

UK MPA Phase 3 Interim Report

Technology Plan and Trial Methodology

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Submitted to	Becht Family Charitable Trust and UK MPA working group
Report number	22-099
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Key findings and Outcomes; Phase 3	<ul style="list-style-type: none"> • Electro Optical images tasked over all 5 MPAs • Synthetic Aperture Radar tasked over MPAs • VMS and I-VMS data requested and obtained and tasked collection for duration of phase 4 • Permits and licenses are going through the application process for the use of the fixed wing UAV • Permission to use the NW IFCA patrol vessel for UAV operations granted.
Next steps; Phase 4	<ul style="list-style-type: none"> • Trial a range of technology in line with the Phase 3 plan to understand the most cost effective and results driven way of ensuring compliance and increase protection of vital marine habitats through the use of live monitoring via all remote sensing technologies. • Site visits in conjunction with UAV flights

Acronyms and Abbreviations					
AIS	Automatic Identification System	IFCA	Inshore Fisheries and Conservation Authority	SAR	Synthetic-Aperture Radar
AOI	Area of Interest	I-VMS	Inshore Vessel Monitoring System	SDG	Sustainable Development Goals
BFCT	Becht Family Charitable Trust	MCS	Monitoring, Control and Surveillance	SPA	Special Protected Areas
BVLOS	Beyond Visual Line Of Sight	MCZ	Marine Conservation Zones	UAVs	Unmanned Aerial Vehicles
CCTV	Closed Circuit Television	MMO	Marine Management Organisation	UK	United Kingdom
DVWF	Detection of Vessels Wide Far	MPA	Marine Protected Area	VHF	Very High Frequency
D&S	Devon & Severn	NM	Nautical Mile	VIIRS	Visible Infrared Imaging Radiometer Suite
EO	Electro Optical	RF	Radio Frequency	WUF	Wide Ultra-Fine
IUU	Illegal, Unreported and Unregulated	SAC	Special Areas of Conservation	XF	Extra Fine

1 Project Overview

The UK MPA Project is a collaboration between the Becht Family Charitable Trust and OceanMind. This project is working with key partners responsible for MPA protection, management and enforcement to identify a range of effective and innovative range of new Monitoring, Control and Surveillance (MCS) tools for use in English waters. This partnership aims to provide cost effective, high impact, deterrent through detection solutions that are scalable and can be applied to all MPAs around the globe.

The project will increase the visibility of activity in the United Kingdom's MPAs. To achieve this, OceanMind will introduce a suite of tools not routinely used by the relevant UK authorities with the aim to highlight risk areas and increase compliant behaviour.

The project is split into five phases:

1. Site identification,
2. Risk & Technology Assessment,
3. Plan & Methodology,
4. Technology Pilot,
5. Final Report.

This report summarises the end of Phase 3 and the creation of the pilot project trial plan and methodology.

1.1 Introduction

Marine Protected Areas (MPAs) are zones of the seas and coasts where wildlife has been highlighted to be of importance and are subject to protection from damage and disturbance. The UK Government has committed to establishing a well-managed ecologically coherent network of MPAs in our seas. By linking MPAs together into a coherent network, supported by wider environmental management measures, they aim to promote the recovery and conservation of marine ecosystems. The network will contain MPAs of different sizes containing habitats and species with a range of protection levels that are designed to meet objectives that single MPAs cannot. A well-designed network is key to achieving biodiversity goals and so the UK has committed to establishing an ecologically coherent network of MPAs under several agreements including the OSPAR Convention, World Summit of Sustainable Development and Convention on Biological Diversity.

Responsibility for the management of the 0-6 NM limit sits with the [Inshore Fisheries and Conservation Authorities \(IFCAs\)](#). There are 10 IFCAs in England, funded by local government and Defra. Whilst IFCAs have a role in the implementation of national legislation, they mostly manage the marine environment and activity through the creation of IFCA district specific byelaws. This allows flexibility and a local approach to fisheries and marine environment management which can be tailored to address issues on a finer scale. IFCAs have their own seagoing assets of varying sizes and capabilities but at sea patrols can be expensive, dangerous and require intelligence to ensure effective risk based, intelligence led tasking.

