MAP VIEWER GUIDE

Introduction   Over the last sixty years, the staff at Sea Watch have assembled a database of sightings of marine megafauna (particularly cetaceans) from both effort-related observations (from land & sea) and incidental (non-effort-related) records, contributed by our network of observers and groups that have partnered with us. We are now in the process of integrating historical and current data into a single database management system linked to a new map viewer. So far, we have migrated across around 240,000 records but there are a further c. 100,000 from mainly offshore surveys to be collated and uploaded once the validation process is complete.

Ultimately, our aim will be to introduce computer coding that from our effort-related database converts numbers into encounter rates, and where systematic line transect surveys have been undertaken, calculates densities. Nevertheless, the present dataset of sighting plots can yield important information and trends, so long as one bears in mind that some areas are watched more than others and, there is generally more watching between May and September than during winter months when weather conditions tend to be less favourable.

https://seawatchadmin.imardis.org/sightings-viewer

User Guide   When you open map viewer, you will see a panel in the centre at the bottom with five icons.
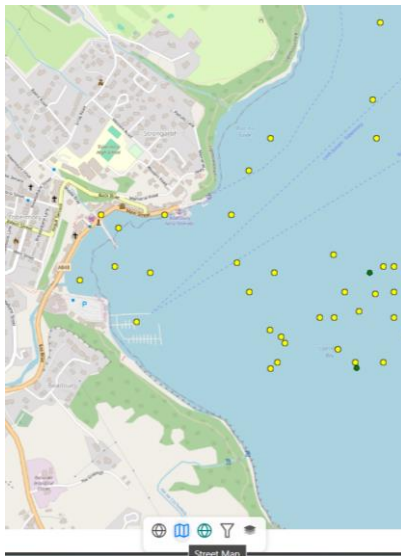

The first three from left to right are **base map** options: the first is a satellite map, the second a political map, and the third a map that presents the ocean bathymetry. You can easily move between them for different uses. The satellite base map is the default setting.
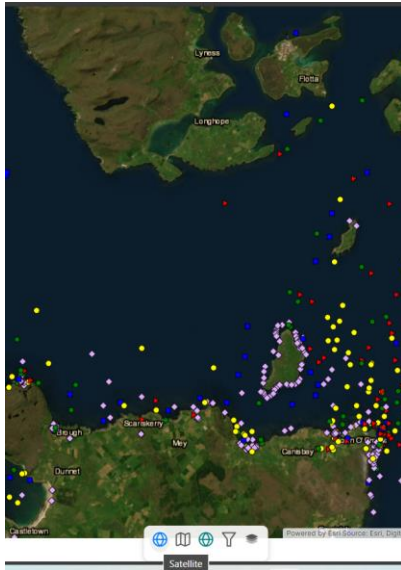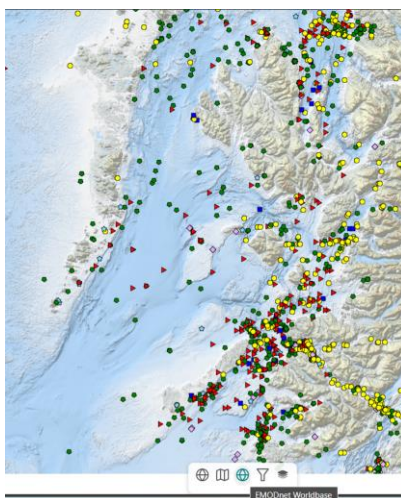
Satellite Map (default)

