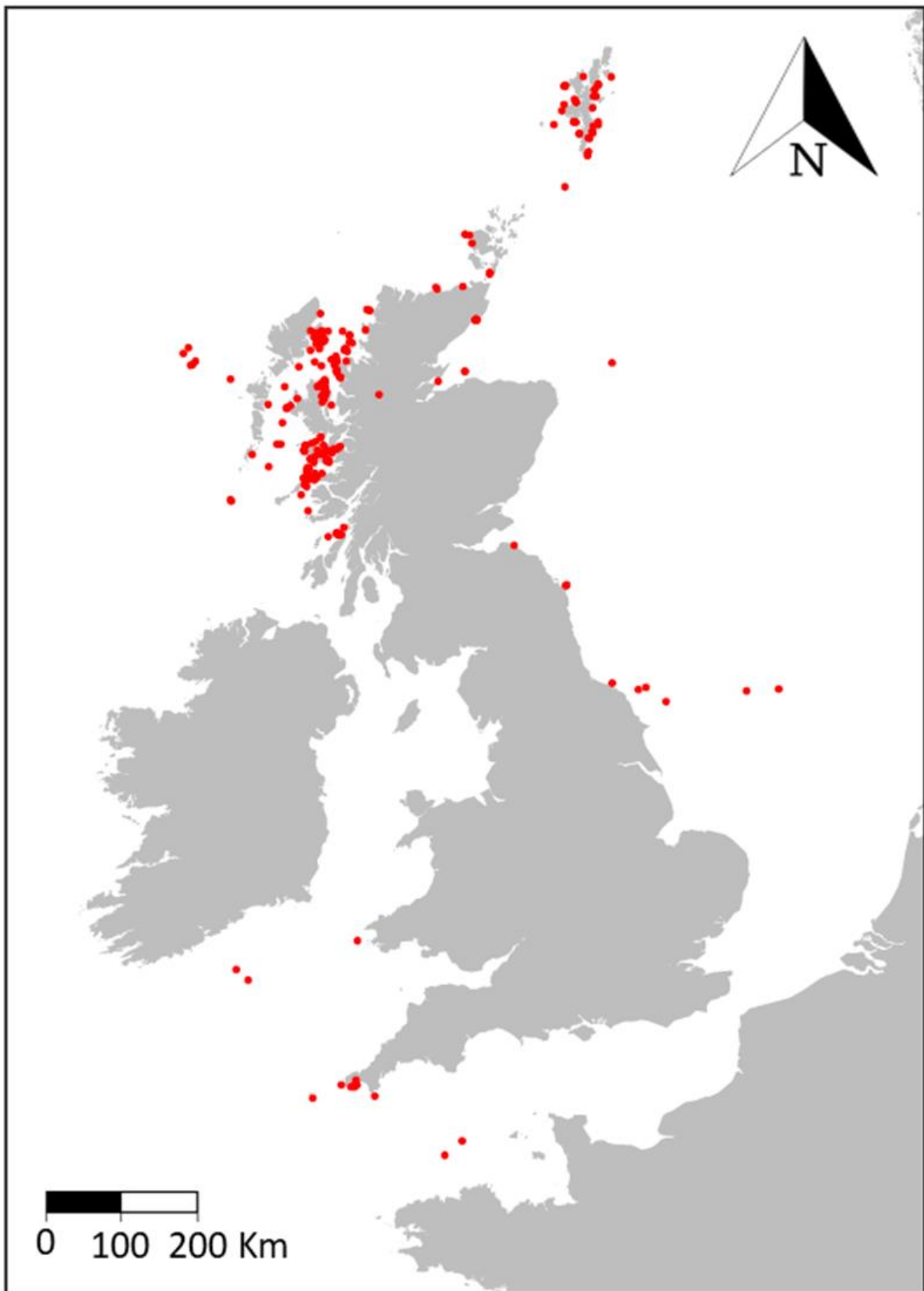


Figure 14. Sightings of minke whales during NWDW 2019 (n=265; 12.4%)

Humpback whale



Humpback whale photographed off Penzance, Cornwall, on August 2nd.
Photos credit: Rupert Kirkwood.

There were five humpback whale records (0.2% of all sightings), all from Cornwall or the Outer Hebrides (Figure 15; Table 1).