The [Marine Management Organisation \(MMO\)](#) are the competent authority with a remit that extends from the 0 NM limit out to the 200 NM limit, or the median line, and are a Non-Departmental Public Body of Defra. Currently the MMO uses a mixture of the Royal Navy (RN) Fisheries Protection Squadron (FPS) and privately chartered seagoing assets at significant cost to deploy as sea going assets.

1.2 National Legislation

England has a network of Marine Protected Areas (MPAs) which includes: Marine Conservation Zones (MCZs), Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). MCZs are designated under the Marine and Coastal Access Act 2009 (MACAA)¹, to protect a range of broad habitats and nationally important, rare or threatened habitats and species. SACs and SPAs are designated under the Wild Birds Directive of 1979 and the Habitats Directive of 1992. SACs protect habitats and species of European importance, and SPAs protect seabirds and their habitats. Often, different MPAs overlap with each other. Additionally, 'No Take Zones' (NTZs) exist as part of MPAs, set by IFCA's using local byelaws.

Legislation on vessel tracking is contained within the Merchant Shipping (Vessel Traffic Monitoring and Reporting Requirements) Regulations 2004 (as amended in 2011)². These provide for the following vessel categories (UK registered or operating in UK waters) to be fitted with AIS, and for the AIS to be maintained in operation at all necessary times:

- vessels over 300 Gross Tonnes (GT) engaged on international voyages;
- cargo ships of over 500 GT not engaged on international voyages;
- passenger ships irrespective of size; and
- fishing vessels of 15m or more (regulation 8A) is.

It is an EU requirement that all fishing vessels of overall length ≥ 12 m must transmit their position every 2 hours when at sea through VMS, which has been retained in UK legislation.³ A public consultation took place in 2018 on the introduction of Inshore Vessel Monitoring Systems (I-VMS) for all licensed British fishing boats under 12m in length operating in English waters. A statutory instrument mandating the use of I-VMS across the fleet is expected to be passed in parliament later this year.

1.3 Site Selection

Proposed sites for the project were nominated by the IFCA's and MMO, based on various criteria such as:

- Fisheries importance
- Current monitoring and enforcement capabilities
- Ecological vulnerability
- Availability of suitable remote sensors
- Having a range of different site types

The proposed sites were reviewed by OceanMind, and their relative merits were assessed. Following this process, a shortlist was presented to the project working group, where 5 sites were unanimously agreed. The sites and their designations are shown in Table 1 below.

¹ [Marine and Coastal Access Act 2009 \(legislation.gov.uk\)](https://www.legislation.gov.uk/ukpga/2009/23/section/1)

² <https://www.legislation.gov.uk/uksi/2004/2110/contents>

³ [Council Regulation \(EC\) No 1224/2009 of 20 November 2009 establishing a Union control system for ensuring compliance with the rules of the common fisheries policy, amending Regulations \(EC\) No 847/96, \(EC\) No 2371/2002, \(EC\) No 811/2004, \(EC\) No 768/2005, \(EC\) No 2115/2005, \(EC\) No 2166/2005, \(EC\) No 388/2006, \(EC\) No 509/2007, \(EC\) No 676/2007, \(EC\) No 1098/2007, \(EC\) No 1300/2008, \(EC\) No 1342/2008 and repealing Regulations \(EEC\) No 2847/93, \(EC\) No 1627/94 and \(EC\) No 1966/2006 \(legislation.gov.uk\)](https://www.legislation.gov.uk/eu/2009/1224/section/1)

Table 1 | Nominated sites and their respective designations.

Site Name	MCZ	SAC	NTZ
West Of Walney	ü		
Lundy	ü	ü	ü
Eddystone and Start point to Plymouth Sound		ü	
South Wight Maritime		ü	
Wight-Barfleur		ü	

1.4 Monitoring, Control and Surveillance Challenges

Monitoring, Control and Surveillance (MCS) of the sites poses a number of common challenges. The most prominent challenges are surrounding the often low capacity for at sea enforcement, whether in terms of patrol assets or personnel (exacerbated by COVID-19). The lack of capacity, combined with the remote locations of the sites, where access is often restricted and dependent on tides, hinders the collection of evidence on fishing activity. This is especially the case when the vessels active at the site are nomadic or foreign-flagged, as data on the vessel's activity (catches, etc.) is not always readily accessible. At some sites, there is an added challenge as patrol efforts can be sighted before their arrival therefore alerting possible operators within the area.