Highlights the sightings most strongly

Political Map

Shows roads and many of the towns
to place sightings in geographical context

Ocean Bathymetry Map

Highlights the topography of the ocean

To the right of those three icons is the main icon for filtering *sightings* or *surveys* by **date** range (the default is the last three years, but you can also choose last week, last month, last six months, last year, or all years) or you can filter by any specific month or choose a custom date range (any range of dates).
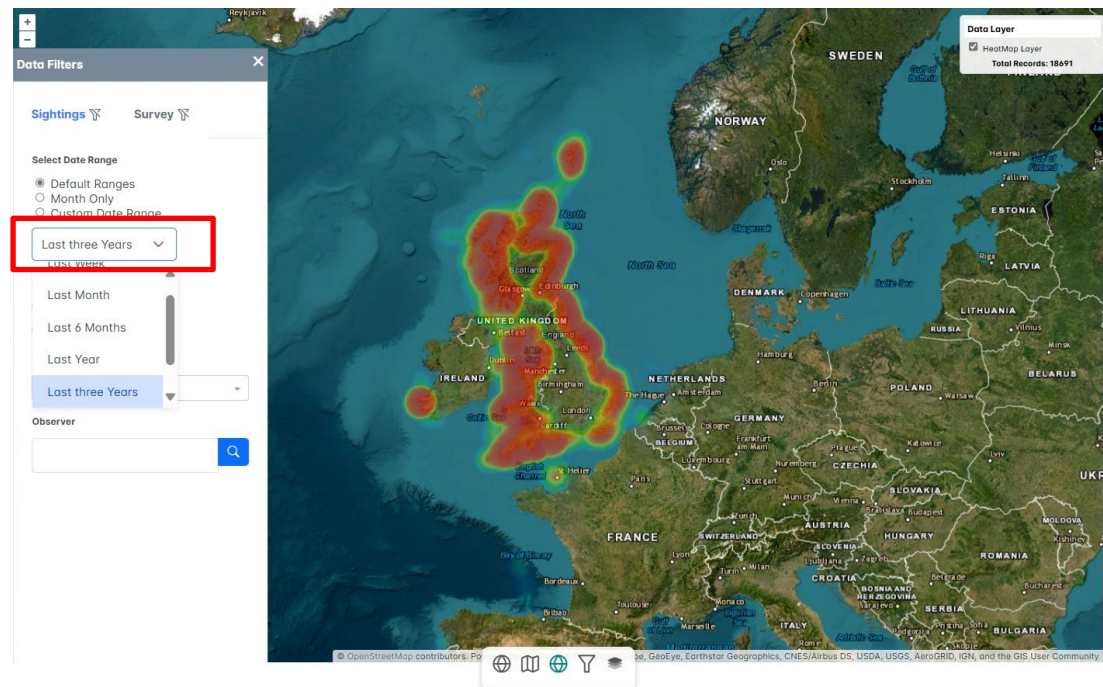
There is also a **species filter.** The default is *all species,* but you can choose a specific species from the select species list or a species group from the select group list. Groups include baleen whale, toothed whale (excluding sperm whale), sperm whale, dolphin, porpoise, seal, and other (shark, turtle, sunfish). Note that "unidentified" cetacean is in the "toothed whale" category.
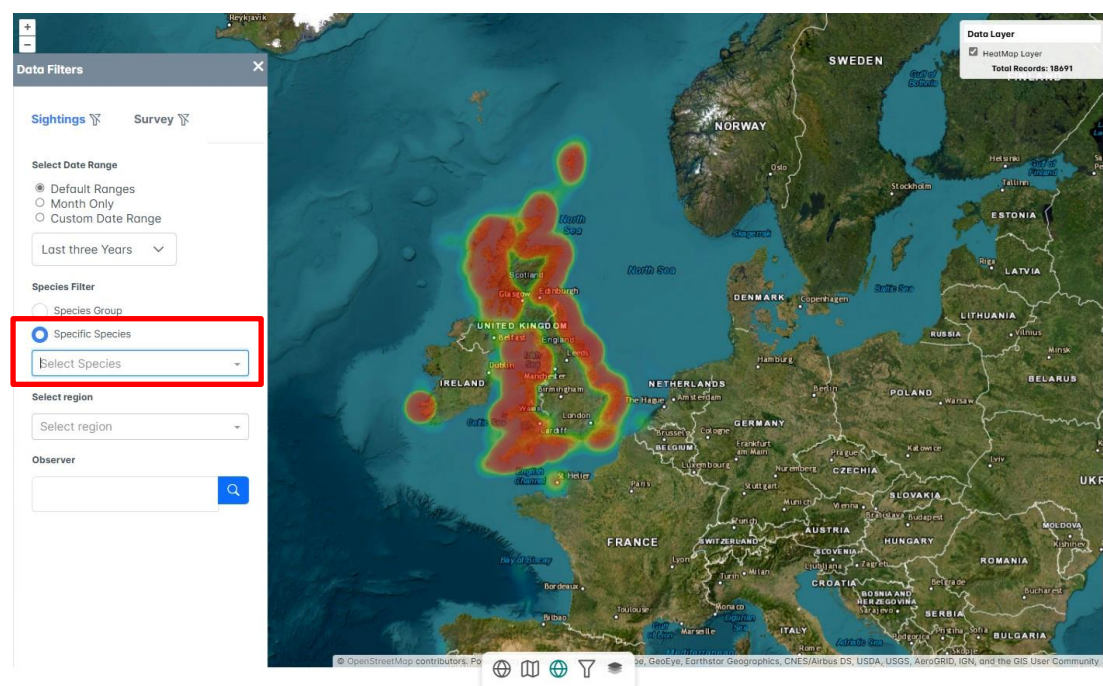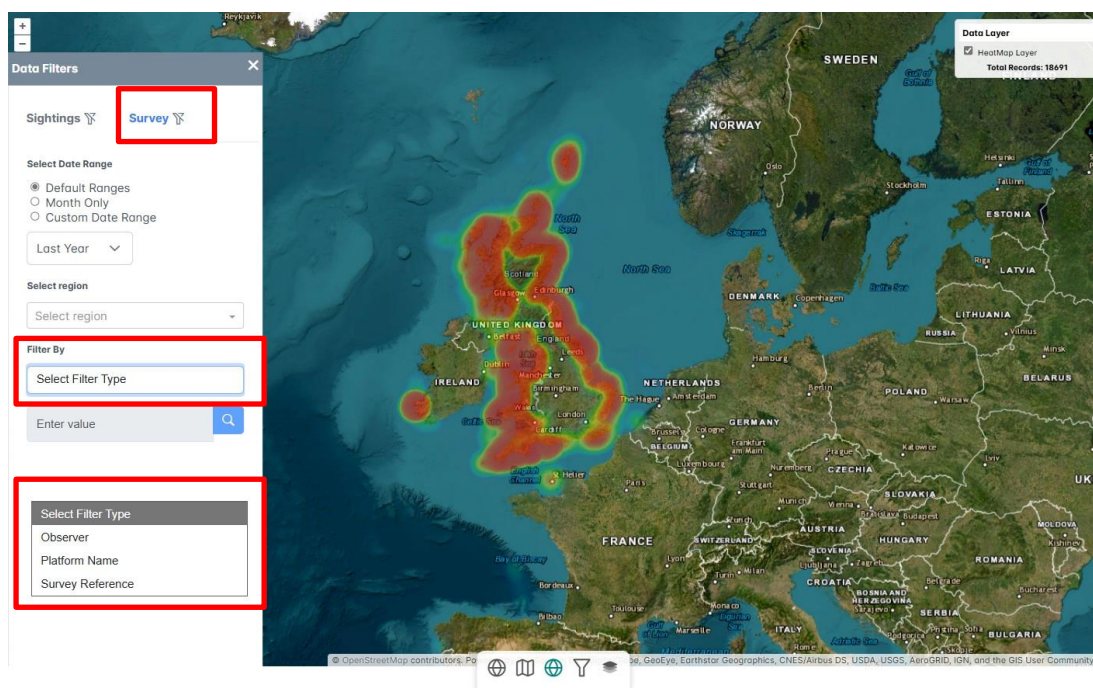
You can also filter by **region** (within the British Isles) using the select region list and by **observer** by typing in the observer's name.
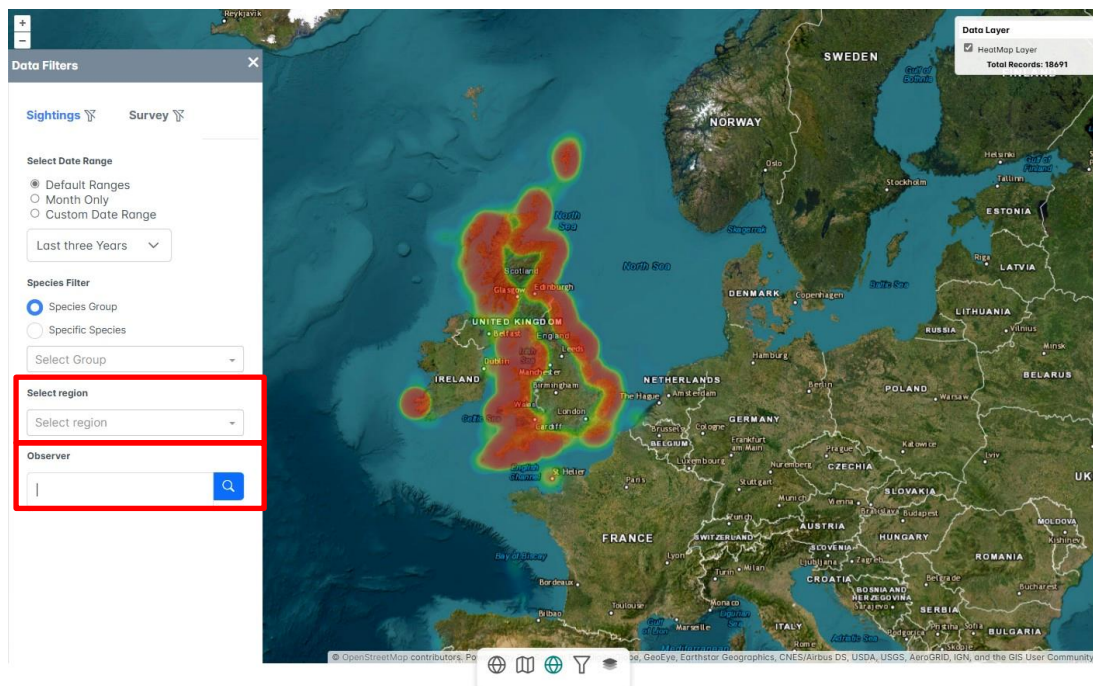
SURVEYS

Finally, you can go to **survey** (next to the sightings menu), enter either a platform name or an observer name, or a survey ID, and for offshore surveys filter by those to show the tracks (showing in purple) of the vessel (or plane).

