ANNEX IV SPECIES RISK ASSESSMENT UISCE ÉIREANN STRATEGIC MODELLING

Prepared by

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1 | INTRODUCTION

The Irish Whale and Dolphin Group (IWDG) was contracted by MERC Environmental Consultants to carry out an Annex IV Species Risk Assessment of proposed water current modelling and bathymetric surveys to be carried out for Uisce Éireann. Annex IV species include cetaceans, marine turtles, otter and bats.

Proposed works

The proposed work involves strategic modelling of water currents to inform the possible locations of waste water outfalls. As part of these investigations Uisce Éireann propose to carrying out the following surveys:

- Vessel based bathymetry (multibeam, single beam)
- Vessel mounted ADCP survey
- Static deployment of ADCPs

Receiving Environment

The receiving environment covers sites from Tramore Co Waterford on the south coast to Wicklow town on the east coast (Figure1). The receiving environment includes the benthos, the benthic, demersal and pelagic fish in the area, and the species listed on Annex IV including marine mammals, marine turtles, otter and bats. Here we only consider the risk to Annex IV species from the proposed works. Survey work will occur within three SACs with cetaceans as qualifying interests.

2 | METHODS

This risk assessment was based on original data collected by the IWDG and a review of the available literature. The IWDG Sightings dataset, which is validated and updated daily was accessed and data from the 10 year period 2014 to 2023 was exported and mapped. Marine mammals and turtles are highly mobile species and sightings in adjacent waters are also considered.

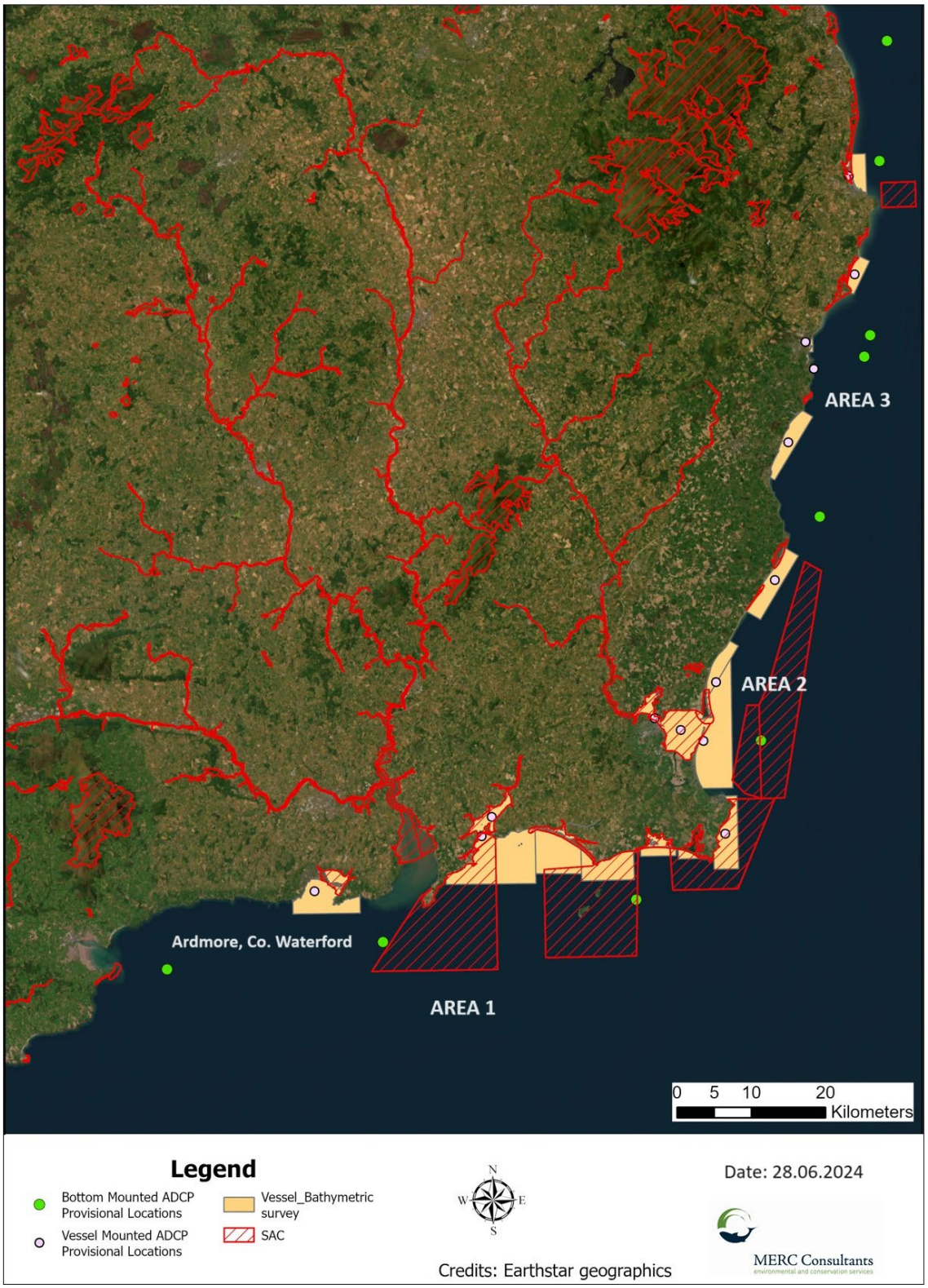


Figure 1: Location of proposed sites for modelling and bathymetric surveys.

3 | LEGAL STATUS

Irish cetaceans (whales, dolphins and porpoises), pinnipeds, otter and leatherback turtle are all protected under national legislation and under a number of international directives and agreements which Ireland is signatory to. All cetaceans, as well as grey and harbour seals, are protected under the Wildlife Act (1976) and amendments (2000, 2005, 2010 and 2012). Under the act and its amendments it is an offence to hunt, injure or wilfully interfere with, disturb or destroy the resting or breeding place of a protected species (except under license or permit). The act applies out to the 12nm limit of Irish territorial waters.

All cetaceans, otter and leatherback turtle are protected under Annex IV of the EC Habitats Directive (92/43/EEC). The Directive lists Annex IV species of community interest 'in need of strict protection'. Pinnipeds are not listed on Annex IV but are listed on Annex II, which also includes the harbour porpoise (*Phocoena phocoena*), bottlenose dolphin (*Tursiops truncatus*), leatherback turtle (*Dermochelys coriacea*) and otter (*Lutra lutra*) which are of community interest and whose conservation requires the designation of special areas of conservation (SACs).

Ireland is also signatory to conservation agreements such as the Bonn Convention on Migratory Species (1983), the OSPAR Convention for the Protection of the Marine Environment of the northeast Atlantic (1992) and the Berne Convention on Conservation of European Wildlife and Natural Habitats (1979).

Under the EU Marine Strategy Framework Directive with respect to maintaining good environmental status (GES), "*human activities should occur at levels that do not adversely affect the harbour porpoise community at the site*" and "*proposed activities or operations should not introduce man-made energy at levels that could result in a significant negative impact on individuals and/or the community of harbour porpoise within the site*". This refers to the "*aquatic habitats used by the species in addition to important natural behaviours during the species annual cycle*".

In 2007, the National Parks and Wildlife Service (NPWS) of the Department of Arts, Heritage and the Gaeltacht produced a '*Code of Practice for the Protection of Marine Mammals during Acoustic Seafloor Surveys in Irish Waters* (NPWS, 2007). These were subsequently reviewed and amended to produce '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters*' (NPWS, 2014). The guidelines recommend that listed coastal and marine activities be subject to a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process.

Once the listed activity has been subject to a risk assessment, the regulator may decide to refuse consent, to grant consent with no requirement for mitigation, or to grant consent subject to specified mitigation measures.

4 | BASELINE ENVIRONMENT

4.1 | Ambient Noise Levels

Ambient, or background noise, is defined as any sound other than the sound being monitored (primary sound) and, in the marine environment, is a combination of naturally occurring biological and physical sound sources including sediment transfer, waves and rain and that of a biological origin including fish, crustaceans and from marine mammals. The impact of noise created by human activity is strongly influenced by background or ambient noise, the impact is less in a noisy environment compared to a quiet environment and it's the intensity and

frequency of this increased noise compared to the ambient levels at a site, which defines its impact. As ambient noise levels increase, the ability to detect a biologically important sound decreases. The point at which a sound is no longer detectable over ambient noise is known as acoustic masking. The range at which an animal is able to detect these signals reduces with increasing levels of ambient noise (Richardson *et al.* 1995). This is important when considering the impact of sound sources on marine mammals by the proposed works.

Ambient noise levels worldwide have been on the rise in recent decades with developments in industry and, in particular, in commercial shipping. In the North Pacific, low frequency background noise has approximately doubled in each of the past four decades (Andrew *et al.* 2002), resulting in at least a 15- to 20-dB increase in ambient noise. In recent years, interest has grown in the effects of anthropogenic noise on marine life.

The ambient noise levels at the sites are not known but are expected to be relatively low overall with increases near ports and harbours (including Waterford, Dunmore East, Rosslare, Arklow and Wicklow) dominated by vessel noise, with peaks in noise due to ferry traffic and larger vessels entering ports and close to shipping routes along the east coast.

4.2 | Marine Mammals

This risk assessment was based on original data collected by the IWDG and a review of the available literature. The IWDG Cetacean Sightings dataset, which is validated and updated regularly with new datasets as they become available was accessed (on 31 May 2024) and data over a 10 year period (2014 to 2023) was exported and mapped.

A total of 1,191 sighting records were accessed (Table 1). At least eight cetacean species were recorded with 82.7% recorded to species level. Most (67.9%) were from the south coast (Area 1) with only 6.4% from the mid-section (Area 2). Harbour porpoise was by far the most frequently recorded species with 32.9% of all records, followed by common dolphin (17.2%), fin (15.5%), minke whale (8.1%) and bottlenose dolphin (4.6%). All fin and all but seven minke whale sightings were in the southern section (Area 1).

Table 1. Cetacean sightings (including IWDG downgrades) recorded off the southeast and east coast and adjacent waters from 2014-2023.