Another MCS challenge is the lack of availability of VMS on under 12m vessels due to the smaller size of the vessels that are often found operating in the sites. Even when VMS is available, it may not be at a sufficiently high transmission rate to capture fishing activities within the site boundary, thus allowing possible vessel incursions within closed areas during the transmission intervals. The exposed locations of the sites and the narrow buffer areas for spatial closures further intensify this issue. AIS may therefore be a more versatile tool for vessel monitoring, as the voluntary use of AIS is slowly increasing.

Finally, while most fishing activities are managed in the sites in relation to the protected features, there is often an intensifying in non-regulated activities at the sites, which at scale can have significant impacts on the conservation aims. This can also lead to gear conflict (static vs. active) or conflicts between the commercial and the recreational fleets.

1.5 Vessel Tracking

Automatic Identification System (AIS) is an autonomous and continuous vessel identification and monitoring system used for maritime safety and security which allows vessels to electronically exchange vessel identification information, position, course and speed with nearby ships and authorities ashore. The requirement for AIS originates from Chapter V of the Safety at Life at Sea (SOLAS) Convention of the International Maritime Organization (IMO). The Department for Transport (DfT) is the responsible Ministerial department within UK Government responsible for maritime, and within DfT the Maritime & Coastguard Agency (MCA) has the responsibility for the implementation of maritime legislation and guidance, including on AIS.

During this phase of the project a review of AIS data for 2 years (2020 and 2021) was carried out. It should be noted that AIS detections do not provide a complete picture of vessel activity as the legislative requirement to have AIS fitted does not extend to all vessels as covered in the section 1.2. Commercial satellite constellations gather AIS data from space and extend their reach across most of the globe. OceanMind used the resulting data to review all AIS activity in the 5 selected MPA's and a 3 NM buffer area. Vessel types are categorised according to the information manually input into the AIS transponder:

- Fishing - all vessels capable of conducting fishing activity.

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- Fish carrier - refrigerated cargo ships used to transport seafood and which are capable of at-sea transshipment.
- Fish bunker - oil products vessels which supply fishing vessels and which are capable of at-sea transshipment of fuel.
- Fishing buoy - AIS transmitters used to mark and retrieve fishing gear while 'soaking' and drifting with the currents when in use.
- Cargo - merchant cargo ships.
- Hazardous cargo - dangerous goods merchant vessels.
- Passenger - passenger transport vessels.
- Pleasure - leisure vessels.
- Unknown - vessels whose AIS transmissions have no clear identity data.
- Other - military, specialised commercial or research vessels.

Using these categories heatmaps of activity and summary figures were generated for each of the MPA's which indicate activity levels within the sites. In addition to the AIS review, I-VMS and VMS data has been obtained and will be analysed in phase 4 of the project. This will help give a more complete view of activity in the selected MPA's.

2 Site Summaries

Each selected site has a unique setting which allows for the consideration and subsequent deployment of the most suitable MCS applications to different scenarios. A review of the activity at each site has been undertaken including a historic analysis of the AIS transmissions for 2020 and 2021 in each MPA and a surrounding 3NM buffer to better understand the risks and potential impact of such activities to the protected site features. The analysis for each site looked at the different types of vessels that are active in the area. The activities of fishing vessels were also assessed by speed as slow speed events are often indicative of fishing activity.

It is notable that the COVID pandemic and associated restrictions were in place throughout 2020, this has impacted on the AIS analysis specifically on the following:

- Lower numbers of pleasure vessels in 2020
- Lower numbers of cargo and hazardous cargo vessels in 2020.

Vessel numbers in 2021 are therefore more representative of historical trends and forecasted activities. Whilst the COVID-19 pandemic had an effect on fishing activities, this was less so than other vessel types, therefore analysis was still carried out for these years as it was felt it would still be representative and be the most useful metric for forecasting future trends and informing phase 4 activities.