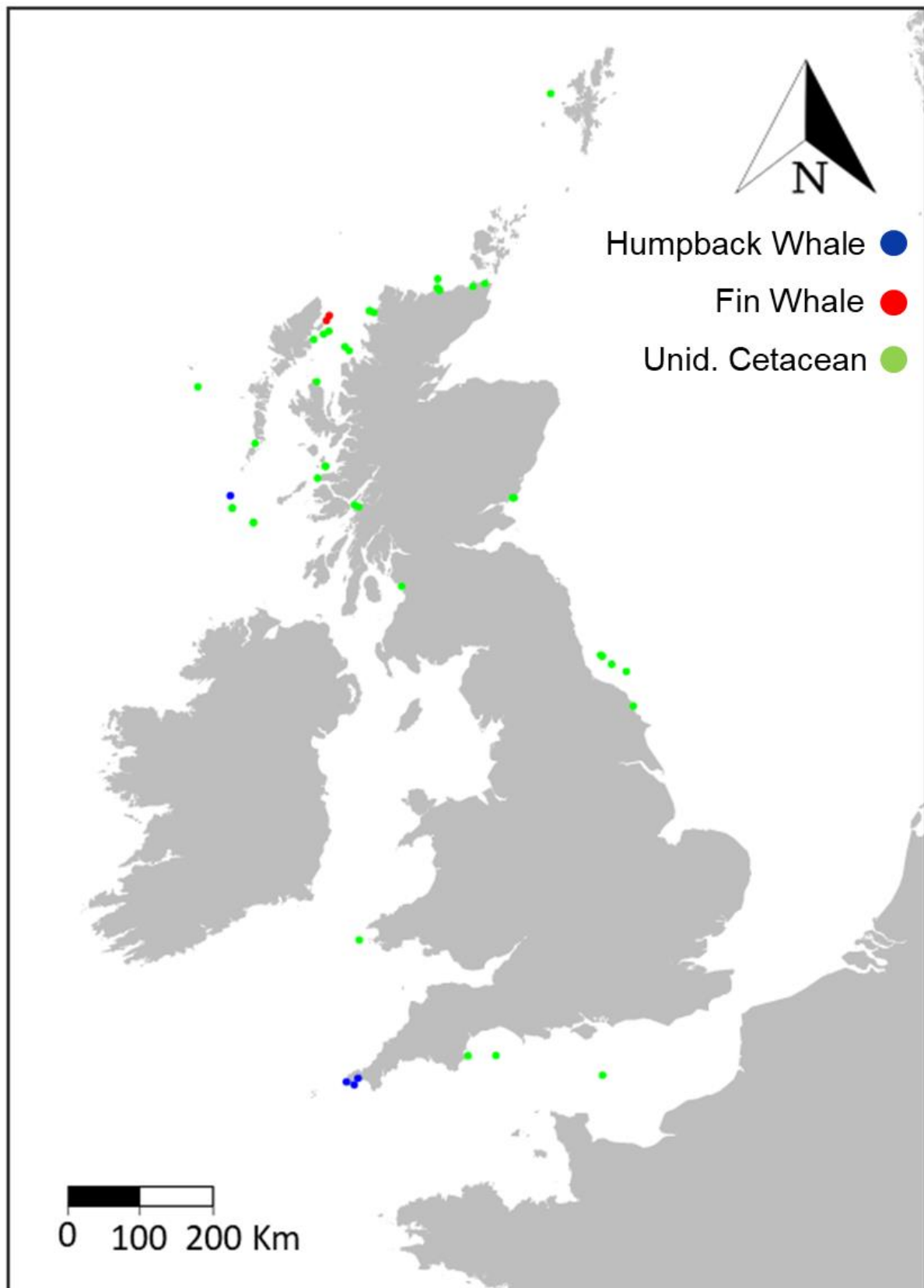


Figure 15. Distribution of fin whales (n=2; 0.1%), humpback whales (n=5; 0.2%), unidentified dolphin species (n=1; 0.1%), and unidentified cetaceans (n=41; 2.5%) during NWDW 2018

Other cetacean species

Two fin whale sightings (probably the same individual) were made off Tiumpán Head, Isle of Lewis, Outer Hebrides (Figure 15, Table 1). Two *Mesoplodon* sp. sightings were reported off the island of Tiree in the Inner Hebrides. There were five sightings of long-finned pilot whales during the NWDW, accounting for 0.2% of the total number of sightings. Both species occurred in the Inner and Outer Hebrides, and North-west Scotland (Figure 16; Table 1). There were eight records of Atlantic white-sided dolphins (0.4% of all records), with groups ranging from one individual sighted off Burravoe, Shetland, to 40 individuals sighted off Freester Shetland (Figure 16, Table 1). Finally, there were also 4 reports of possible northern bottlenose whales. These unconfirmed sightings reports were made at different locations around the Inner Hebrides (Figure 16, Table 1).