Species	1. South Area		2. Mid Area		3. North Area	
	No. sightings (individuals)	% of records	No. sightings (individuals)	% of records	No. sightings (individuals)	% of records
Harbour porpoise	119(279)	14.7	44(87)	57.1	230(476)	75.4
Bottlenose dolphin	30(220)	3.7	10(37)	13.0	15(188)	4.9
Common dolphin	185(6468)	22.9	3(19)	3.9	17(453)	5.6
Risso's dolphin	24(105)	3.0	1(1)	1.3	3(16)	1
Long-finned pilot whale	1(20)	0.1	0(0)	0	0(0)	0
Dolphin species	76(511)	9.4	18(326)	23.4	34(232)	11.1
Minke whale	90(147)	11.1	1(1)	1.3	6(7)	2
Fin whale	185(464)	22.9	0(0)	0	0(0)	0
Humpback whale	21(31)	2.6	0(0)	0	0(0)	0
Whale species	78(144)	9.6	0(0)	0	0(0)	0
Total	**809(8389)**		**77(471)**		**305(1372)**	

4.2.1 Cetaceans

Area 1: South: Harbour porpoise

Harbour porpoise *(Phocoena phocoena) we*re the most widespread and abundant cetacean species in the southern part of the areas of interest (Fig. 2) but overlapping with the bathymetric surveys areas is low. Harbour porpoise were typically encountered throughout the year as individuals or in small groups of 2-3 animals. Harbour porpoise typically avoid medium and large vessels.

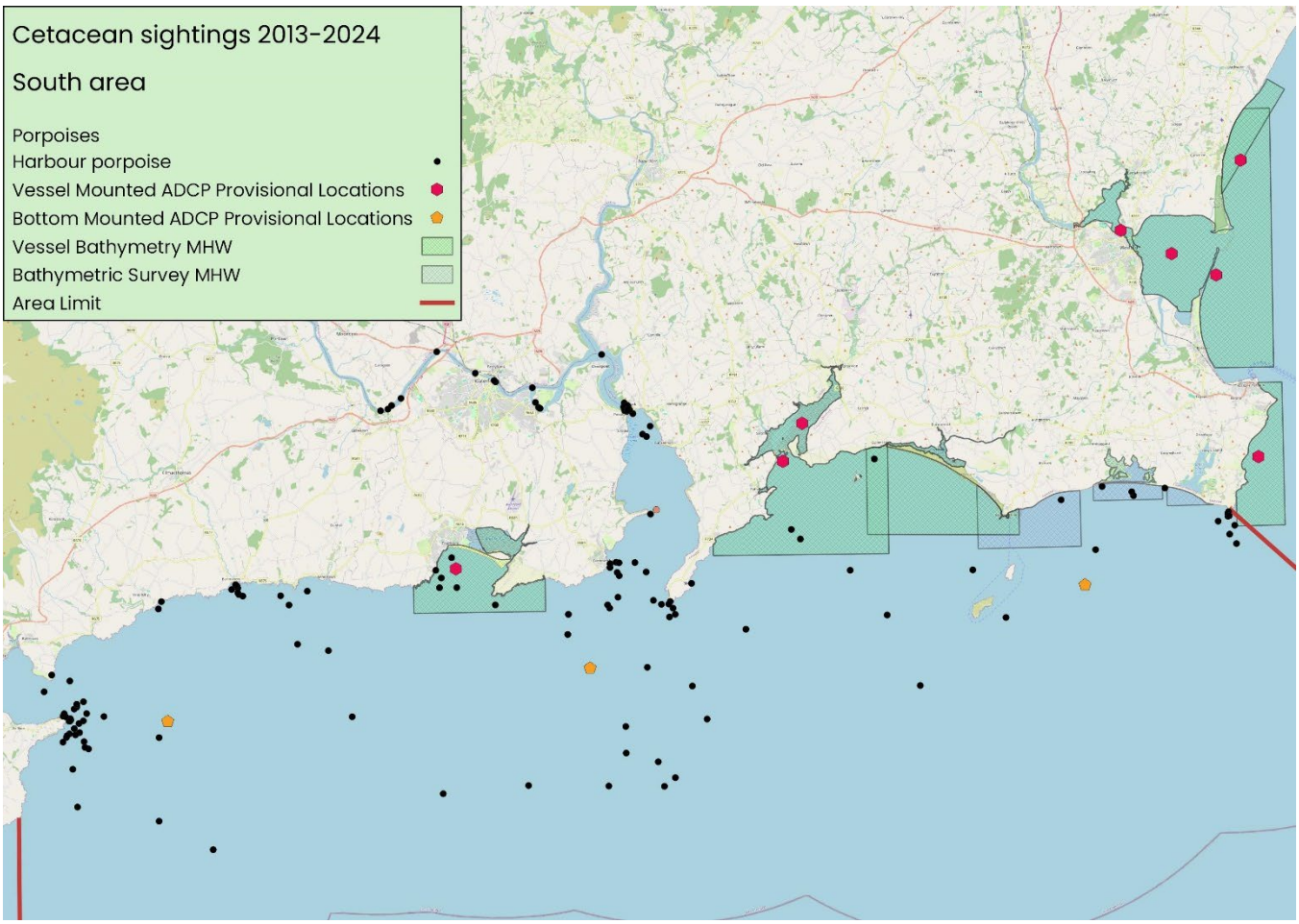


Figure 2: Sightings of harbour porpoise in the southern area of interest

Area 1 South: Dolphins

Bottlenose dolphin (*Tursiops truncatus)* were reported occasionally close to the coast in the southern area of interest and occurring within the proposed bathymetric survey areas (Fig. 3). Animals encountered inshore are likely to derive from a coastal population which range around the entire Irish coastline and also to adjacent UK coasts (O'Brien *et al.* 2009; Robinson *et al.* 2012). Inshore animals will readily approach vessels but are less likely to engage in extended periods.

Common dolphins (*Dephinus delphis*) are frequently recorded in the Celtic Sea with peak counts during autumn (Wall *et al.* 2013). They are widespread in the area of interest both inshore and offshore and

occur within the bathymetric areas of interest (Fig. 3). Risso's dolphin *(Grampus griseus*) were frequently reported around the Saltees Island and occasionally closer to shore in bathymetric areas of interest with long-finned pilot whales (*Globicephala melas*) recorded only once; a large group of 20 individuals (Table 1).

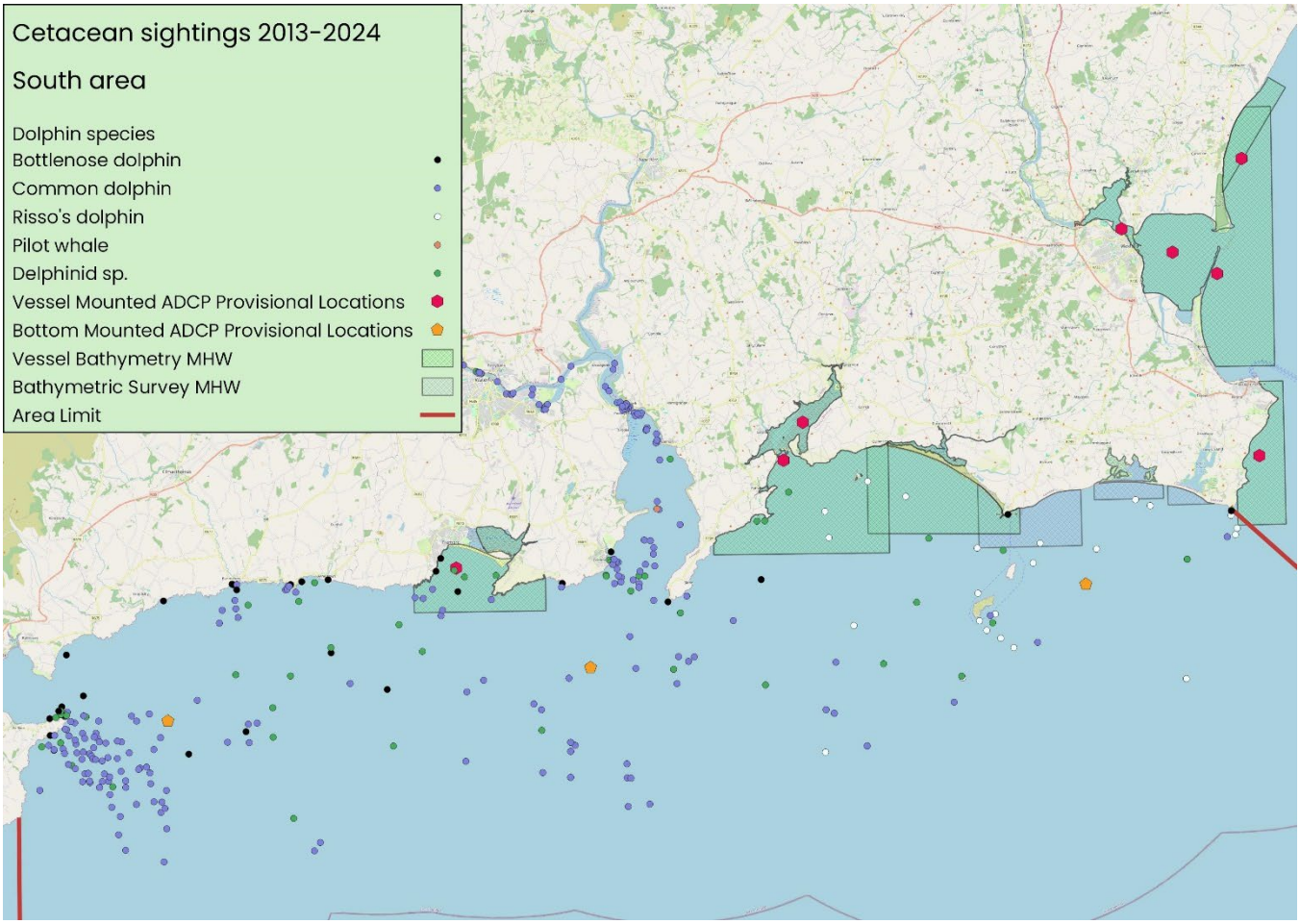


Figure 3: Sightings of dolphins in the southern area of interest

Area 1 South: Whales

A number of whale species have been recorded including fin, humpback and minke whales but most are to the west of the southern area of interest and typically offshore though concentrations occurred off Ram and Hook Heads (Fig. 4). There were few sightings to the east of Hook Head. Fin whales are seasonally abundant, peaking during winter (Whooley et al. 2011) and humpbacks in the autumn (Ryan et al. 2016).