An initial review of the byelaws and local regulations has been made to understand what legislation is in place at each site.

2.1 West Of Walney MCZ

2.1.1 Site Characteristics

The West of Walney MCZ is situated in the Irish Sea, encompassing around 388 km². The largest proportion of the MCZ is within the 12 NM limit, but a small part of it lies outside of this limit. Legislated under the MACAA, the West of Walney MCZ was designated in 2016. The location of the West of Walney MCZ places the area across the MMO and North Western IFCA's jurisdiction.

Protected features at the site include:

- Subtidal sand (Broad-Scale Habitat)
- Subtidal mud (Broad-Scale Habitat)
- Sea-pen and burrowing megafauna communities (Habitat Feature of Conservation Importance)

2.1.2 Site Activity

There have been incidences of mobile gear use by UK and non-UK registered vessels within the West of Walney MCZ, including demersal otter trawling (targeting Nephrops) and beam trawls. Potting and static bottom gears are present and currently permitted within the MCZ boundaries. Fishing activity tends to be tidally-dependent. The vessels operating within the site range from small to large (<10m – >15m). Recreational activity is limited within the site.

Energy infrastructure is a major presence in and around the MCZ, including a small number of oil and gas wells and 5 associated pipelines. There are 4 windfarms whose footprint overlaps with the MCZ (Ormonde, West of Duddon sands, Walney 1 & 2), with another one in development (Walney extension) which will also overlap. Furthermore, one telecommunications cable runs through the MCZ, as do several power cables from the renewable energy sites.

2.1.3 Byelaws and local regulations

The site has an MMO byelaw prohibiting bottom towed gear for the whole site, up to the 12NM limit, which has been in force since 2019.⁴ The byelaw specifically pertains to Dredges, Trawls and Seine, and surrounding nets.

2.1.4 Historic AIS Review

Figure 1 shows the total number of unique AIS transmissions within the site and a 3 NM buffer as a proportion in the analysis years. The proportion of fishing vessel identities does not change significantly between years; however the proportion of pleasure vessels is higher in 2021. The heatmap for all AIS activities within the area (Figure 2, All AIS) shows a likely shipping lane. It also shows that fishing activity is concentrated in the southwest corner and fishing slow speeds are seen extending inside the MPA.

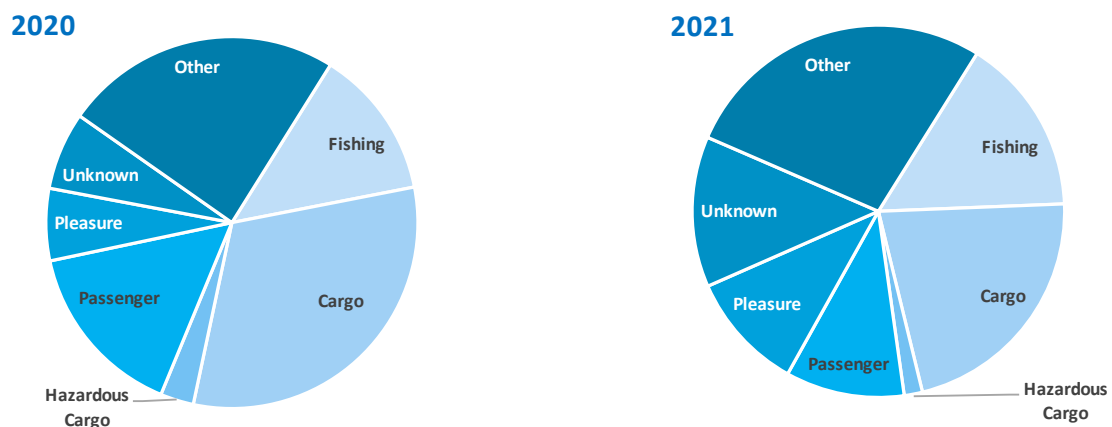


Figure 1 | Proportion of unique AIS identities within the West of Walney MCZ and 3 NM buffer for the years 2020 and 2021

⁴ <https://www.gov.uk/government/publications/west-of-walney-marine-conservation-zone-specified-area-bottom-towed-fishing-byelaw>