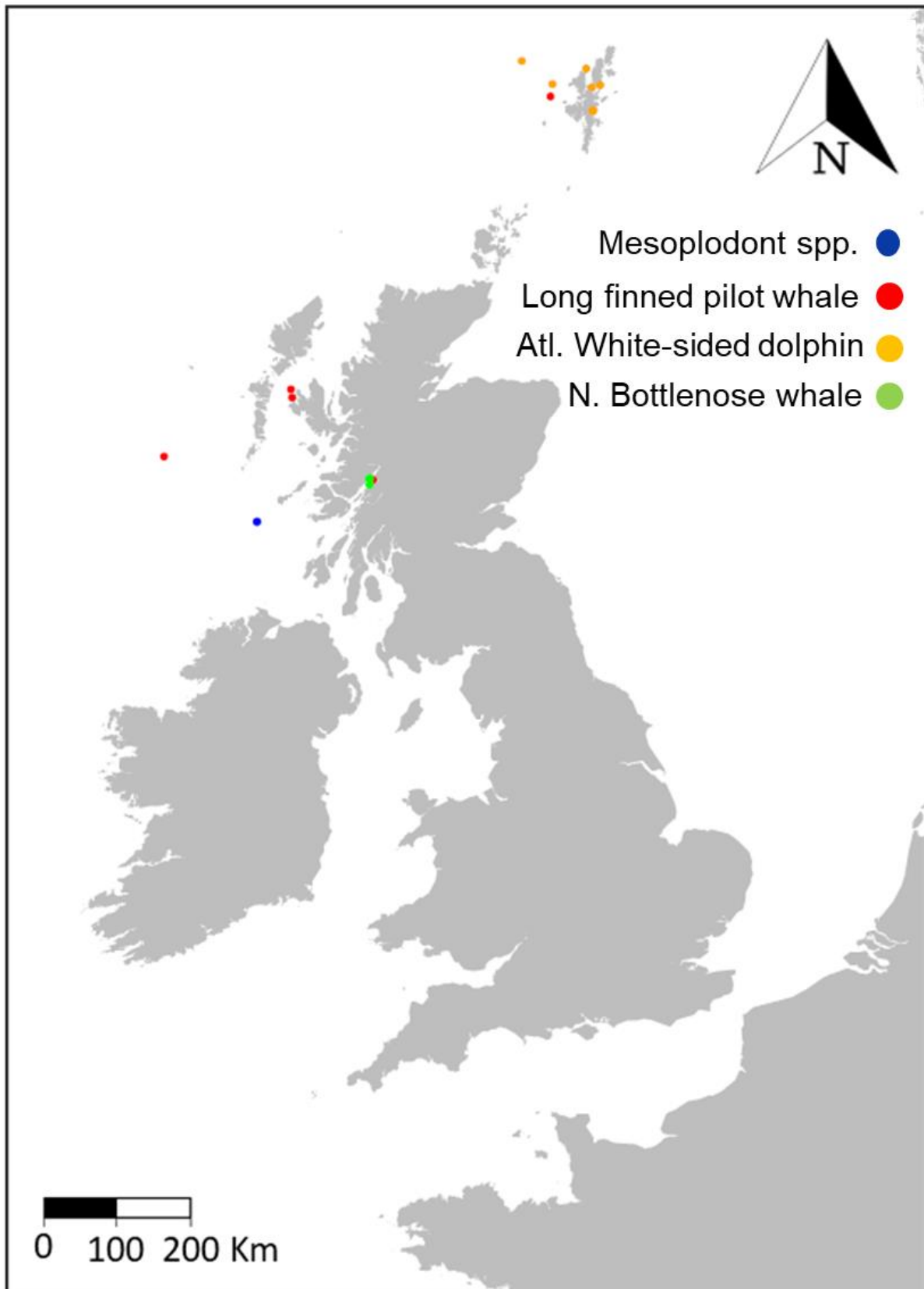


Figure 16. Distribution of Atlantic white-sided dolphins (n=8; 0.4%), long-finned pilot whales, (n=5; 0.2%), Northern bottlenose whale (n=4, 0.2%), and Mesoplodon spp. (n=2; 0.1%) during NWDW 2019.

Table 1. Quantitative description of sightings per species during NWDW 2019

Species	No. of sightings	%	No. of individuals	%	Av. Group Size
Atlantic white-sided dolphin	8	0.38	150	1.26	18.75
Bottlenose dolphin	177	8.31	1095	9.23	6.19
Fin whale	2	0.09	2	0.02	1
Harbour porpoise	1200	56.34	3119	26.29	2.6
Humpback whale	5	0.23	5	0.04	1
Long-finned pilot whale	5	0.23	24	0.2	4.80
Minke whale	265	12.44	312	2.63	1.18
Orca	36	1.69	248	2.09	6.89
Northern bottlenose whale	4	0.19	4	0.03	1
Mesoplodon spp.	2	0.09	2	0.02	1
Risso's dolphin	44	2.07	334	2.81	7.59
Short-beaked common dolphin	308	14.46	5927	49.96	19.24
White-beaked dolphin	30	1.41	278	2.34	9.27
Unidentified cetacean	44	2.07	364	3.07	8.27
Totals	2130	100	11864	100	4.87