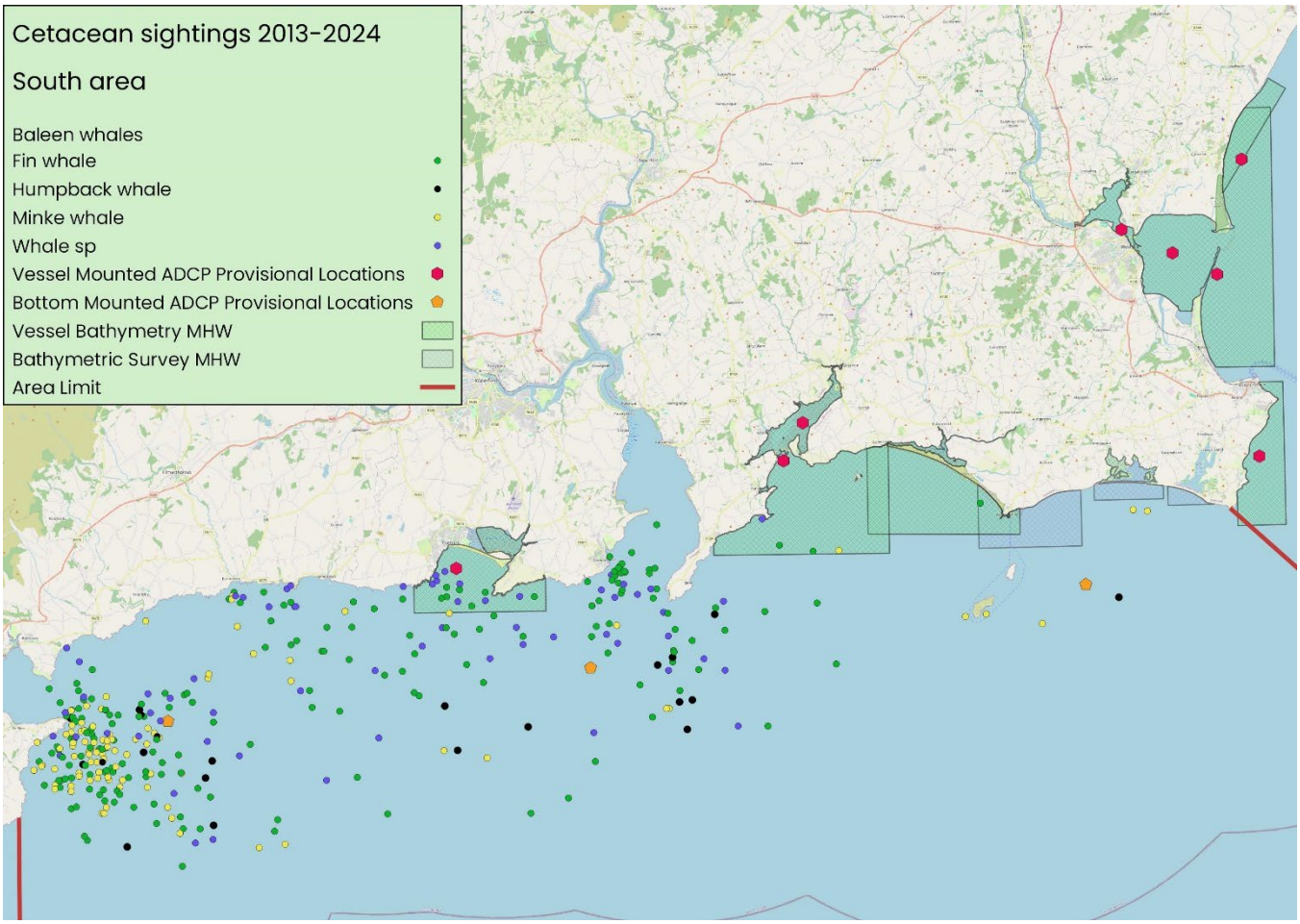


Figure 4: Sightings of whales in the southern area of interest

Area 2 Mid: Harbour porpoise

Harbour porpoise were widespread but only seen occasionally in the mid part of the area of interest (Fig. 5) with sightings only in the bathymetric survey area of interest between Carnsore Point and Rosslare Harbour.

Area 2 Mid: Dolphins

Dolphins including common, bottlenose and Risso's dolphins were recorded in the mid area of interest but only occasionally and generally offshore, outside the areas of interest (Fig. 6).

Area 2 Mid: Whales

Whales were even more scarce with minke whale the only species recorded (Fig. 7).