If you filter by dates (e.g. all years, last three years, etc), all the survey tracks over that period will show, similarly, if you filter by observer or platform name. To select a specific track, click on it and it will be highlighted in yellow.
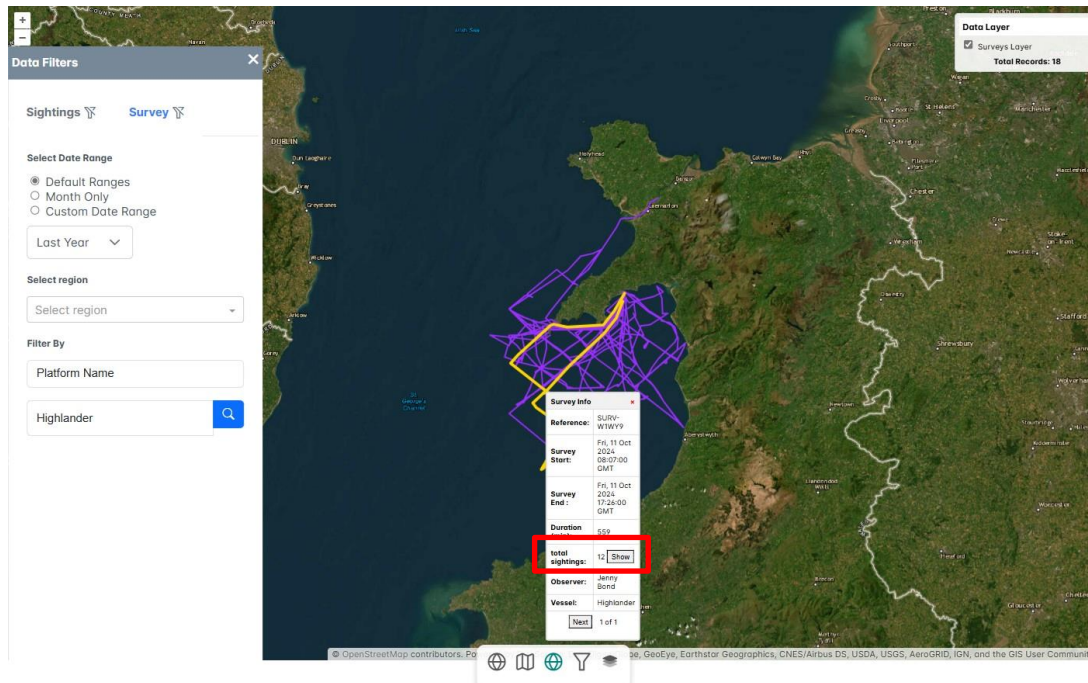
The number of sightings associated with the track will show in a popup window and if you click on any of the sighting symbols associated with that survey, you will see the details – species, group size, time & date, and observer.
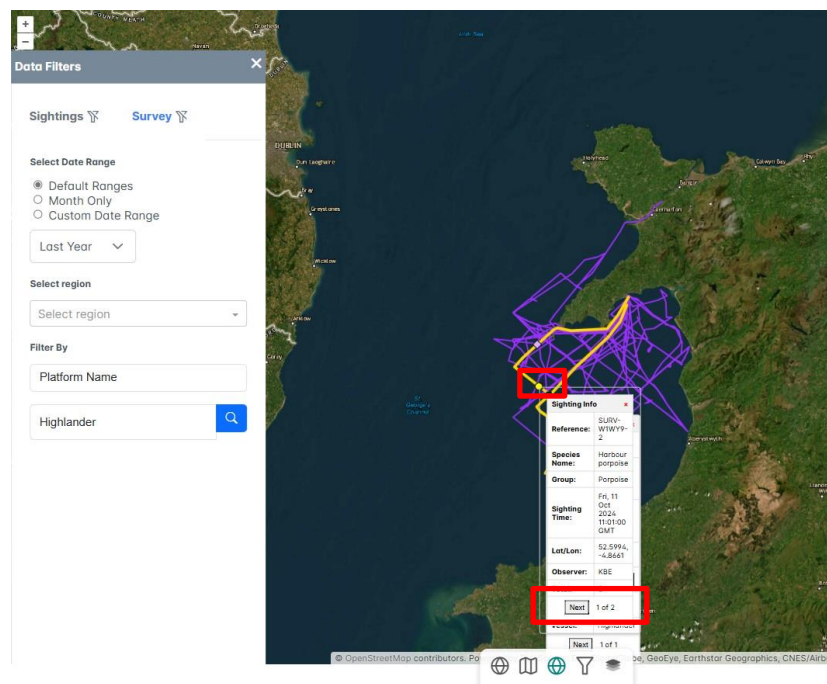
On opening map viewer, the base map is centred upon the British Isles and adjacent seas, but you can move the map around to any part of the world and sightings submitted anywhere in the world can be viewed. Where there are a large number of sightings at the scale you are zoomed in at, a heat map will appear.

As you zoom into a particular region and the number of sightings in the zoomed area reduces, these will show up as individual symbols.
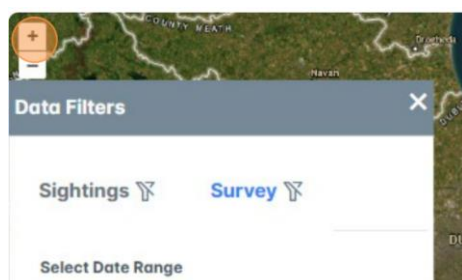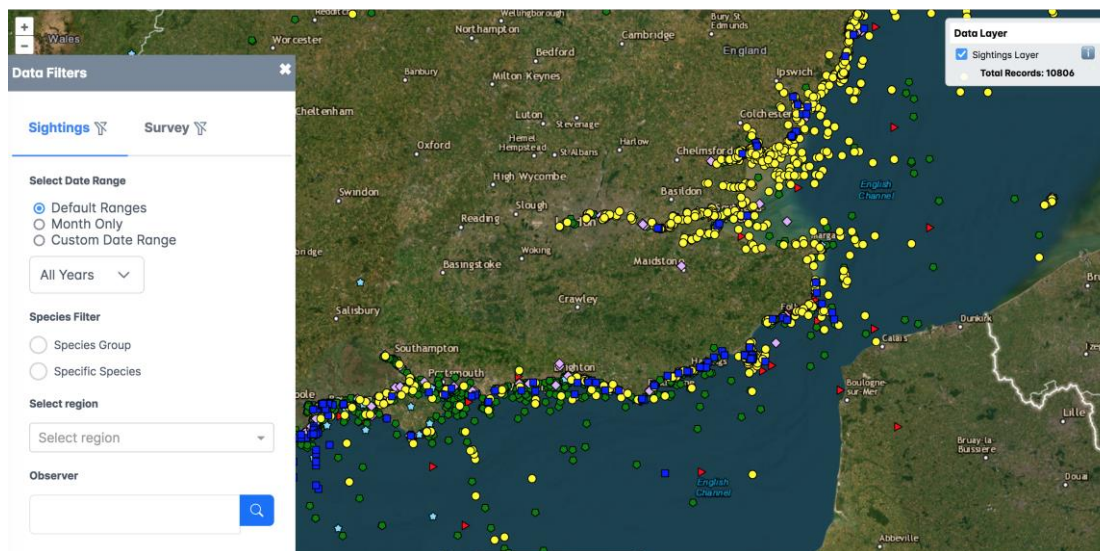
The zoom tool (+/-) is in the top left of the map.