ACKNOWLEDGEMENTS

The Sea Watch Foundation staff would like to thank Charlotte Andrews, our 2019 National Whale and Dolphin Watch Assistant, for her hard work, creativity and enthusiasm. We would also like to thank Ellie Richardson, Jaz Harker, and Verity Tonge for their dedication and commitment in organizing activities in New Quay during the NWDW event this year. Immense gratitude goes to all volunteer observers who patiently spent their time collecting data from land and from the sea, and to the volunteer observers who are part of the Sea Watch Sightings Network and who report their sightings to the charity all year long. Special thanks are due to all Regional Coordinators and Recommended Boat Operators who are the backbone of this event and who made it all possible. Thank you also to the following organizations that have greatly contributed to the success of this year's National Whale and Dolphin Watch: ORCA, Hebridean Whale and Dolphin Trust, Yorkshire Wildlife Trust, MARINELife, Whale & Dolphin Conservation, Manx Whale and Dolphin Watch, Scottish Seabird Centre, RSPB Bempton Cliffs, RSPB Conwy, RSPB Orkney, Alderney Wildlife Trust, Cornwall Wildlife Trust, Essex Wildlife Trust, Devon Wildlife Trust, Dorset Wildlife Trust, Living Seas North West, North Wales Wildlife Trust, Scottish Wildlife Trust, Yorkshire National Trust, Birling Gap and the Seven, Sisters National Trust, South West National Trust, St Abb's Head National Trust, Berry Head Countryside Trust, Coast Care, Coastwatch Scotland Irvine Unit, Dorset Council, High Life Highland Countryside Rangers, Isle of Rum Community Trust, Macduff Marine Aquarium, Pakefield Coastwatch, Pembrokeshire Coast National Park Authority, Samphire Hoe National Nature Reserve, and Scottish Natural Heritage. Finally, thanks to all Cardigan Bay Monitoring volunteers, Work Experience students and home-volunteers who helped make this event a great success.

APPENDIX 1.

General overview of the weather by country for the period of NWDW 2019 (*Met Office July-August Summaries* - <https://www.metoffice.gov.uk/research/climate/maps-and-data/summaries/index>)

The second half of July was generally more unsettled with frequent westerly and south-westerly winds, but with an exceptionally hot spell from the 22nd to 26th which saw record-breaking temperatures in many parts of the country, including a new record for the UK as a whole, and also widespread thunderstorms.

The UK July extremes were as follows: A maximum temperature of 38.7°C was recorded at Cambridge Botanic Garden on the 25th. A wind gust of 50 knots (58 mph) was recorded at Berry Head (Devon) on the 29th.

On the 25th, UK Power Networks reported that 10 to 20,000 properties had power cuts due to thunderstorms, and some buildings were struck by lightning; also, several large field and gorse fires arose. On the 28th, heavy rain continued in the north of England and in southern Scotland. The A77 and various local roads were closed due to flooding; in Edinburgh damage was caused to the National Records of Scotland building and some public events were cancelled due to flooding. The heavy and persistent rain resulted in surface water and some

minor river flooding in Greater Manchester, Lancashire and Bradford with some properties flooded and travel disruption.

August opened with a weak ridge of high pressure, which brought some warm sunshine but also some scattered thundery showers in some places.

Mean maximum temperatures were mostly about 1.0°C above normal but were over 2°C above in the east of East Anglia. Mean minimum temperatures were about 0.5°C above average in the south, but over 1 °C above in most areas from the Midlands northwards. Rainfall was 153% of average, and large areas of Scotland, Cumbria and Northumberland had over twice the normal rainfall, but it was drier than average in East Anglia and Kent. Sunshine was 107% of average, and it was generally sunnier than average in central and eastern England and in the east of Northern Ireland, with close to or slightly below average sunshine elsewhere.

After heavy rain at the end of July, early August had lingering impacts relating to flooding, exacerbated in places by thundery showers in early August. On the 1st, there was flooding on the rail line between Manchester Piccadilly, Manchester Airport and Wilmslow, with flooding also on the M60. The dam holding the Toddbrook reservoir at Whaley Bridge was in danger of collapsing and this led to the evacuation of Whaley Bridge and operations to reduce the water level in the reservoir. On the 2nd, manhole covers were lifted due to heavy rain in Nottingham. In Scotland, the rail line between Tyndrum and Dalmlally was closed, the A82 was closed in both directions between Crianlarich and Tarbet due to a rockfall, and there were delays on the A9 due to flooding.