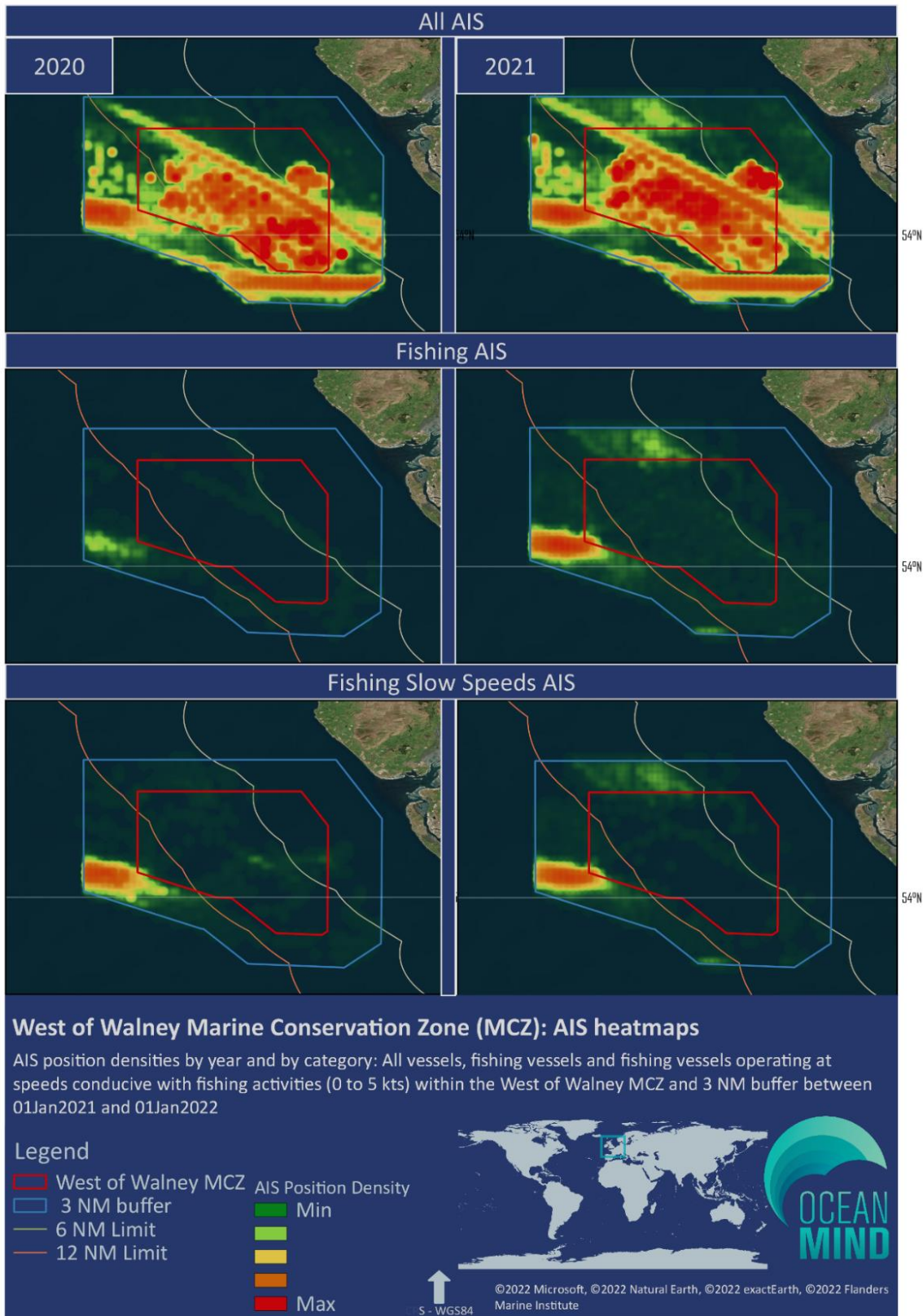


Figure 2| Heatmap showing activity of all vessels and then fishing vessels and fishing vessels at slow speeds inside the West of Walney MCZ and 3NM buffer for 2020 and 2021.