By default, the symbols show by species group. In the top right of the map is a data layer menu indicating the number of records uploaded at that particular zoomed level. Which can be switched on or off to display with or without layers.
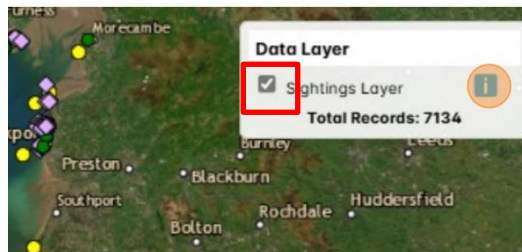
If you click the "i" next to it, a key to the symbols appears on the left. A red triangle = baleen whale, dark blue square – toothed whale, green hexagon = dolphin, yellow circle = porpoise, mauve diamond = seal, and pale blue star = other (shark, turtle or sunfish).
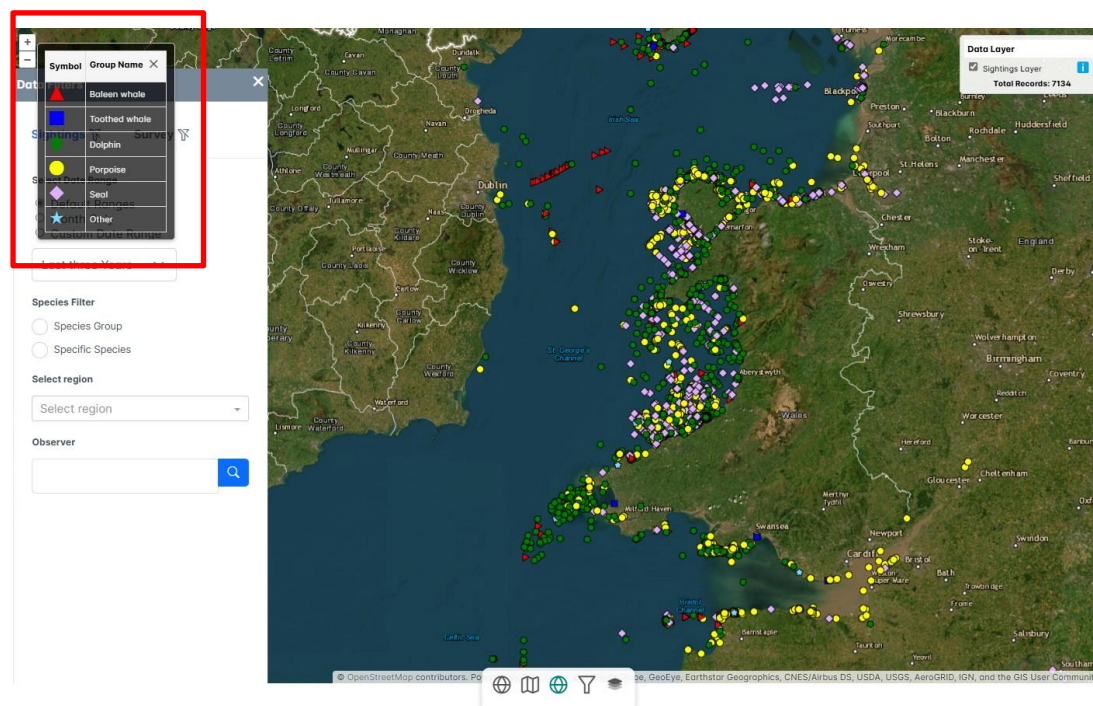
You can, of course, select a particular species as described above, and if you want to change species, dates, region, or observer, click on the "clear filters" tab at the top left of the sightings/survey filter.
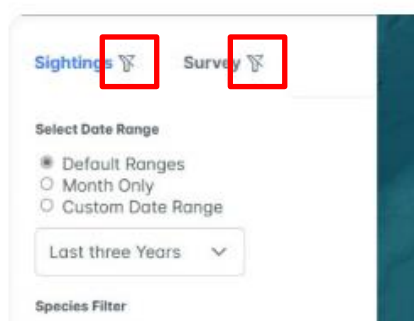
Clicking on a species / species group symbol will provide information on the species, group size, date, and observer (where the observer's name is disclosed; if this has not been disclosed it will appear as "anonymous").
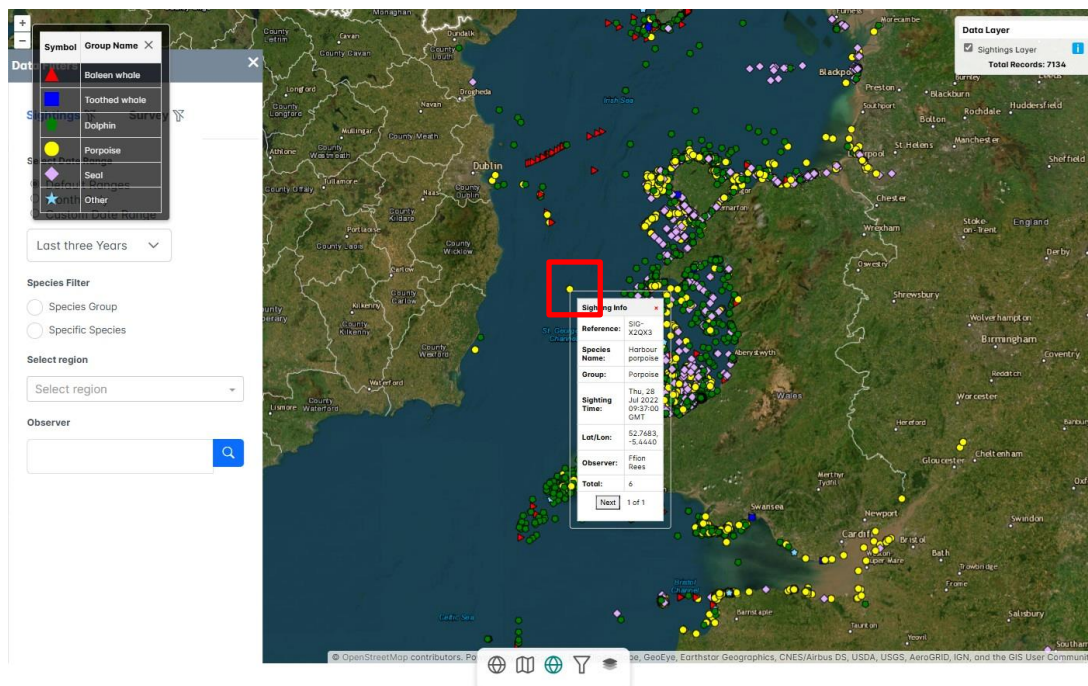
LAYERS