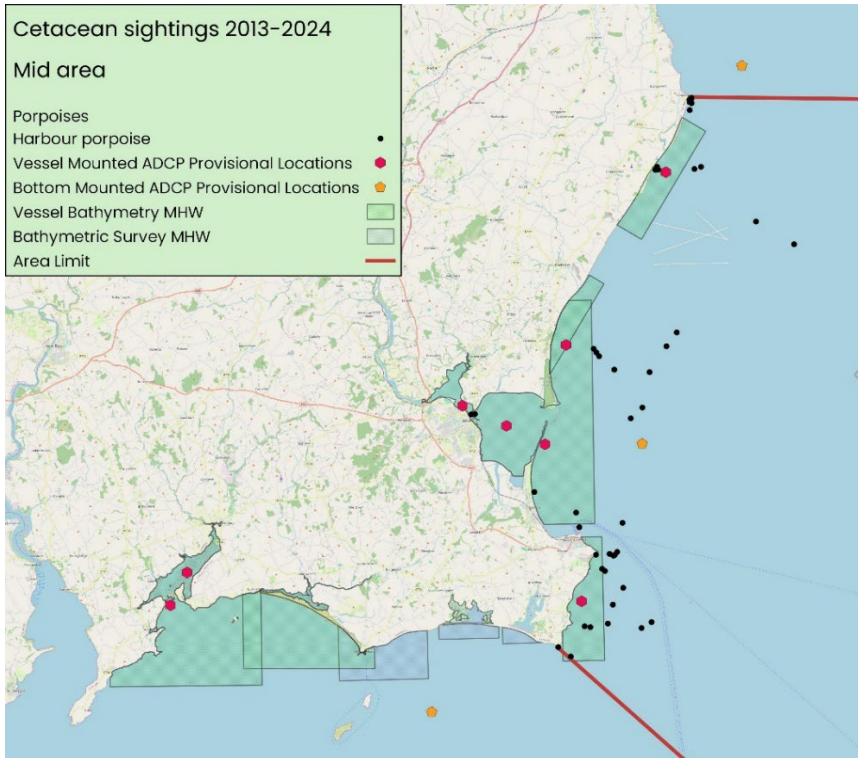


Figure 5: Sightings of harbour porpoise in the southern area of interest

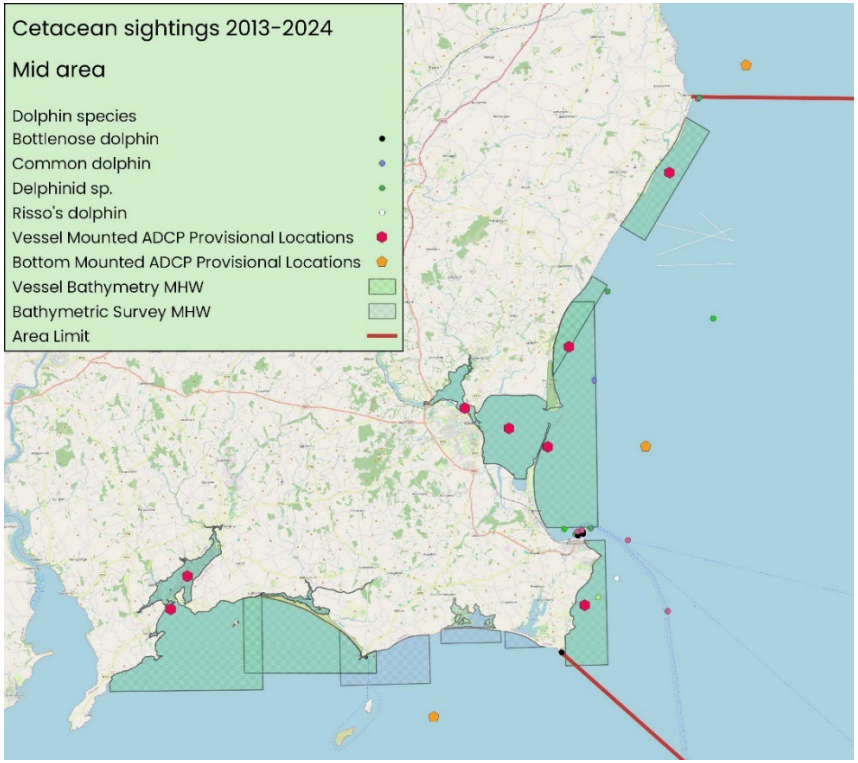


Figure 6: Sightings of dolphins in the southern area of interest

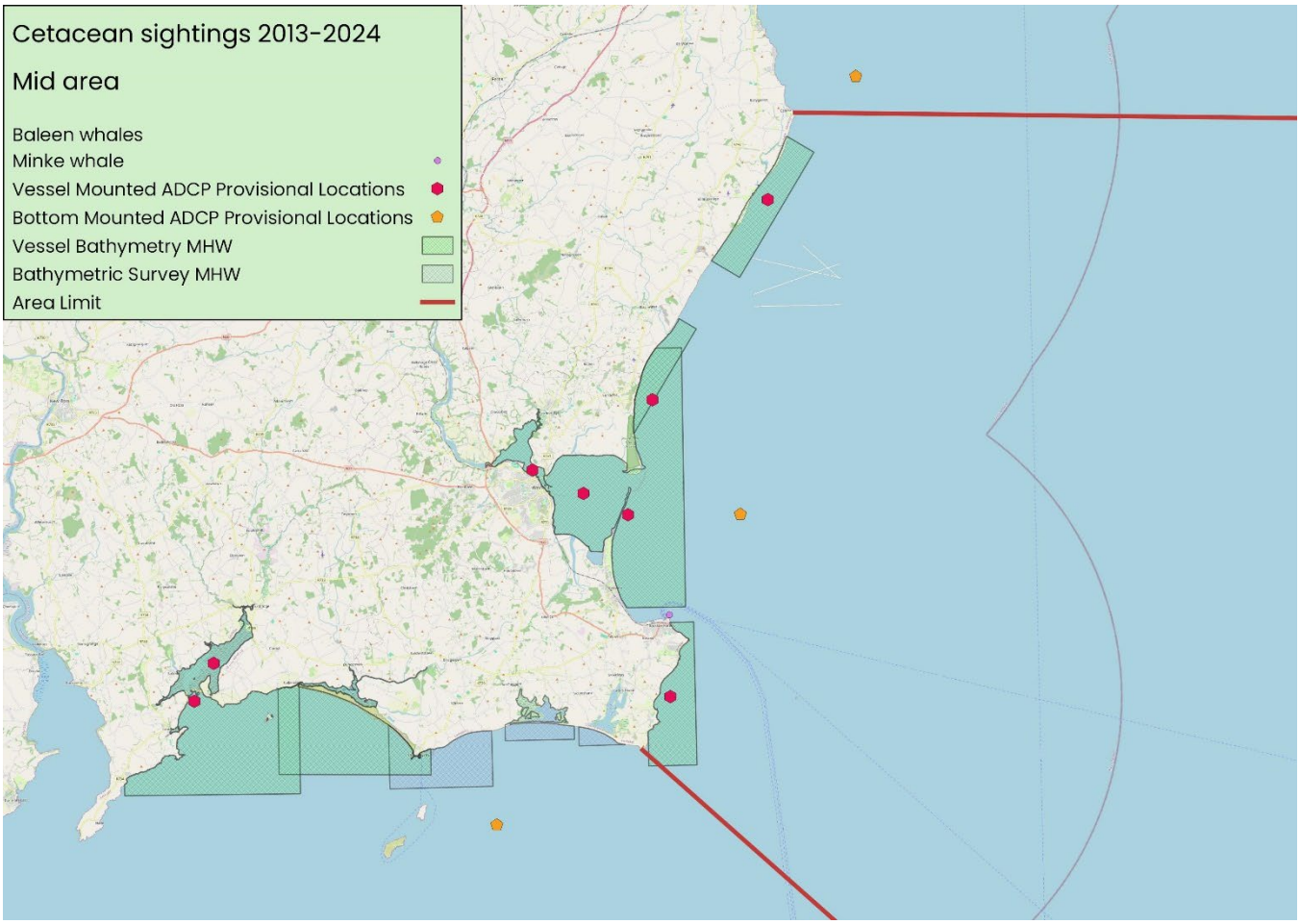


Figure 7: Sightings of whales in the mid area of interest

Area 3 North: Harbour porpoise

Harbour porpoise were widespread in the northern part of the area of interest (Fig. 8) with sightings frequently occurring within the bathymetric survey area of interest.

Area 3 North: Dolphins

Dolphins including common, bottlenose and Risso's dolphins were recorded in the northern area of interest but only bottlenose dolphins occurred regularly close to shore and within the bathymetric survey area of interest (Fig. 9).

Area 3 North: Whales

Whales were only occasionally sighed in the northern area with minke whale the only species recorded (Fig. 10).

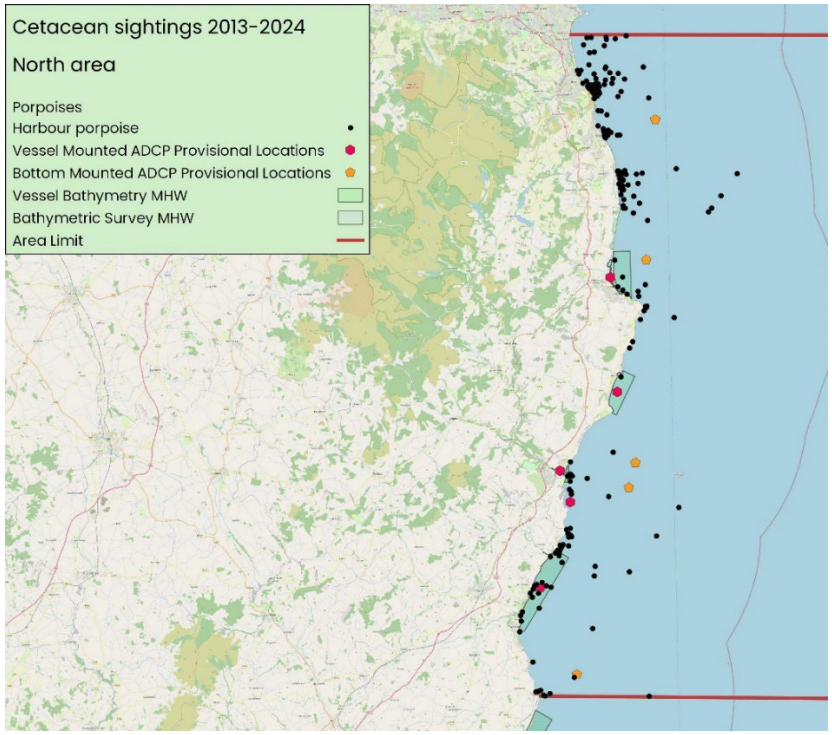


Figure 8: Sightings of harbour porpoise in the northern area of interest

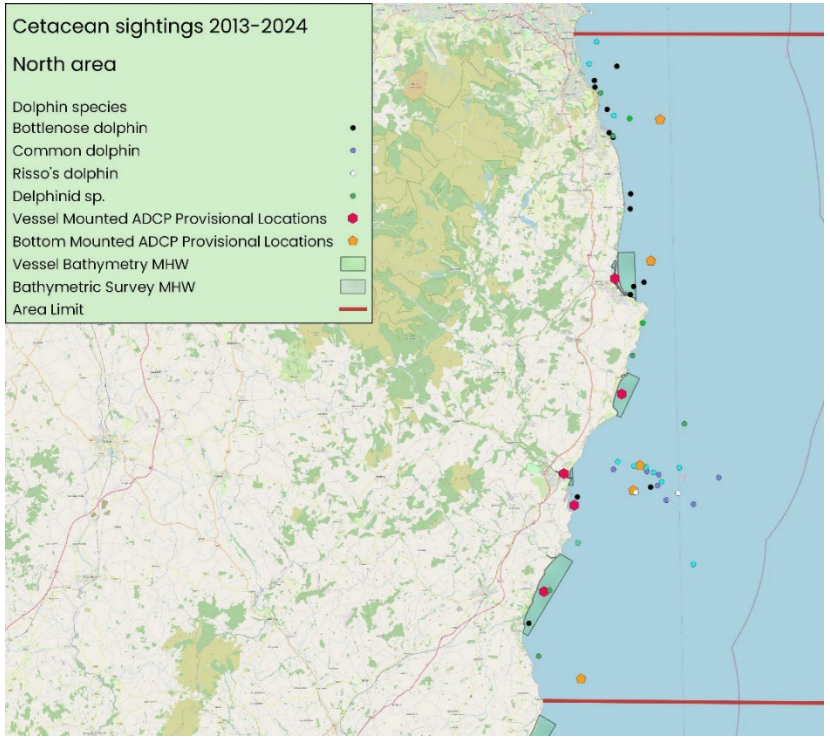


Figure 9: Sightings of dolphins in the northern area of interest

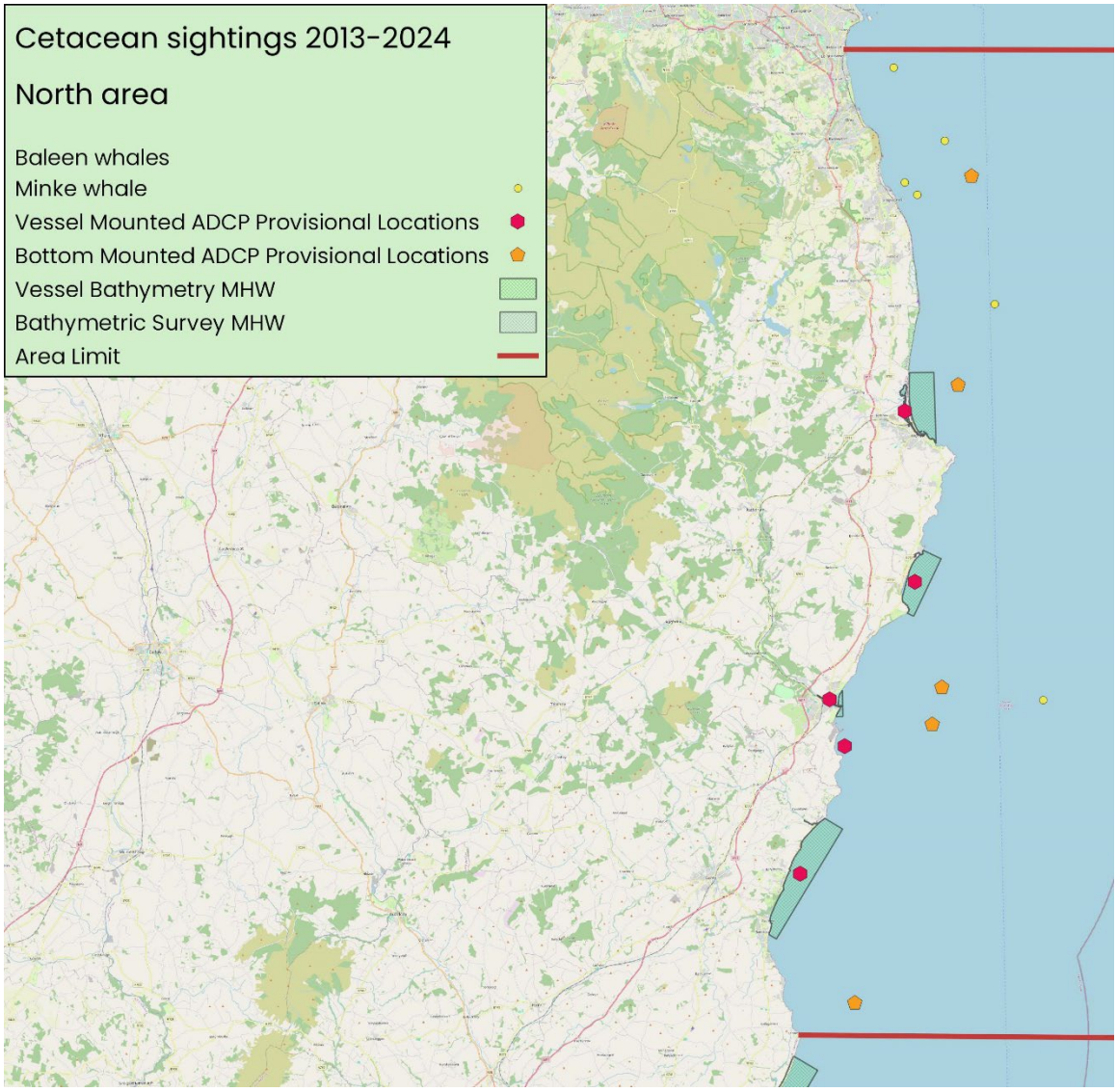


Figure 10: Sightings of whales in the northern area of interest

4.3 Other Annex IV species

Other Annex IV species of interest include marine turtles and bats (Table 3). Data from the National Biodiversity Data Centre was also accessed (on 12 June 2024) to help inform this Annex IV assessment.