2.1.4.1 Fishing vessel activity

Over the 2 year period a total of 50 vessels broadcast their identity as fishing vessels within the MCZ and 3NM buffer. In 2020 activity peaked in May and June, in 2021 it peaked in April and May (Figure 3⁵). Fishing vessel activity was consistent across years. Notably, management measures were introduced in 2019 and figures show that prior to management measures vessel activity in the area was high (34 vessels in 2019). The fishing heatmaps (Figure 2, Fishing Slow Speeds AIS) indicate that fishing activity is primarily occurring in the south westerly corner of the MCZ outside of the 12 NM limit where the byelaw restrictions end. It is likely that a high amount of this activity is bottom towed gear which is prohibited in the rest of the MCZ. Other slow speeds either occur in proximity to shipping lanes and indicate avoidance measures or are likely be by vessels undertaking potting activity which is not restricted in the site.

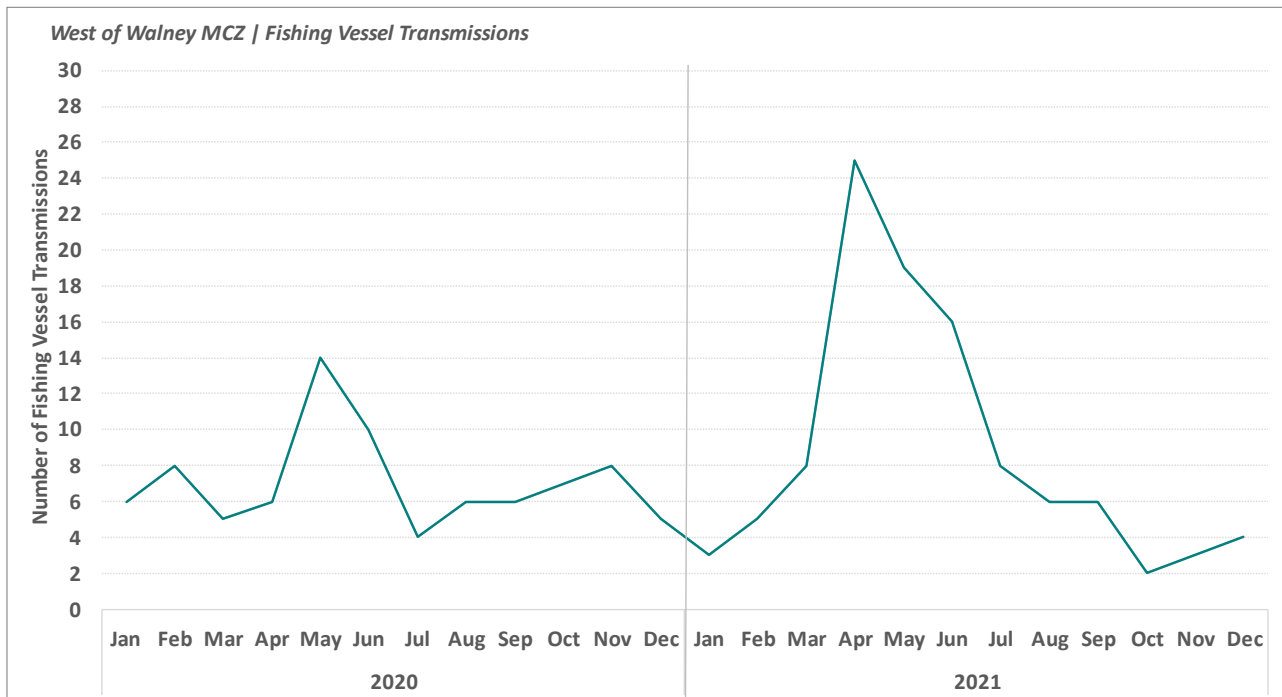


Figure 3 | Monthly unique fishing vessel transmissions within the West of Walney MCZ and 3 NM buffer for the years 2020 and 2021

2.1.4.2 Cargo/ Hazardous Cargo Proximity

Over the 2-year period a total of 91 individual vessels broadcast their identity as cargo vessels and 7 as hazardous cargo vessels within the MCZ and 3NM buffer. There was no discernible seasonal peak in vessel activity during 2020 but there was a noticeable drop in the number of Cargo vessels within the MCZ from March 2021 (Figure 4). This is a relatively quiet shipping route with low risk of collision and environmental impact.