The final icon to the right of the icon for filtering species/surveys is the **layers** icon. Layers can be viewed with or without sightings and surveys, and multiple layers can also be view simultaneously.
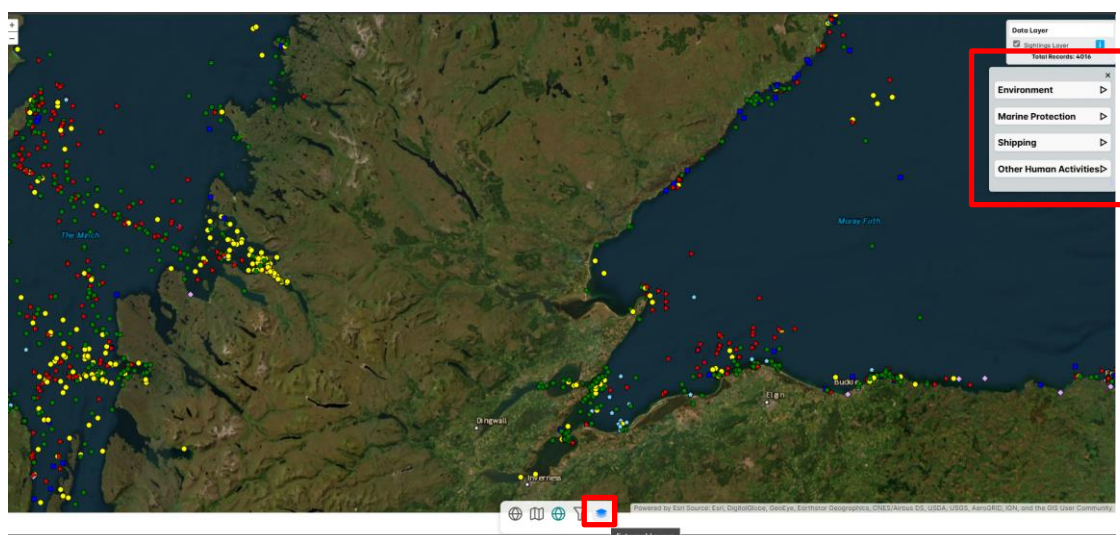
There are four main categories: **Environment**, **Marine Protection**, **Shipping**, and **Other Human Activities**. These are detailed below:

Environment: All of the static variables (the first two and the last two listed below) are provided through the European Marine Observation and Data Network (EMODnet); the remaining four dynamic variables that vary over time come from the COPERNICUS system.

Bathymetric contours
These are generated automatically from the EMODnet bathymetry service with contour lines at the following intervals: 50, 100, 200, 500, 1,000, and 2,000 metres depth.

Mean Depth Rainbow Colour
Generated also from EMODnet bathymetry service, the colours aid in distinguishing mean depths within different depth ranges, with red being most shallow, then yellow, then green, pale blue, dark blue, and finally at greatest depths, mauve. Click on the "i" to see the colour scale. Some species (e.g. sperm whale, beaked whales) favour deep (>500 m) waters; others (e.g. Atlantic white-sided dolphin, common dolphin, fin whale) may associate with the shelf edge (at depths of 100-200 m); whilst porpoises, for example, are mainly over the shelf (<100 m depth). Any marked changes in depth may attract cetaceans and seals.
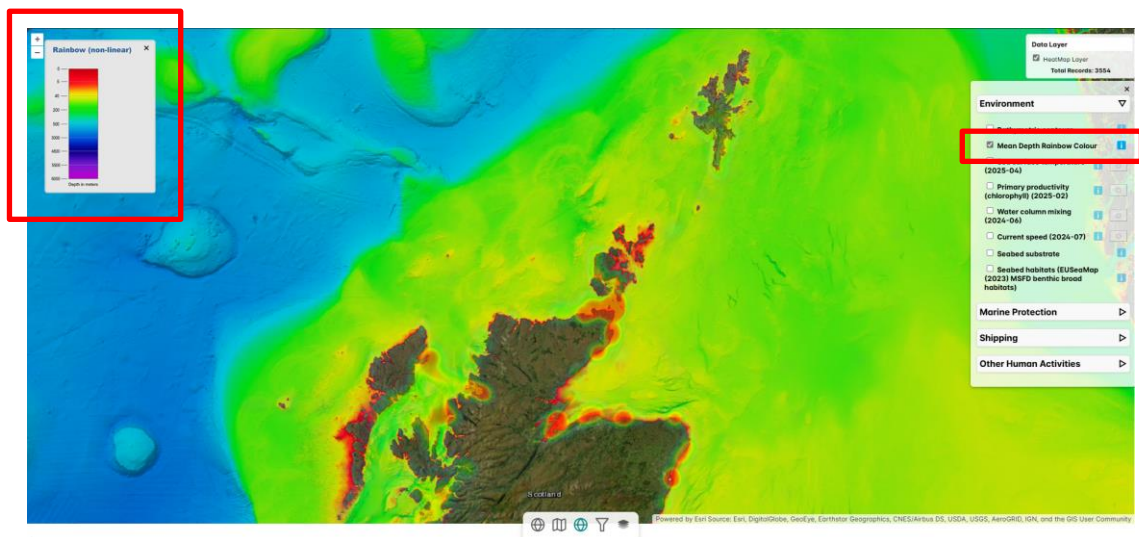
Sea surface temperature