Five species of marine turtle have been recorded in Irish waters (King and Berrow 2009; Botterell *et al*. 2020) including: leatherback (or Leathery) turtle (*Dermochelys coriacea)*, loggerhead (*Caretta caret*ta), Kemps Ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata*) and green turtle (*Chelonia mydas*). Hawksbill and green are very rare. Records of hard-shell turtles stranded in the UK, including loggerhead turtles and Kemp's Ridley turtles, have significantly increased over the last 100 years but with a notable decrease in records in the most recent years. The majority of records of hard-shell turtles were juveniles and occurred in the boreal winter months when the waters are coolest in the North-east Atlantic. In contrast to hard-shell turtles, leatherback turtles were most commonly recorded in the boreal summer months with the majority of strandings being adult sized, of which

there has been a recent decrease in annual records (Botterell *et al.* 2020). All five species of marine turtles reported in Ireland are listed on Annex IV of the EU Habitats Directive.

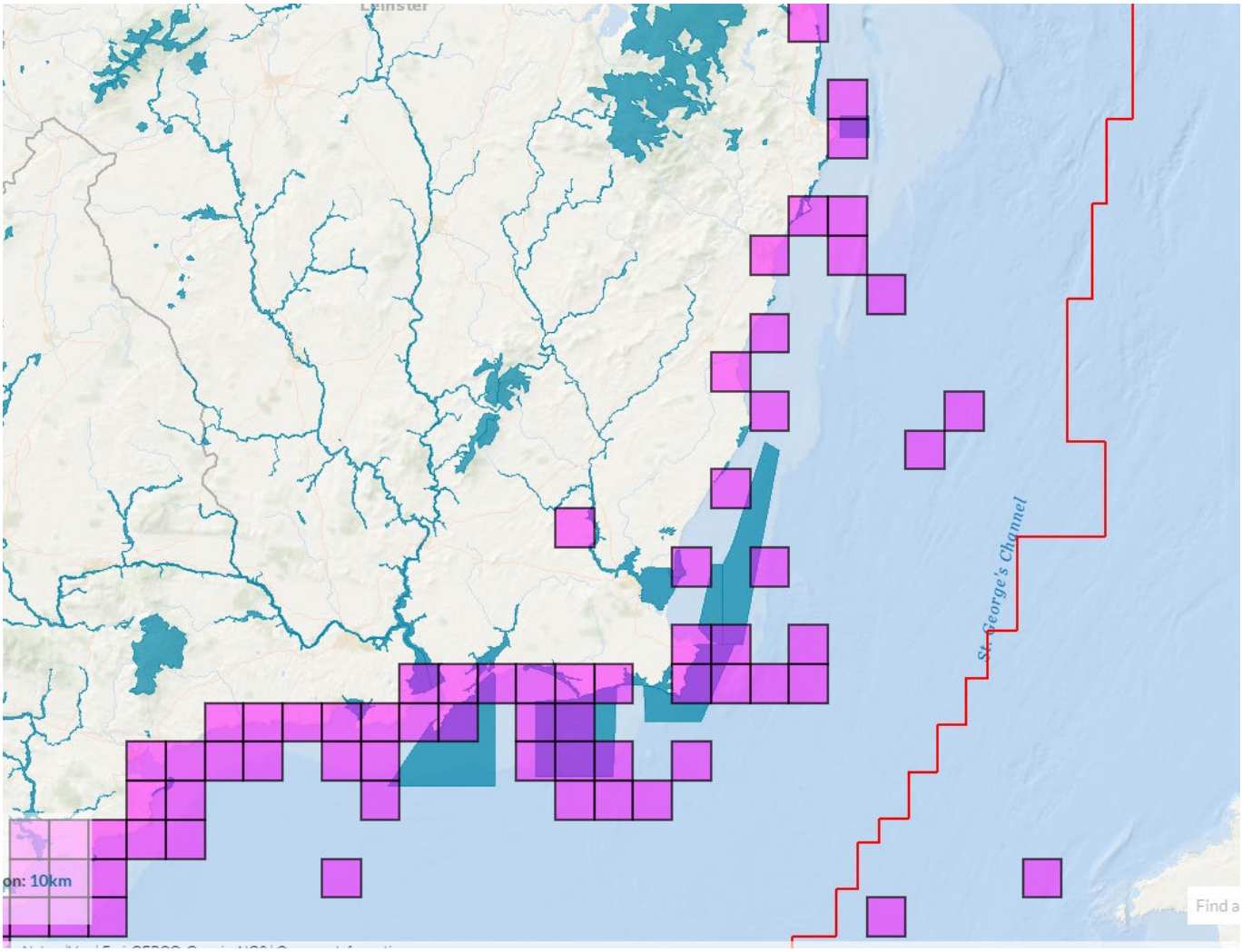


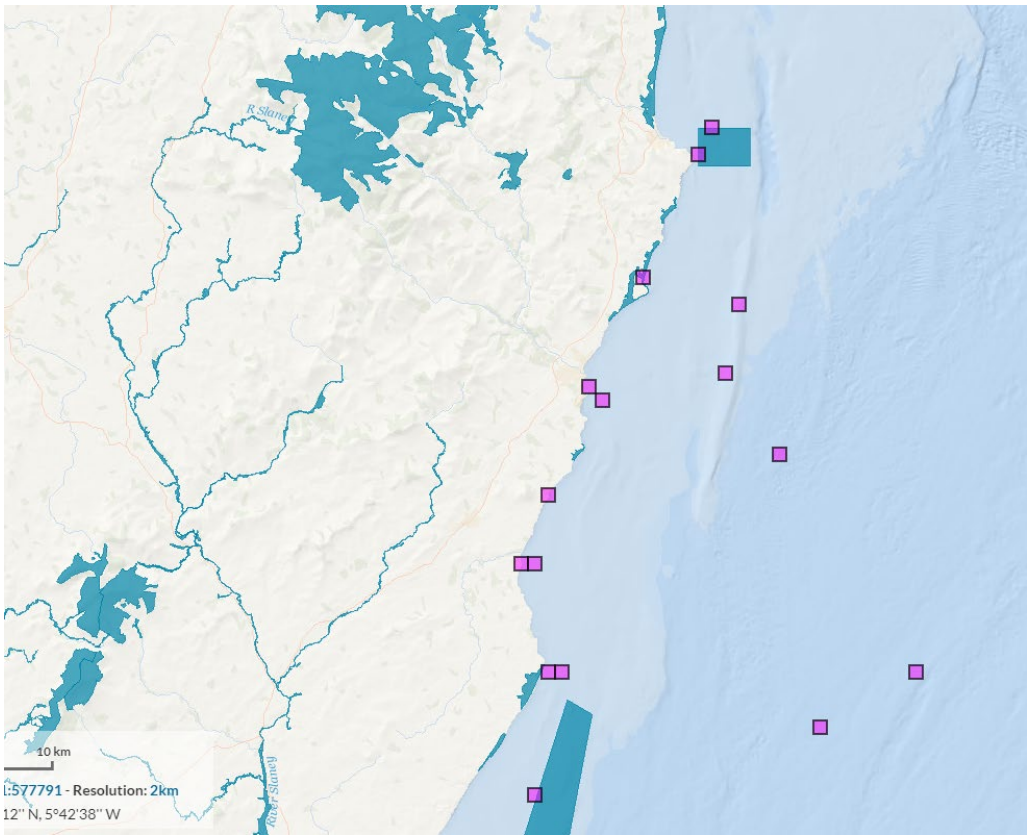
Figure 5. Map of leatherback turtle sighting records from west Waterford to north Wicklow (map courtesy of the National Biodiversity Data Centre).

4.3.1 Leatherback turtle (Dermochelys coriacea)

Leatherback turtles are the largest extant sea turtle and have many unique anatomical and physiological adaptations (Doyle 2007). Leatherback turtles have recorded throughout the areas of interest (Figure 5) but only in small numbers and occasionally. The data presented cover a period over many decades and in reality, leatherback turtles are still rare in Irish waters, but may occur occasionally during summer months.

4.3.2 Loggerhead turtle

Loggerhead turtles are stranded regularly in Ireland with records reported once every few years (King and Berrow, 2009; Doyle 2007; Marine Environmental Monitoring annual reports). They are very rarely sighted alive in Irish waters. Loggerhead turtles have been recorded stranded on seven occasions since all along the south coast (King and Berrow 2009).



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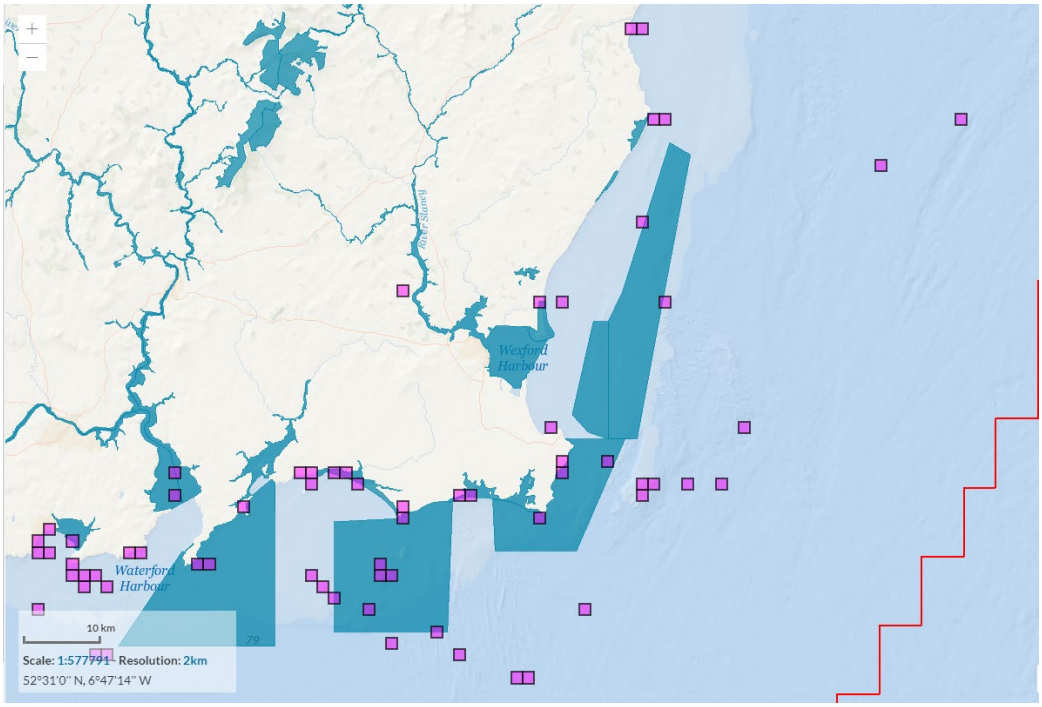
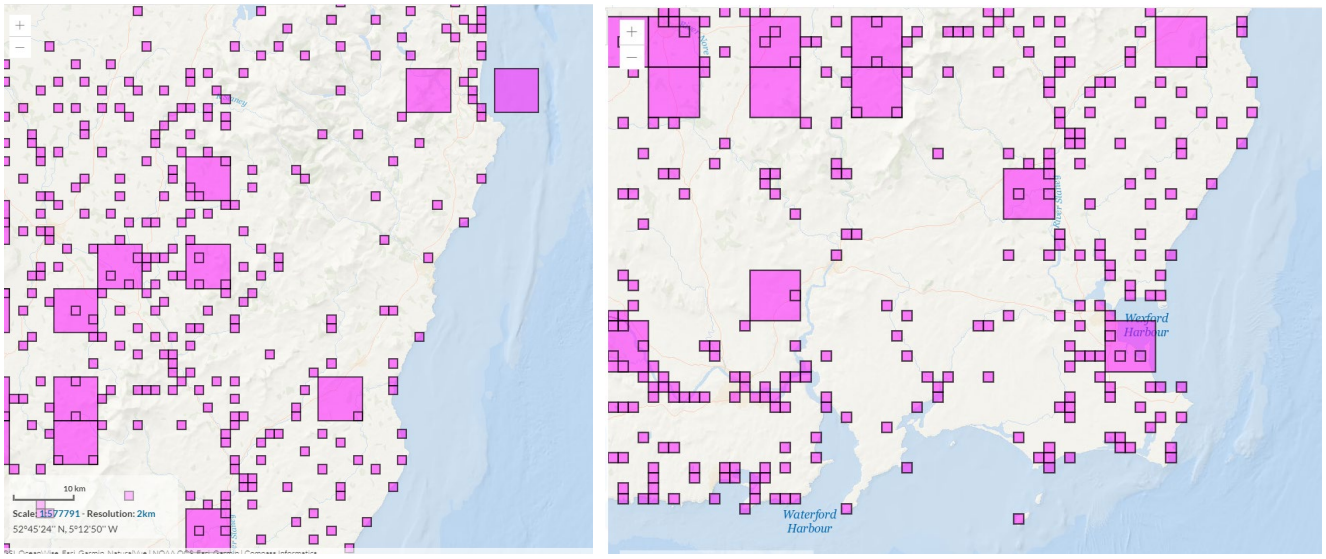