England

In July, the thunderstorms cleared the east coast before midday on the 24th, followed by a mainly cloudy day in the west, but it was again sunny and hot in the east, especially the south-east. The 25th was dry and sunny in most areas with record-breaking temperatures, and Cambridge Botanic Garden reached 38.7°C, setting a new UK temperature record. Thunderstorms again broke out, mainly in eastern areas. The night of the 25th/26th was exceptionally warm, with Carlton (Cleveland) not falling below 22.6°C, and the 26th saw outbreaks of rain and some thunder for the north and east, brighter with scattered showers for the south-west. Persistent heavy rain affected many areas on the 27th and 28th, with 67.4 mm of rain at Rochdale (Lancashire) on the 28th, but parts of the south and south-west remained fine and dry. A vigorous southerly tracking low brought gusts to 58 mph at Berry Head (Devon) later on the 29th, with showers and thunderstorms moving into the south-west, but other areas continued mainly dry and sunny. Showers and longer spells of rain affected most areas on the 30th and 31st, and thunderstorms and heavy falls of rain affected Lancashire and Yorkshire, which on the 30th also extended to Cumbria. In August, sunshine and showers was the dominant theme during this period. The month started with a weak ridge of high pressure, bringing warmth and sunshine, but showers broke out quite widely on the 1st, with thunderstorms across parts of the Midlands and north-west. Showers were more scattered on the 2nd, particularly in the south. Weak fronts brought more widespread showers on the 3rd and 4th, with thunder in some central and northern counties on the 4th.

Wales

In July, the 25th was hot and sunny in most areas with a high of 32.5°C in Colwyn Bay (Clwyd), and the heat sparked off some thunderstorms in the east during the afternoon. The night of the 25th/26th was unusually warm with the temperature falling no lower than 18.9°C at Porthmadog (Gwynedd), then the 26th had some sunshine but also scattered showers. Much of the country suffered from persistent rain on the 27th but the south and south-west remained mostly sunny and dry. The rain became more confined to far northern and north-eastern counties on the 28th. A depression took an unusually southerly track on the 29th-31st, bringing showers or longer spells of rain into the south-east later on the 29th which was otherwise generally warm and sunny. Showers and longer spells of rain, locally thundery especially over the north, occurred on the 30th; these became mainly confined to the north on the 31st with some sunshine in the south. In August, a ridge of high pressure brought mostly warm dry sunny weather on the 1st and 2nd, with 14.0 hours of sunshine at Dale Fort (Dyfed) on the 1st, although some showers developed in the southwest on the 2nd. Weak fronts brought cloudier weather with more in the way of showers on the 3rd and 4th, with some heavy outbreaks of rain for the north and north-west early on the 4th, but it remained warm.

Scotland

In July, sunny and hot weather became established widely on the 25th with maxima of 31.6°C at Edinburgh Gogarbank and Floors Castle (Roxburghshire). Thunderstorms again broke out in the evening, mainly in the Borders, and Achnagart (Ross & Cromarty) did not fall below 20.9°C overnight 25th/26th, setting a new high minimum temperature record for Scotland. The 26th started off sunny and became hot again in the north, but it turned cloudier from the south with some showers for the south and east. A belt of heavy persistent rain straddled much of the country on the 27th, which was replaced by showers on the 28th, but the Northern Isles were dry, sunny and unusually warm with 14.9 hours of sunshine at Lerwick (Shetland) on the 27th. The 29th was mostly cloudy with some showers or longer spells of rain and drizzle affecting mainly northern and western areas. After a sunny start on the 30th, a southerly tracking depression brought showers and longer outbreaks of rain northwards from late morning, and further showers spread north on the 31st, becoming widespread and thundery during the afternoon particularly in the Central Belt. During the first week of August, a weak ridge of high pressure brought warm but mostly cloudy weather with scattered showers in places but with a fair amount of sunshine in the Western Isles. There were isolated thunderstorms in the west on the afternoon of the 1st, and the temperature did not fall below 16.5°C in Great Cumbræ, Millport (Buteshire) overnight 1st/2nd. Most places were dry with some sunshine on the 3rd, though with isolated showers, especially over the central Highlands and parts of the south, and it was very warm in the north and west. Weak fronts brought a band of rain north-eastwards on the 4th, followed by sunshine and showers, the showers heavy and thundery in some central and south-eastern parts.