The sea surface temperature measurements are derived from satellite and are provided by COPERNICUS. The latest measurement available is shown in parentheses after the sea surface temperature label (e.g. 2005-03 would mean March 2025 and would apply to the 1st of the month). Any month and year prior to the latest can be selected by clicking on the box to the right of the "i" icon. Currently, we are waiting for Copernicus to provide the key to the scale. Colours vary from dark blue (coldest), through pale blue, green, yellow, and red (warmest). Persistent warm sea temperatures may bring warmer water fish species further north, and cetaceans such as common and striped dolphins following these.
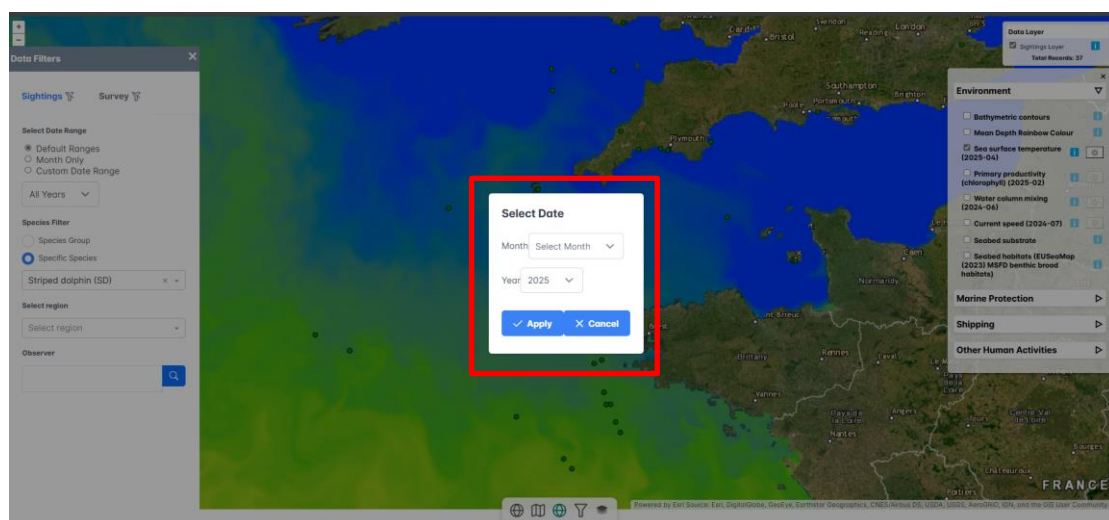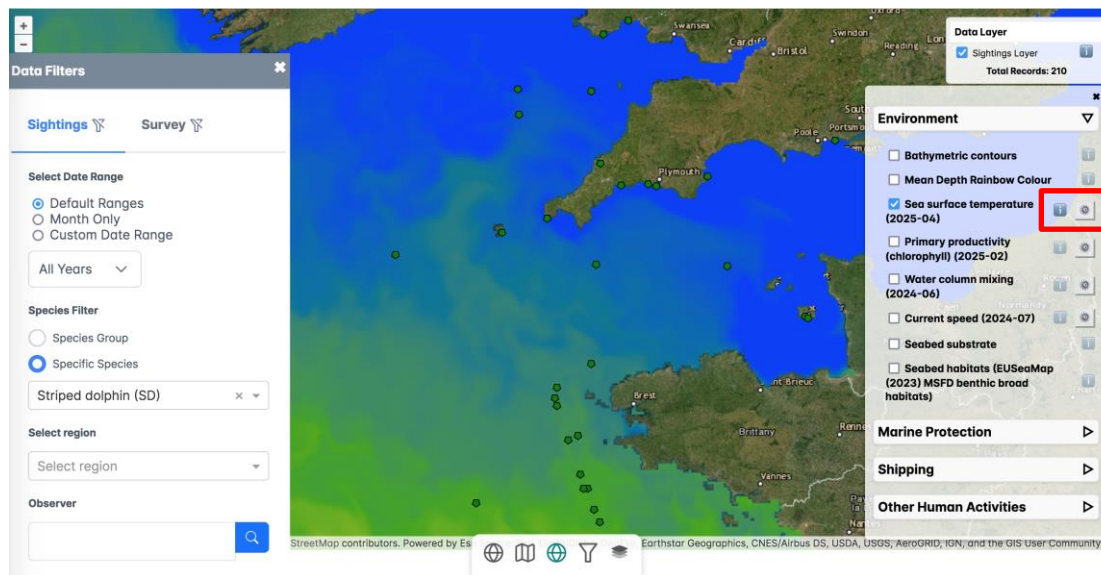
Primary productivity (chlorophyll)
Primary productivity measurements representing chlorophyll levels are derived from satellite provided by COPERNICUS. The latest measurement available is shown in parentheses after the primary productivity label (e.g. 2005-01 would mean January 2025 and would apply to the 1st of the month). Any month and year prior to the latest can be selected by clicking on the box to the right of the "i" icon. Again, we are waiting for Copernicus to provide the key to the scale. If a map will not upload for an earlier date, clear the filter and re-start. You may need to re-start entirely. The colour scale is represented by shades of green with darkest being where chlorophyll levels are highest. Regions of high chlorophyll (or adjacent to those areas) may result in zooplankton concentrations attracting plankton feeding whales such as fin whale, or shoaling fish which in turn attract their predators such as minke whale and common dolphin.

Water column mixing
Marine environments are broadly divisible into mixed and stratified water columns. Chemical and physical properties are similar across depths in mixed water columns but differ greatly across depths in stratified water columns. Typically, in the latter, the water column is divided into a shallow and deep water-mass. The Mixed Layer Depth (MLD) is indicative of the thermocline, which is the boundary between the shallow and deep water-masses. Higher values indicate deeper (or absent) thermoclines, whereas smaller values indicate shallower thermoclines. In this instance, the MLD is derived from oceanographic models provided by COPERNICUS. Mixing and stratification influences primary productivity and often determines when and where animals at higher trophic levels choose to forage.

The latest month and year available is shown in parentheses after the water column mixing label (e.g. 2004-06 would mean June 2024 and would apply to the 1st of the month). Any month and year prior to the latest can be selected by clicking month and year in the box to the right of the "i" icon. As with the previous dynamic variables, we are currently waiting for Copernicus to provide the key to the scale. If a map will not upload for an earlier date, clear the filter and re-start. You may need to re-start entirely. The colour scale ranges from yellow (little stratification) to orange, then mauve and then blue (greatest stratification). Look to see where fronts may be occurring as colours transition from the lightest (yellow, indicating little stratification) to the darkest (blue, indicating greatest stratification). These can be important for several species of whale and dolphin.

Current speed
Current speed is measured using data provided by COPERNICUS. The latest month and year available are shown in parentheses after the current speed label (e.g. 2004-06 would mean June 2024 and would apply to the 1st of the month). Any month and year prior to the latest can be selected by clicking month and year in the box to the right of the "i" icon. Currently, we are waiting for Copernicus to provide the key to the scale. If a map will not upload for an earlier date, clear the filter and re-start. You may need to re-start entirely. The colour scale ranges from light brown (weakest currents) to darker brown, light green to

dark green (strongest currents). The arrows show the main direction of water movement. Areas with strong currents (often around headlands and channels between islands) are foraging locations for species such as harbour porpoise and minke whale.

Seabed substrate
The seabed substrate from mud through sand, gravel, mixed sediment and rock is mapped across the NW European continental shelf seas using data provided to EMODnet. Click on the "i" to see the colour scale (note that the scale is presented by EOMDnet in triplicate). The map is collated and harmonized from seabed substrate information within the EMODnet Geology project. Where necessary, the existing seabed substrate classifications (of individual maps) have been translated to a scheme that is supported by EUNIS. This EMODnet reclassification scheme includes at least five seabed substrate classes. Four substrate classes are defined on the basis of the modified Folk triangle (mud to sandy mud; sand; coarse sediment; and mixed sediment) and one additional substrate class (rock and boulders) was added. If the original seabed substrate dataset has enabled more detailed substrate classification, classifications with 7 and 16 substrate classes may become available. Note: The data may include some errors, e.g. data discontinuities. Different substrate types are used by different species of fish and invertebrate. Areas of sand are good habitats for sand eels and various flatfish species, which may be preyed upon by porpoises or coastal bottlenose dolphins.

Seabed habitats (EUSeaMap (2023) MSFD benthic broad habitats)
A more detailed classification of seabed habitats derived from EU Sea Map (published in 2023) presents the main benthic habitats as used within the EU Marine Strategy Framework Directive (MSFD). Click on the "i" to see the colour scale. Note that obtaining detailed maps of habitat types, particularly at a high resolution, is very challenging and may not necessarily be accurate, particularly with reference to features such as biogenic reefs. Some may be represented, but others may be overlooked; conversely, some may be missed or have become degraded. The map was produced using a modelling approach (at a scale of around 100 metres) with classified habitat descriptors to determine a final output habitat. Habitat descriptors differ per region but include: Biological zone Energy class Oxygen regime Salinity regime Seabed substrate Riverine input Habitat descriptors (excepting Substrate) are calculated using underlying physical data and thresholds derived from statistical analyses or expert judgement on known conditions. The model includes the sublittoral zone only; due to the high variability of the littoral zone, a lack of detailed substrate data, and the resolution of the model, it is difficult to predict littoral habitats at this scale. Biogenic reefs may attract several species of fish upon which species such as coastal bottlenose dolphins, white-beaked dolphins, grey and harbour seals may prey.