b.

Figure 6. Map of leatherback turtle sighting records from a. north Wexford to Wicklow and b. west Waterford to Wexford (map courtesy of the National Biodiversity Data Centre)

4.3.4 Otter (Lutra lutra)

Otters are widespread around the Irish coast (Reid *et al.* 2013). Otter densities were considered low (0/00-0.10 females per km^2) in the East and Southeast regions. Signs of otter occurrence were recorded in 41.8% (corrected) sites surveyed I the Eastern region and 23.2% (corrected) in the Southeast region (Reid *et al.* 2013). Data from the National Biodiversity Data Centre was accessed (on 12 June 2024) to help inform this Annex IV assessment (Figure 6). Clearly otters are widespread along the coast but at low densities.



a. **b.**

Figure 6. Map of otter distribution a. north Wexford to Wicklow and b. west Waterford to Wexford (map courtesy of the National Biodiversity Data Centre)

4.3.5 Bats

All bat species in Ireland are listed in Annex IV of the EU Habitats Directive. These include:

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Nathusius' pipistrelle (*Pipistrellus nathusii*)
- Leisler's bat (*Nyctalus leisleri*)
- Lesser horseshoe bat (*Rhinolophus hipposideros*)
- Brown long-eared bat (*Plecotus auritus*)
- Daubenton's bat (*Myotis daubentonii*)
- Whiskered bat (*Myotis mystacinus*)
- Natterer's bat (*Myotis nattereri*)

Data from the National Biodiversity Data Centre was accessed (on 12 June 2024) to help inform this Annex IV assessment (Figure 6). Clearly otters are widespread along the coast but at low densities. With the exception of Whiskered bat and Lesser horseshoe bat, records for all of the other species are available for the southeast coast of Ireland within the 100km grid squares that cover the coastline and their adjacent waters.

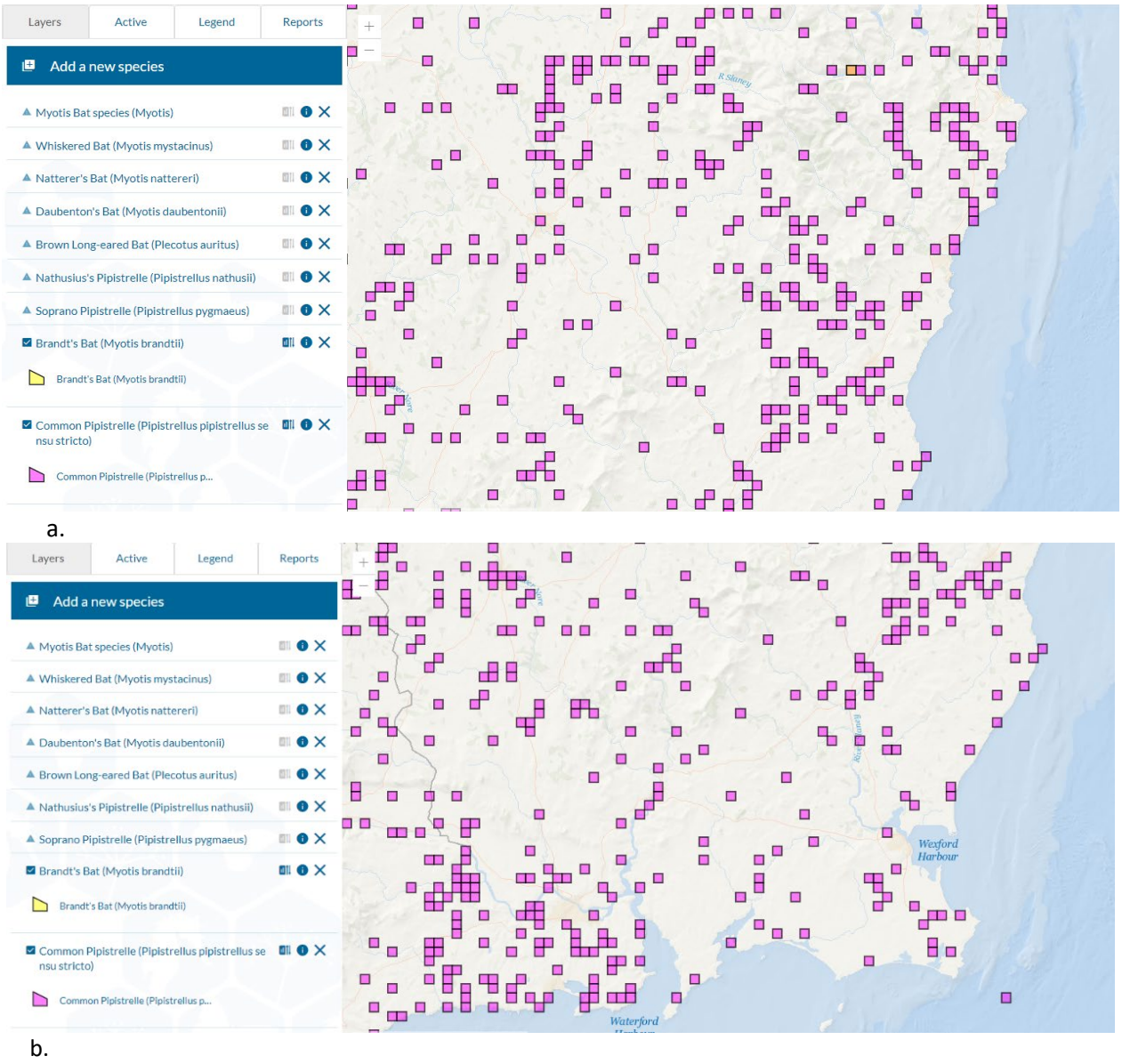


Figure 7. Map of all bat species distribution a. north Wexford to Wicklow and b. west Waterford to Wexford (map courtesy of the National Biodiversity Data Centre)

While bats are typically classed as terrestrial mammals, some evidence suggests they may follow prey insects into coastal water depending on the prevailing weather conditions. Recent evidence also notes that bats can migrate considerable distances over open marine waters. However, it is considered highly unlikely they would make use of the proposed project area for foraging. Furthermore all equipment deployment is subtidal so there is no potential for impact.

5| IMPACT ASSESSMENT

The proposed works involve bathymetric surveys intend to map the seabed and deployment of ADCP to measure currents and other physical oceanographic features.

The NPWS '*Guidance to manage the risk to marine mammals from man-made sound sources in Irish waters – January 2014*' recommends that listed coastal and marine activities, undergo a risk assessment for anthropogenic sound-related impacts on relevant protected marine mammal species to address any area-specific sensitivities, both in timing and spatial extent, and to inform the consenting process. It is required that such an assessment must competently identify the risks according to the available evidence and consider (i) direct, (ii) indirect and (iii) cumulative effects of anthropogenic sound (NPWS, 2014).