Northern Ireland

In July, the 25th was cloudy in the west, but sunny and warm in the east. The fronts moved eastwards overnight, and the 26th had sunshine and showers but the east stayed dry. A slow-moving frontal system brought dry cloudy weather on the 27th, and a belt of rain spread into northern and eastern counties on the 28th, with Altnahinch (County Antrim) reaching

only 13.2°C on the 28th, but these two days were mostly dry and sunny in the south-west. Most areas had sunshine and showers on the 29th and 30th, and then the 31st started cloudy with some light rain but brightened up. In August, a ridge of high pressure brought mostly dry sunny weather on the 1st and 2nd, with 13.0 hours of sunshine at Aldergrove (County Antrim) on the 1st. Weak fronts brought some rain northwards through the country on the 3rd, followed by brighter weather with scattered showers in the south. Temperatures did not fall below 16.2°C at Magilligan (County Londonderry) overnight 3rd/4th, followed by a dry and bright start on the 4th, but cloud increased from the south-west, bringing heavy rain and thunderstorms to the far west and south-west by late afternoon.

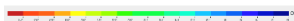
APPENDIX 2 - Weather Maps

General overview of the weather by day during the period of NWDW 2018 using pressure maps and SST maps from Magic Seaweed.

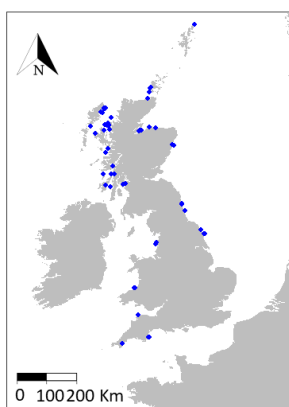
Key for Wind force maps:



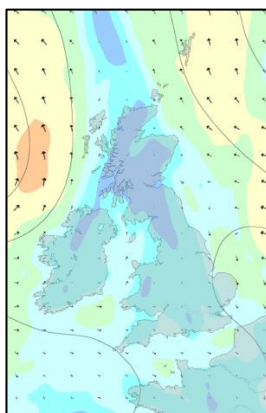
Key of SST force maps:



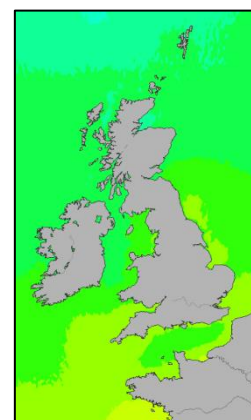
Saturday, 27th July



Cetacean sightings on day 1 of NWDW 2019 (27th July)

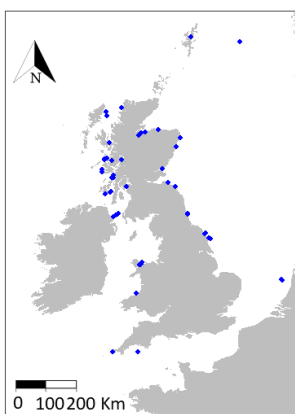


Wind map on day 1 of NWDW 2019 (27th July)

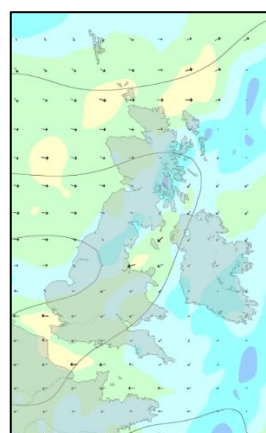


SST map on day 1 of NWDW 2019 (27th July)

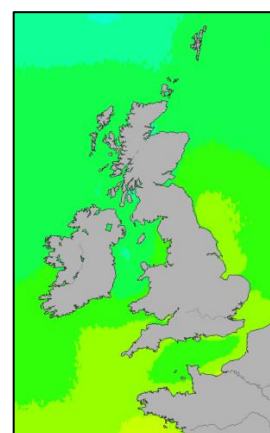
Sunday, 28th July



Cetacean sightings on day 2 of NWDW 2019 (28th July)

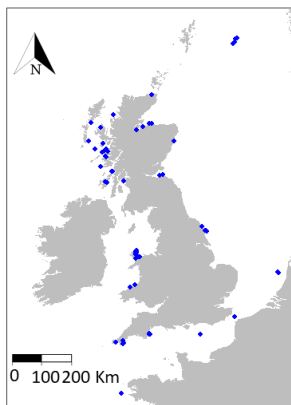


Wind map on day 2 of NWDW 2019 (28th July)

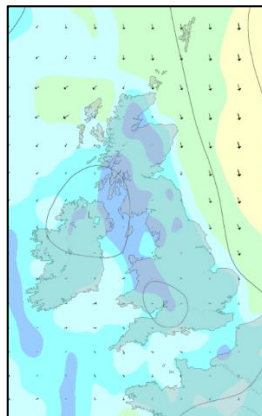


SST map on day 2 of NWDW 2019 (28th July)