Marine Protection:

IUCN Important Marine Mammal Areas
The IUCN Marine Mammal Protected Area Task Force, working with marine mammal scientists from all around the world have identified a network of Important Marine Mammal Areas. This map displays all of those selected to date. For more details on each IMMA, go to the following link: https://www.marinemammalhabitat.org/imma-eatlas/

Protected Areas
   Regional Seas Conventions MPAs
The dataset on Marine Protected Areas (MPAs) established under the framework of the Regional Sea Conventions (RSCs) was created in 2023 by Cogea for the European Marine Observation and Data Network (EMODnet). It is based upon spatial data provided by HELCOM, by SPA/RAC and MedPAN through the MAPAMED database, and by OSPAR. It is available for viewing and download on the EMODnet web portal (under Human Activities, https://emodnet.ec.europa.eu/en/human-activities). The dataset displays all the MPAs as officially reported by the respective Contracting Parties to the Helsinki Convention, to the Barcelona Convention, and to the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR). The RSC MPAs are established in order to promote the cooperation in the management and conservation of natural areas, as well as in the protection of threatened species and their habitats. Each RSC MPA may be established in the marine and coastal zones subject to the sovereignty or jurisdiction of the Parties and in areas situated partly or wholly on the high sea. Thus, the dataset covers the MPAs Beyond National Jurisdiction (ABNJ) and the MPAs in the following countries: Albania, Algeria, Belgium, Cyprus, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Italy, Latvia, Lebanon, Lithuania, Monaco, Morocco, Netherlands, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Tunisia, and the United Kingdom. Where available, each polygon has the following attributes: Regional Sea Convention (Barcelona, HELCOM, OSPAR), code, name (English and/or original), country, designation, IUCN category (Ia, Ib, II, IV, V, not applicable, not assigned, not reported), area square km (reported, calculated), marine area square km (reported, calculated), status (adopted/designated, managed or partly managed, proposed), establishment year, management authority, site link. This information is not on our map viewer but can be seen by going directly to the EMODnet web portal. For further information please visit the data providers' websites. This dataset covers the last updated versions released in 2021 and 2022 by HELCOM and MAPAMED, and in 2024 by OSPAR.

   Natura 2000 sites
The dataset on Natura 2000 sites was created in 2014 by Cogea for the European Marine Observation and Data Network. It is entirely based on spatial data from the European Environmental Agency (EEA), plus additional info, links and selected EEA data joined to the feature attributes, as well as the Cogea's calculation of marine and coastal location of features. It is available for viewing and download on the EMODnet web portal (Human Activities, https://emodnet.ec.europa.eu/en/human-activities). Natura 2000 is an

ecological network composed of sites designated under the Birds Directive (Special Protection Areas, SPAs) and the Habitats Directive (Sites of Community Importance, SCIs, and Special Areas of Conservation, SACs). The dataset covers the whole EU. Following the United Kingdom's withdrawal from the EU on 31 January 2020, it ceased to be part of the EEA's institutional networks and governance. In the webmap, the EEA dataset has been filtered to show only (i) marine sites, i.e. sites with a marine area percentage higher than 0 (as calculated by the EEA) and (ii) sites that, even if not identified as marine by the EEA, intersect the EEA coastline or that are within a distance of 1 km from the coastline (using a 1 km inner buffer from the EEA coastline). In both cases the COAST_MAR field value = 1. The EEA coastline dataset is available at https://www.eea.europa.eu/data-and-maps/data/eea-coastline-for-analysis-2. Where available, each polygon has the following attributes: site code, site name, country code, country name, site type (A, B, C), site description (Special Conservation Interest - SCI, Special Protection Areas - SPA, Both SPA and SCI), link to directive, area (ha), marine area percentage, release date, date classified as SPA, date confirmed as SCI, date designated as SAC, marine/coastal location of feature. This information is not on our map viewer but can be seen by going directly to the EMODnet web portal. Compared with the previous version, this one includes the updated dataset 'Natura 2000 End 2022', published by the EEA in April 2024. For further information (e.g. biogeographic region, directive, habitats, sites, impact, management, species and metadata), please visit the EEA's website hosting the Natura 2000 tabular data.

Emerald Network

The dataset on Emerald Network sites was created in 2023 by Cogea for the European Marine Observation and Data Network. It is entirely based on spatial data from the European Environmental Agency (EEA), plus additional information and selected EEA tabular data added as feature attributes. It is available for viewing and download on the EMODnet web portal (Human Activities, https://emodnet.ec.europa.eu/en/human-activities). The Emerald Network is an ecological network made up of Areas of Special Conservation Interest designated under Recommendation No. 16 (1989) and Resolution No. 3 (1996) of the Standing Committee to the Bern Convention. The objective of the Emerald Network is the long-term survival of the species and habitats. The Network involves all the European Union member States (the European Union contributes to the Emerald Network with its Natura 2000 sites), some non-Community States and a number of African States. This dataset covers the following countries: Albania, Andorra, Armenia, Azerbaijan, Bosnia and Herzegovina, Georgia, Iceland, Liechtenstein, Moldova, Montenegro, North Macedonia, Norway, Serbia, Switzerland, Ukraine and the United Kingdom. In the webmap the dataset has been filtered in order to show only marine and coastal sites. Where available, each polygon has the following attributes: site code, site name, country code, country name, site type/description (A: SPA, Special Protection Areas - sites designated under the Birds Directive; B: SCIs and SACs, Sites of Community Importance and Special Areas of Conservation - sites designated under the Habitats Directive; C: where SPAs and SCIs/SACs boundaries are identical, sites are designated under both directives), site status (Proposed, Candidate or Adopted), compilation date, update date, area (ha),

marine area percentage, marine/coastal location. This information is not on our map viewer but can be seen by going directly to the EMODnet web portal. For further information (e.g. biogeographic region, designation status, sites, habitats, impact, management, species and metadata) please visit the EEA's website hosting the Emerald tabular data (https://www.eea.europa.eu/data-and-maps/data/emerald-network-data-1/emerald-tabular-data). This version covers the reporting in 2023 as adopted by the Standing Committee to the Bern Convention in December 2023. As a result of a written consultation of Contracting Parties carried out between 28th June and 15th September 2023, the Emerald Network sites located on the territory of Belarus and of the Russian Federation had been suspended until further notice and removed from the Emerald Network tools.

Shipping:

Route Density Annual Totals
The Vessel Density maps in the EU are created since 2019 by Cogea for the European Marine Observation and Data Network (EMODnet). The dataset is updated every year and is available for viewing and download on the EMODnet Human Activities web portal (https://emodnet.ec.europa.eu/en/human-activities). The maps are based on AIS data yearly purchased from Collecte Localisation Satellites (CLS) and ORBCOMM. The maps, GeoTIFF format, show shipping density in 1x1 km cells of a grid covering all EU waters and some neighbouring areas. Density is expressed as hours per square kilometre per month. The following ship types are available: *Cargo vessels, Fishing vessels, Other vessels, Passenger vessels, Tanker* and *All ship types.* Data are available by month of year. Yearly averages are also available.