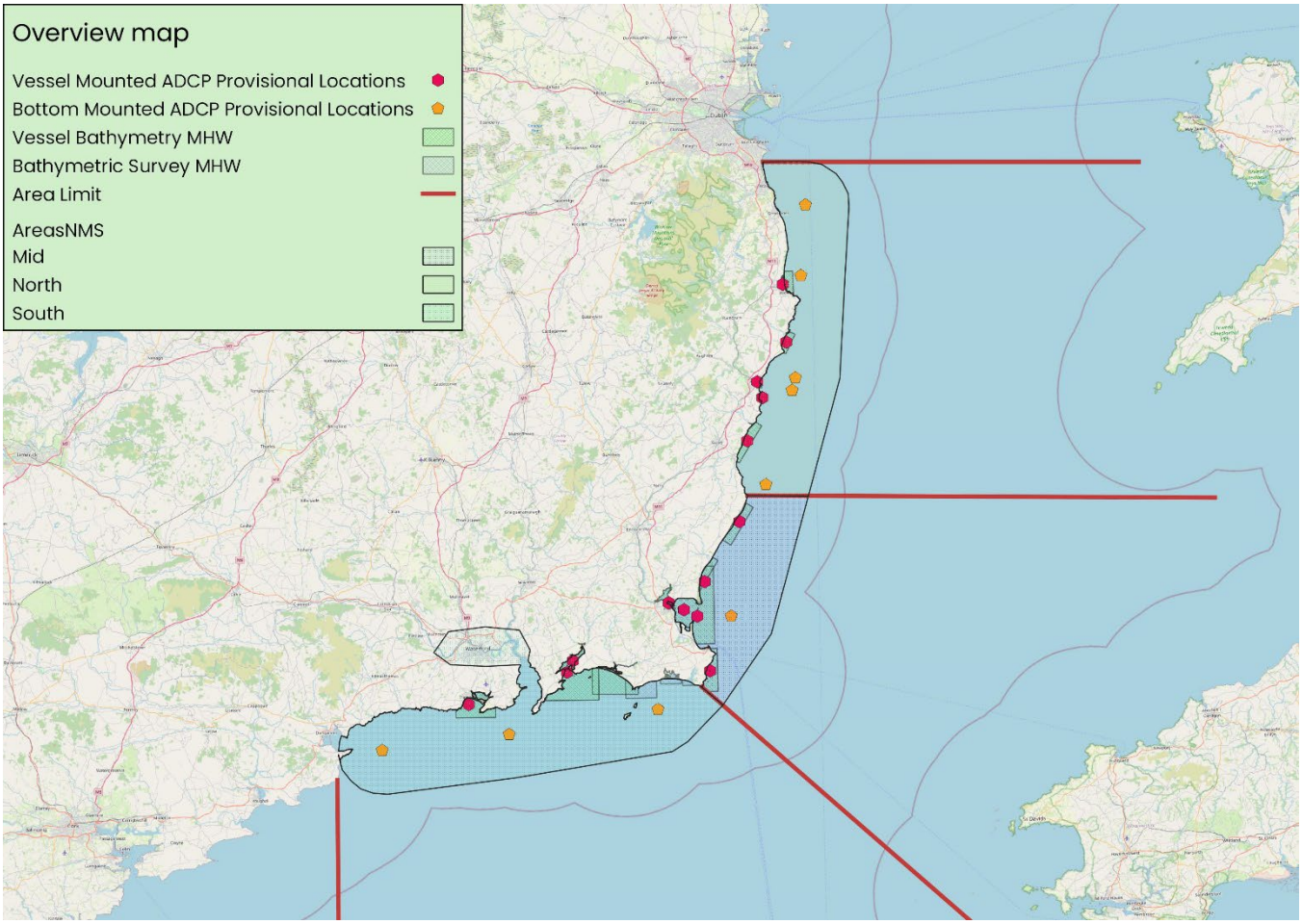


Figure 11. Map showing the location of bottom mounted ADCPs and bathymetric survey areas.

The potential effects of multibeam, single beam and ADCPs on Annex IV species was addressed by assessing the likelihood that these species would be exposed, or interact, with marine activities. Impacts assessed include likelihood of occurrence, and disturbance especially from noise emitted during survey work and from the extra marine activity. Acoustic disturbance includes the ability of the individual to detect increased noise levels over ambient levels, masking, Temporary Threshold Shift (TTS) and Permanent Threshold Shift (PTS) and behavioural

impacts, i.e. resulting in a behavioural change by individuals. The potential effects of indirect impacts on preferred prey are also considered.

5.1 | Description of Activities

Acoustic surveys (multibeam and single beam)in marine or coastal waters involve the systematic collection of information on the physical environment by means of sound signal production, reception, analysis and interpretation. ADCP surveys record the tidal flow to provide information on flow and direction. Such methods commonly involve the use of ships or smaller vessels fitted with specialised equipment or from which such equipment can be deployed or towed. The level of environmental impact associated with this acoustic activity is variable depending on a number of factors including the type of the equipment being used, its sound signal and propagation characteristics, and the depth in which it is operating (NPWS 2014).

Acoustic and water current surveys in coastal waters are commonly mobile, taking the form of a systematic series of survey lines within an overall target area. Depending on the location and scale of this area and the data objectives such acoustic surveys may require a period of hours, days or weeks, with many surveys being performed on a 24-hour basis once they have begun. These activities, particularly where accurate geophysical data are required via a deep acoustic penetration into the seafloor, in substantial water depths or at high resolutions, have the potential in many circumstances to introduce persistent pulse and/or non-pulse sound at levels that may impact upon marine mammal individuals and/or populations, constituting an important conservation risk (NPWS 2014).

5.1.1 Multibeam Echo Sounder

The proposed survey equipment is presented in Table x and involves a Konsberg EM2040, which is a shallow water multibeam echo sounder based on EM 2040 technology. By alternating between the frequency modes per ping, the system is capable of providing the operator with Multi Frequency Backscatter of up to 5 frequencies in a single pass. The maximum depth range for a dual head system in cold ocean water is 520 m at 200 kHz with a swath width up to 700 m. The operating frequency range is from 200 to 400 kHz with frequency selection in steps of 10 kHz. According to the client the Sound Pressure Level re 1 µPA in water @ 1m from source is 210 db (Table 2).

Table 2. Summary of proposed multibeam equipment to be used

Equipment	Model	Deployment	Company	Sound Pressure Level re 1 µPA in water @ 1m from source
Multibeam Echo Sounder	EM2040 (200, 300 & 400 kHz)	Retractable hull mount	Konsberg Maritime	210

Although at the higher end of marine mammal acoustic sensitivities (200-400 kHz) odontocetes are the most likely group to be able to detect these sounds from mid-frequency sources (fishery, communication, and hydrographic systems). Mysticetes are sensitive to low-frequency sources as they typically produce low frequency vocalisations. Minke whales produce repetitive, low-frequency (100-500 Hz) pulse trains that may consist of either grunt-like pulses or thump-like pulses (Risch *et al.* 2014) and leatherback turtle in the 300-500 Hz range (Mrosovsky 1972). Otters auditory threshold (in air) is at 80 dB SPL the hearing ranged from around 200 Hz to 32 kHz, with lowest thresholds around 4 kHz (Voight *et al*. 2019).

5.1.2 Single beam

Single-beam sonar (SBS) operates in a similar way to multibeam but with a narrower band width in the regions of a 2-15 degree beam. They are typically used in shallow waters for smaller areas where the time required to achieve 100% insonification with a multibeam sonar is considered unnecessary depending on the purpose the bathymetry is being gathered for.

5.1.3 Acoustic Doppler Current Profiler

An Acoustic Doppler Current Profiler (ADCP) is an instrument to measure how fast water is moving across an entire water column. The ADCP measures water currents using the Doppler effect. A sound wave has a higher frequency, or pitch, when it moves to you than when it moves away. The ADCP works by transmitting "pings" of sound at a constant frequency into the water. As the sound waves travel, they ricochet off particles suspended in the moving water, and reflect back to the instrument. Due to the Doppler effect, sound waves bounced back from a particle moving away from the profiler have a slightly lowered frequency when they return.

The proposed equipment to be used in the current survey are presented in Table 4. A Nortek and Teledyne ADCP are proposed both operating at frequencies of ≥600KHz. According to the client the Sound Pressure Level re 1 µPA in water @ 1m from source is a maximum of 120 db (Table 4).

Table 4. Summary of proposed multibeam equipment to be used

Equipment	Model	Deployment	Company	Sound Pressure Level re 1 µPA in water @ 1m from source
Fixed ADCP	Nortek AWAC600 kHz or 1 MHz	Bed mounted	Nortek	Maximum 120
Vessel ADCP	TRDI WH Monitor 600 kHz	Vessel mounted	Teldyne	Maximum 120

The high frequencies used by the proposed ADCPs and low sound pressure levels (120db re 1 µPA in water @ 1m) means that acoustic impacts on cetaceans and marine turtles in water will not be detectable as the frequencies are very much higher than these species ability to detect. No sound will penetrate the air and thus will have no impact on bats.

5.3.4 Increased marine traffic

An additional survey vessel will operate in the survey area during site investigations. This increase in vessel noise relative to the daily traffic in coastal waters is very low and is unlikely to cause any significant disturbance as other vessels regularly use this area. The presence of vessels in the area may also lead to a very localised increase in vessel traffic and associated noise. The presence of an additional small vessel and the associated noise produced, is very unlikely to have a significant impact on Annex IV species.

5.3.5 Indirect impacts on preferred prey

Indirect impacts may occur on marine mammals and otters if the distribution or abundance of their preferred prey is impacted by the proposed surveys. Adult and juvenile fish and their eggs have been shown to experience

mortality in the immediate vicinity of air gun array detonations, typically within a few tens of meters and at sound levels close to 240 dB or more, while at lower levels (down to 180 dB) physical impacts include inner ear damage, hemorrhaging, eye damage, blindness, swim bladder rupture and eventually death (Bluewise 2023). Studies have also shown that low frequency noise can cause avoidance behaviour in fish, although the degree of impact varies on a species-by-species basis. For example cod displayed avoidance behaviour to the split-beam echosounders of bottom-trawling vessels, with changes in both horizontal and vertical movement speeds observed (Bluewise 2023). The impact from site investigation surveys should be most noticeable in the close vicinity of the survey, up to a few thousand meters of the survey vessel, and particularly around the vessel's vertical beam. As the survey vessel covers the survey site and since the survey area is usually much larger than this, the impact will be distributed throughout the area.

No significant effects on the availability of preferred prey to marine mammals and turtles are expected from the proposed surveys.

5.3.6 Water quality

There will be no impact on water quality.

5.3.7 Cumulative Effects

These site investigations are scheduled to take place over many months but each survey duration is likely to be relatively short (days-weeks). Cumulative effects of these surveys with other similar surveys such as those associated with site investigations for offshore windfarms although unlikely should be avoided by being carried out during different times and not at the same sites simultaneously.

5.4 | Identification of Relevant Natura 2000 sites with marine mammals as a qualifying interest

Marine mammals are highly mobile and range far outside those sites designated to protect them. There are four SACs with marine mammals as qualifying interests overlapping or adjacent to the sites (Table 5). Harbour porpoise are listed as QI for three and grey seal and bottlenose dolphin for one each.

The proposed multibeam surveys occur within the Blackwater Bank SAC, Carnsore Point SAC and Hook Head SAC and adjacent to the Great Saltee SAC. In all these SACs Activities Requiring Consent (ARC) 35 applies regarding *undertaking active acoustic surveys in the marine environment*. Thus a full assessment is required to obtain permission for these activities.

Table 5. Special Areas of Conservation, which list marine mammals as a Qualifying Interest, within the area of interest

Site	Qualifying Interest		
	Grey seal	Harbour porpoise	Bottlenose dolphin
Blackwater Bank SAC (Site Code 0002953)		x	
Carnsore Point SAC (Site Code 0002269)		x	
Great Saltee SAC (Site Code 000707)	x		
Hook Head SAC (0000764)		x	x

The Conservation Objectives of these SACs in relation to harbour porpoise and bottlenose dolphins are (NPWS 2011a; 2011b; 2023) are to maintain their favourable conservation condition, which is defined by a number of attributes and targets:

Access to suitable habitat

i) Species range within the site should not be restricted by artificial barriers to site use.