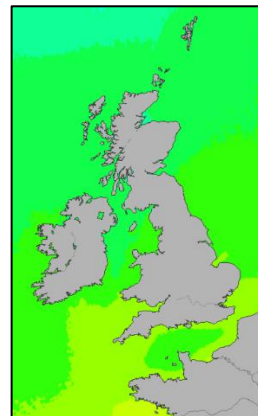
Monday, 29th July



Cetacean sightings on day 3 of NWDW 2019 (29th July)

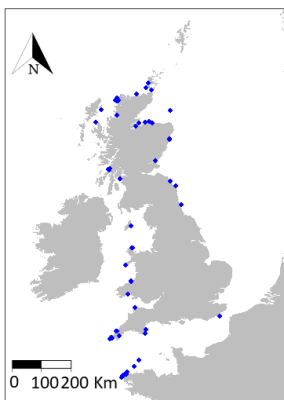


Wind map on day 3 of NWDW 2019 (29th July)

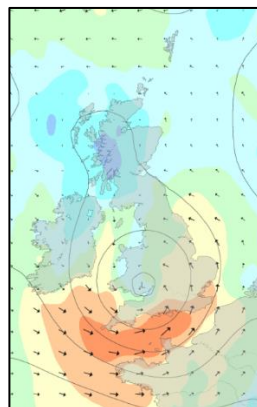


SST map on day 3 of NWDW 2019 (29th July)

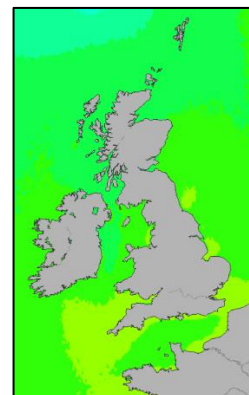
Tuesday, 30th July



Cetacean sightings on day 4 of NWDW 2019 (30th July)

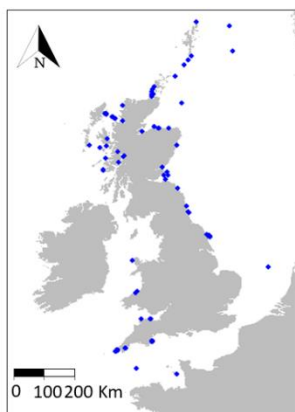


Wind map on day 4 of NWDW 2019 (30th July)

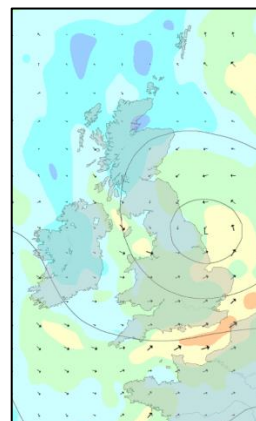


SST map on day 4 of NWDW 2019 (30th July)

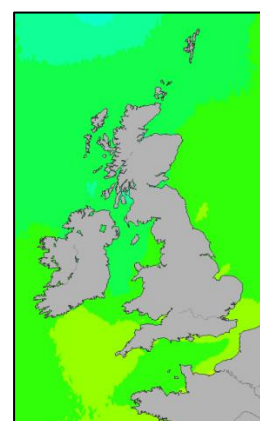
Wednesday, 31st July



Cetacean sightings on day 5 of NWDW 2019 (31st July)

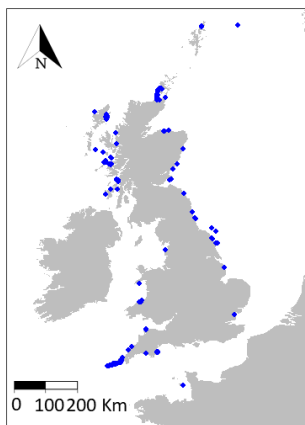


Wind map on day 5 of NWDW 2019 (31st July)

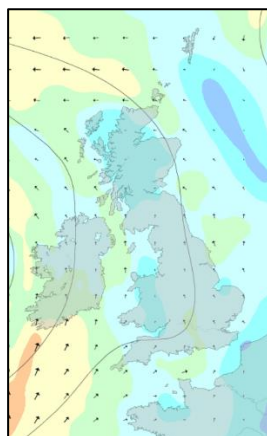


SST map on day 5 of NWDW 2019 (31st July)

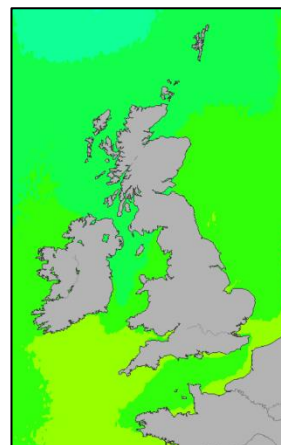
Thursday, 1st August



Cetacean sightings on day 6 of NWDW 2019 (1st August)