Vessel Density Annual Average
The Vessel Density maps in the EU are created since 2019 by Cogea for the European Marine Observation and Data Network (EMODnet). The dataset is updated every year and is available for viewing and download on EMODnet Human Activities web portal (https://emodnet.ec.europa.eu/en/human-activities). The maps are based on AIS data yearly purchased from Collecte Localisation Satellites (CLS) and ORBCOMM. The maps, GeoTIFF format, show shipping density in 1x1 km cells of a grid covering all EU waters and some neighbouring areas. Density is expressed as hours per square kilometre per month. The following ship types are available: *Cargo, Dredging or underwater operations, Fishing, High speed craft, Military & Law Enforcement, Passenger, Pleasure Craft, Sailing, Service, Tanker, Tug and Towing and All ship types.* Data are available by month of year. Yearly averages are also available.

Other Human Activities:

Fishing Intensity
The datasets on fishing intensity in EU waters by sea basin are created every year by the International Council for the Exploration of the Sea (ICES). In 2020 Cogea started to collect and harmonize them according to the EMOdnet Human Activities dataset schema. The EMODnet dataset is updated yearly, as soon as new data from ICES Fishing Overviews are released and is available for viewing and download on the EMODnet web portal (Human Activities, https://emodnet.ec.europa.eu/en/human-activities). Where and when available, the fisheries overview fishing intensity data concern: i) the spatial distribution of average annual fishing effort (mW fishing hours) by ecoregion (Azores, Bay of Biscay and the Iberian Coast, Baltic Sea, Barents Sea, Celtic Seas, Faroes, Greater North Sea, Icelandic Waters, Norwegian Sea and Oceanic Northeast Atlantic) and by gear type *(Beam trawls, Bottom otter trawls, Bottom seines, Dredges, Pelagic trawls and seines, Static gears)*. Fishing effort data are only shown for vessels >12 m having vessel monitoring systems (VMS); ii) the *average annual subsurface* (top) and bottom contacting surface (bottom) mobile fishing gear (i.e. *Bottom otter trawls, bottom seines, dredges, beam trawls*) disturbance by ecoregion in the Bay of Biscay and the Iberian Coast, Baltic Sea, Barents Sea, Celtic Seas, Faroes, Greater North Sea, Icelandic Waters, Norwegian Sea and Oceanic Northeast Atlantic, expressed as average swept-area ratios (SAR). Due to data confidentiality issues, VMS/logbook data are anonymized and aggregated in a 0.05×0.05 degree grid prior to submission to ICES, using the C-squares geocode system (polygons). The last data loaded into the database, from the ICES 2024 Fishing Overview update or revision (where available), report the 2019-2022 averages. Historical data are also included in the database, starting from the 2020 fishing overview, and reporting the 2015-2018, 2017-2020, 2018-2021, and 2019-2020 averages.

Underwater Noise
Impulsive noise events measured in Pulse Block Day Unit. A PBDU is the number of days in a calendar year in which impulsive sound activity occurred within the cell-grid. The product applies a common grid (10' latitude x 20' longitude) to harmonize the Regional Conventions events DBs. These data are collected at national level and contribute to the Sea Regional Convention events registry. ICES (http://underwaternoise.ices.dk/map.aspx) is hosting OSPAR and HELCOM registries. Mediterranean data are integrated from CTN under the ACCOBAMS demonstrator (http://accobams.noiseregister.org/).

Oil & Gas
The dataset on *offshore active licences* for Oil and Gas exploitation and exploration in European seas was created in 2014 by Cogea for the European Marine Observation and Data Network (EMODnet). It is the result of the aggregation and harmonization of datasets provided by several EU and non-EU sources. It is available for viewing and download on the EMODnet web portal (Human Activities, https://emodnet.ec.europa.eu/en/human-activities). The dataset contains polygons representing the currently active licences in the following countries: Croatia, Cyprus, Denmark, Germany, Ireland, Italy, Malta,

Netherlands, Norway, Poland, Spain and United Kingdom. Where available each polygon has the following attributes: country, code, name, type (exploitation, exploration, exploitation and exploration, other), licensing round (it includes also pending applications in Spain), area (square km), area info (it indicates if the area value is original from the source or has been calculated), valid from, valid to, operator or administrator, notes. This more detailed information is not on our map viewer but can be seen by going directly to the EMODnet web portal. Currently there are no active licenced areas in the French and Portuguese waters and no data available for other countries.

Offshore Installations
The dataset on offshore installations for Oil and Gas exploitation and exploration activities was created in 2015 by Cogea for the European Marine Observation and Data Network (EMODnet). It is the result of the aggregation and harmonization of datasets provided by several EU and non-EU sources. It is updated every year and is available for viewing and download on the EMODnet Human Activities web portal (https://emodnet.ec.europa.eu/en/human-activities). It contains points representing offshore installations and where available each point has the following attributes: ID, name, country, location block, operator, production start year, primary production, current status, category and function of the installation, sub-structure and topside weights (tonnes), water depth (metres), distance to coast (metres) and notes. The OSPAR Commission source covers data for Germany, Ireland, Spain (Atlantic Sea), while for Italy, data have been collected and harmonized from the Italian Ministry of Economic Development, for Denmark from the Danish Energy Agency, for the Netherlands from the TNO - Geological Survey of the Netherlands, for Croatia from the Croatian Hydrocarbon Agency, for Norway from the Norwegian Petroleum Directorate, for the UK from the Oil and Gas Authority (surface infrastructures), for Polish and Russian installations in the Baltic Sea from Marine Traffic and HELCOM, finally from Marine Traffic come the data for Bulgarian, Russian and Ukrainian installations in the Black Sea and for Lybian and Spanish installations in the Mediterranean Sea. Compared with the previous version, this new version has been updated for all countries.

Wind Farms
The dataset on offshore wind farms in the European seas was created in 2014 by CETMAR for the European Marine Observation and Data Network (EMODnet). It is the result of the aggregation and harmonization of datasets provided by several sources. It is updated every year and it is available for viewing and download on the EMODnet web portal (Human Activities, https://emodnet.ec.europa.eu/en/human-activities). The dataset contains *points* and/or (where available) *polygons* representing offshore wind farms in the following countries: Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Netherlands, Norway, Poland, Portugal, Spain, Sweden and United Kingdom. Each point and polygon has the following attributes (where available): Name, Nº of turbines, Status (Approved, Planned, Dismantled, Construction, Production, Test site), Country, Year, Power (MW), Distance to coast (metres) and Area (square kilometres). The distance to coast (EEA coastline shapefile) has been calculated using the UTM WGS84 Zone

projected coordinate system where data fall in. This more detailed information is not on our map viewer but can be seen by going directly to the EMODnet web portal.

IMPORTANT NOTE: These layers contain an enormous amount of data, and particularly for the dynamic environmental variables (sea surface temperature, chlorophyll, water column mixing, and current strength) may take some time to upload. If you are not seeing a map (and it is not a recent one which may not be available yet, as indicated by the date next to it), it is best to clear all filters, and re-start or try again later.

Errors can occur and some may have been overlooked. We are still checking records and tracks so please let us know if you see something you may have submitted that needs correcting. And if you are an observer whose name has been withheld but you are happy for it to show, do tell us.

For enquiries, please contact our Sightings Officer, Simone Evans, at simone.evans@seawatchfoundation.org.uk.