Disturbance Level of impact

ii) Human activities should occur at levels that do not adversely affect the grey seal population

The only attribute which could potentially be impacted is attribute ii) disturbance. With respect to Great Saltee SAC whose qualifying interest is grey seal the main target that could be impacted is "*Human activities should occur at levels that do not adversely affect the grey seal population*".

5.3.1 Indirect impacts on preferred prey

Impacts on fish from site investigation surveys will be most noticeable in the close vicinity of the survey, up to a few thousand meters of the survey vessel, and particularly around the vessel's vertical beam. As the survey vessel covers the survey site and since the survey area is usually much larger than this, the impact will be distributed throughout the area; however, depending on the survey plan and the area extent, the effects on fish and shellfish will vary in time across the survey area (Blue Wise 2023). Instant mortality of both fish and shellfish due to site investigation surveys is very unlikely. Impacts are most commonly behavioural, although some species may suffer physical impact (depending on several factors such as SPL, cumulative SEL, distance to the source, sensitivity to acoustic noise, sensitivity to particle motion, capacity to find shelter, capacity to leave the area). Temporary behavioural or physical impacts are unlikely to have population level consequences.

No significantly adverse effects on fish species is expected from marine operations due to their relatively short duration and limited area for each survey.

5.3.2 Potential disturbance to life-cycle

The proposed marine operations may cause adverse effects on some Annex IV species in the immediate area without mitigation.

6 | MITIGATION MEASURES

Mitigation is required for harbour porpoise and to a lesser extent bottlenose and common dolphins to ensure disturbance caused by multibeam for Annex IV species is required. It is extremely unlikely that species such as marine turtles or otters will be exposed to potential impacts as the likelihood of them being within the impacted area is extremely low and they are not sensitive to high frequencies sound sources.

Mitigation is required to minimize impacts on these Annex II species and the NPWS (2014) guidelines would apply.

6.1 Marine Mammal Mitigation

The National Parks and Wildlife Service *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters* recommends a distance of 1000m radial distance for geophysical surveys including multibeam in water depths of <200m (NPWS 2014).

The measures outlined below are applicable to

(i) all seismic surveys (including the testing and full operational use of airguns, water guns, sparkers, boomers and vertical seismic profiling [VSP] or checkshot systems) in inshore and offshore Irish waters;

(iii) all multibeam, single beam, side-scan sonar and sub-bottom profiler (e.g., pinger or chirp system) surveys within bays, inlets or estuaries‡‡ and within 1,500m of the entrance of enclosed bays/inlets/estuaries;

(iii) or as advised by the relevant Regulatory Authority

Multibeam, single beam, side-scan sonar surveys

1. A qualified and experienced marine mammal observer (MMO) shall be appointed to monitor for marine mammals and to log all relevant events using standardised data forms.

2. Unless information specific to the location and/or plan/project is otherwise available to inform the mitigation process (e.g., specific sound propagation and/or attenuation data) and a distance modification has been agreed with the Regulatory Authority, acoustic surveying using the above equipment shall not commence if marine mammals are detected within a 500m radial distance of the sound source intended for use, i.e., within the Monitored Zone.

Pre-Start Monitoring

3. Sound-producing activities shall only commence in daylight hours where effective visual monitoring, as performed and determined by the MMO, has been achieved. Where effective visual monitoring, as determined by the MMO, is not possible the sound-producing activities shall be postponed until effective visual monitoring is possible.

4. An agreed and clear on-site communication signal must be used between the MMO and the Works Superintendent as to whether the relevant activity may or may not proceed, or resume following a break (see below). It shall only proceed on positive confirmation with the MMO.

5. In waters up to 200m deep, the MMO shall conduct pre-start-up constant effort monitoring at least 30 minutes before the sound-producing activity is due to commence. Sound-producing activity shall not commence until at least 30 minutes have elapsed with no marine mammals detected within the Monitored Zone by the MMO.

6. This prescribed Pre-Start Monitoring shall subsequently be followed by a Ramp-Up Procedure which should include continued monitoring by the MMO.

Ramp-Up Procedure

7. In commencing an acoustic survey operation using the above equipment, the following Ramp-up Procedure (i.e., "soft-start") must be used, including during any testing of acoustic sources, where the output peak sound pressure level from any source exceeds 170 dB re: 1µPa @1m:

(a) Where it is possible according to the operational parameters of the equipment concerned, the device's acoustic energy output shall commence from a lower energy start-up (i.e., a peak sound pressure level not exceeding 170 dB re: 1µPa @1m) and thereafter be allowed to gradually build up to the necessary maximum output over a period of 20 minutes.

(b) This controlled build-up of acoustic energy output shall occur in consistent stages to provide a steady and gradual increase over the ramp-up period.

(c) Where the acoustic output measures outlined in steps (a) and (b) are not possible according to the operational parameters of any such equipment, the device shall be switched "on" and "off" in a consistent sequential manner over a period of 20 minutes prior to commencement of the full necessary output.

8. In all cases where a Ramp-Up Procedure is employed the delay between the end of ramp-up and the necessary full output must be minimised to prevent unnecessary high-level sound introduction into the environment.

9. Once the Ramp-Up Procedure commences, there is no requirement to halt or discontinue the procedure at night-time, nor if weather or visibility conditions deteriorate nor if marine mammals occur within a 500m radial distance of the sound source, i.e., within the Monitored Zone.

Breaks in sound output

10. If there is a break in sound output for a period greater than 30 minutes (e.g., due to equipment failure, shut-down, survey line or station change) then all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) must be undertaken.

11. For higher output survey operations which have the potential to produce injurious levels of underwater sound as informed by the associated risk assessment, there is likely to be a regulatory requirement to adopt a shorter 5-10 minute break limit after which period all Pre-Start Monitoring and a subsequent Ramp-up Procedure (where appropriate following Pre-Start Monitoring) shall recommence as for start-up.

Reporting

12. Full reporting on MMO operations and mitigation undertaken must be provided to the Regulatory Authority.

Given that sections of the proposed surveys will be conducted adjacent to the shore, best practice is to ensure that no animals are entrapped between the survey and the shore, particularly in embayments where escape is difflcult. Survey lines should be soft-started on the shoreward end of a line and move towards open water (i.e. inshore-offshore transects and not parallel to the shore) to allow any animals present ample opportunity to leave the area.

7 | NPWS ASSESSMENT

1. Do individuals or populations of Annex IV species occur within the proposed area?

Harbour porpoise are the most frequently recorded Annex IV species within the sites but common, bottlenose and Risso's dolphins have also been recorded as have fin, humpback and minke whale and leatherback turtles. Otters occur along the coast and marine turtles, while very rare may also occur seasonally in the areas of

interest. Bats will occur on adjacent land and may venture short distances out to sea but no suitable roosting occur in the marine areas of interest.

2. Is the plan or project likely to result in death, injury or disturbance of individuals?

The activities proposed during this project consist of multibeam, single beam and ADCP surveys. It is extremely unlikely any noise generated will be capable of causing disturbance or permanent or temporary hearing injury to a marine mammal or sea turtle as frequencies to be used are above most species' sensitivities. Harbour porpoise are the species most likely to be impacted.

The project will not cause injury or death nor disturbance with proposed mitigation, as any impacts including noise associated with the project is local and of short duration. The risk of injury or mortality is considered non-existent to Annex IV species.

3. Is it possible to estimate the number of individuals of each species that are likely to be affected?

No abundance estimates for marine mammals exposed to the proposed activity are available. Density estimates for harbour porpoise in the southern North sea and off Carnsore Point are available. During summer 2011, sighting rates of harbour porpoise of 0.10 harbour porpoise per km or 1.91 sightings per hour were recorded in the southern North Sea and relative abundance of 0.16 harbour porpoise per km or 3.00 individuals per hour (Berrow *et al.* 2011). Berrow *et al.* (2014) reported densities of 0.58± 36.3 harbour porpoise per km^2 off Carnsore Point between July and September 2008 with a CV of 0.42. No density estimates of marine turtles are available.

4. Will individuals be disturbed at a sensitive location or sensitive time during their life cycle?

The proposed works to be carried out during summer months. Cetaceans occurring in the area may occur more during summer months but species such as harbour porpoise occur throughout the year at the site. Harbour porpoise and common dolphin adults with calves have been recorded in the area during the summer.

5. Are the impacts likely to focus on a particular section of the species' population, e.g., adults vs. juveniles, males vs. females?

There are no data to suggest that any particular gender or age group Annex IV species predominates in the area suggesting the proposed surveys are likely to expose all age groups and both genders.

6. Will the plan or project cause displacement from key functional areas, e.g., for breeding, foraging, resting or migration?

There is no evidence the sites are within critical habitats such as those essential for foraging, nursing young, resting or migration routes. No long-term displacement will occur. The proposed surveys will not lead to any long-term significant disturbance of Annex IV species.

7. How quickly is the affected population likely to recover once the plan or project has ceased?

The proposed surveys are of relatively short duration and limited area for each survey. No significantly adverse effects on Annex IV species or indirectly though affecting their fish prey is expected from the proposed surveys due to the high frequencies that will be used.

8 | MITIGATION

Mitigation is required to minimize impact for Annex IV species through the implementation of the NPWS (2014) *Guidance to Manage the Risk to Marine Mammals from Man-made Sound Sources in Irish Waters.*

9 | RESIDUAL IMPACTS

There will be no residual impacts from the proposed surveys on Annex IV species in the area.

10 | SUMMARY

A number of Annex IV species occur within the areas of interest including harbour porpoise and less frequently common and bottlenose dolphins. Minke whales may occur seasonally and marine turtles very rarely. Otters are will occur along the coast close to shore and bats may forage also along the coast.

Acoustic disturbance from the proposed surveys could impact on harbour porpoise if very close to the vessel as there is some although minimal overlap between frequencies used and harbour porpoise sensitivities. There will be no impact of ADCPs on Annex IV species as they generate sound at very high frequencies and low pressure levels

We recommend NPWS (2014) mitigation guidelines are implemented, which primarily involve the employment of an MMO to ensure no harbour porpoise or dolphins occur within an agreed mitigation zone during the start of multibeam and single beam surveys to reduce impacts on cetaceans and marine turtles and if implemented will result in no significant impacts.

Given that sections of the proposed surveys will be conducted adjacent to the shore, best practice is to ensure that no animals are entrapped between the survey and the shore, particularly in embayments where escape is difficult. We recommend that survey lines should be soft-started on the shoreward end of a line and move towards open water (inshore-offshore) to allow any animals present ample opportunity to leave the area.

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