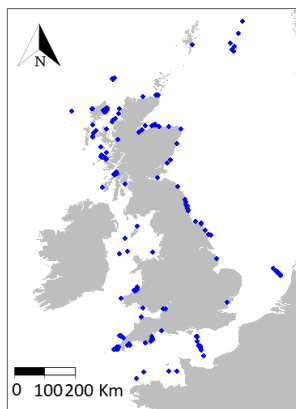


Wind map on day 6 of NWDW 2019 (1st August)

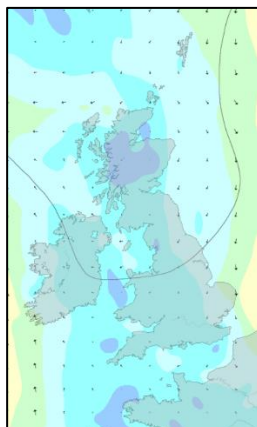


SST map on day 6 of NWDW 2019 (1st August)

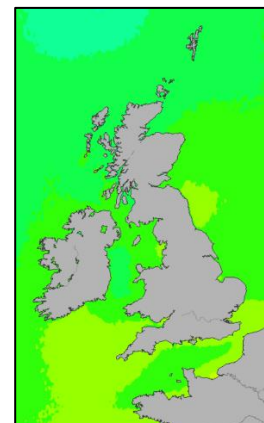
Friday, 2nd August



Cetacean sightings on day 7 of NWDW 2019 (2nd August)

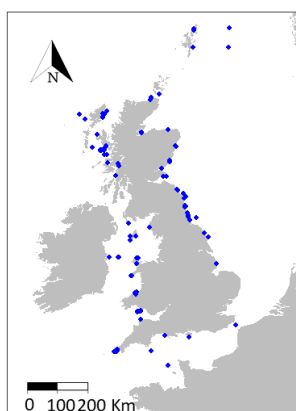


Wind map on day 7 of NWDW 2019 (2nd August)

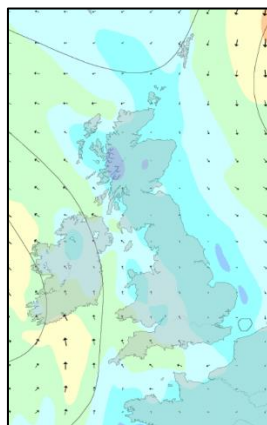


SST map on day 7 of NWDW 2019 (2nd August)

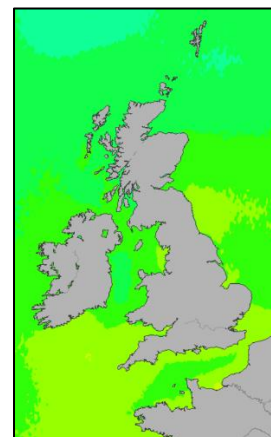
Saturday, 3rd August



Cetacean sightings on day 8 of NWDW 2019 (3rd August)

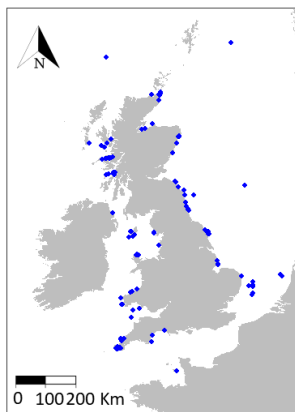


Wind map on day 8 of NWDW 2019 (3rd August)

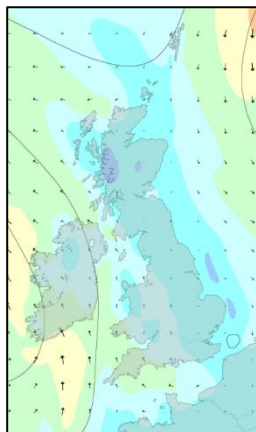


Satellite map on day 8 of NWDW 2019 (3rd August)

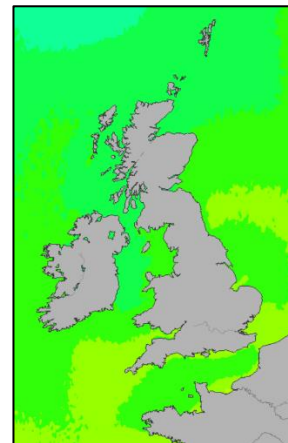
Sunday, 4th August



Cetacean sightings on day 9 of NWDW 2019 (4th August)



Wind map on day 9 of NWDW 2019 (4th August)



Satellite map on day 9 of NWDW 2019 (4th August)