2.1.4.3 Unknown, Other and Pleasure Vessel activity

Over the 2 year period a total of 44, 94 and 33 vessels broadcast their identity as unknown, other and pleasure vessels respectively within the MCZ and 3NM buffer. For all vessel identities, vessel activity peaked in July and August (Figure 5). The similar trend in Pleasure vessel transmissions and unknown vessel transmissions may indicate that the unknown transmissions are also pleasure vessels who have not identified a category on their AIS units. Other vessel transmissions also peaked in March in both years; these transmissions are likely linked to the support vessels servicing the windfarms.

⁵ The graphs below show monthly totals of unique identities observed on AIS across 2020 and 2021. Each vessel is only counted once during the month but is counted each month it is present inside the AOI.

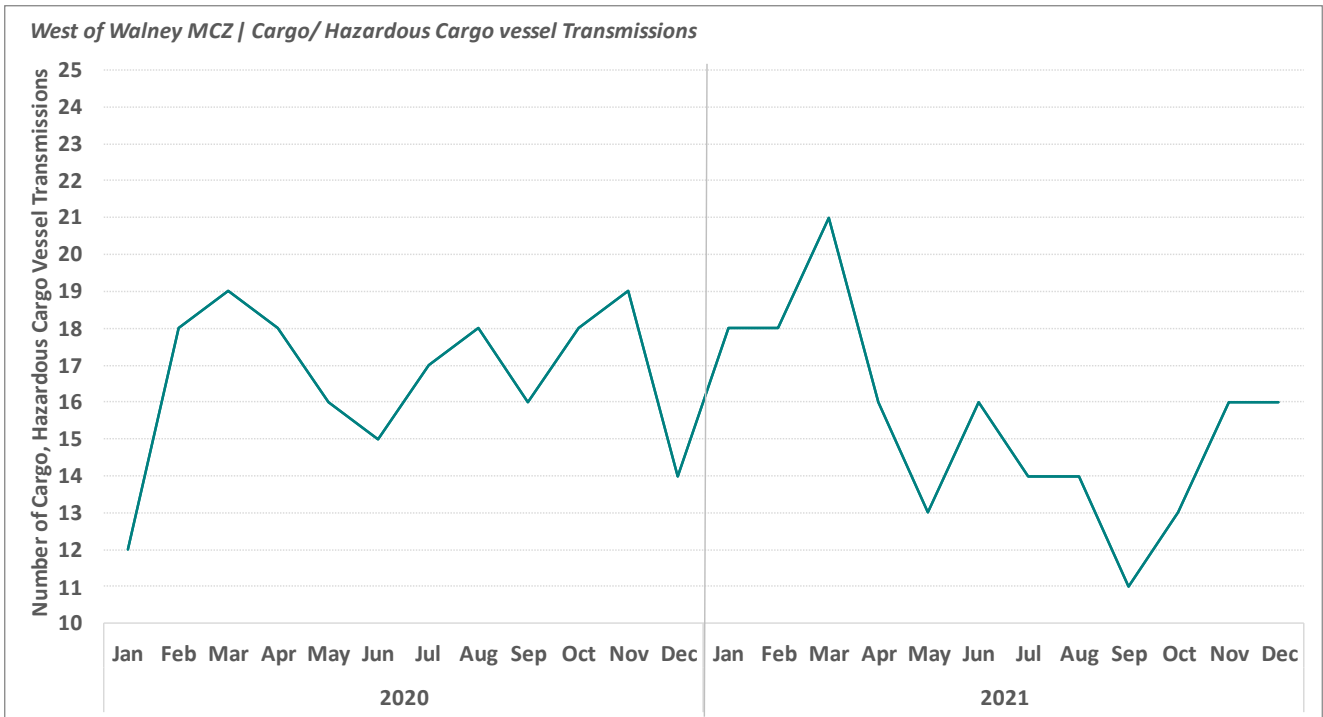


Figure 4 | Monthly unique cargo, hazardous cargo vessel transmissions within the West of Walney MCZ and 3 NM buffer for the years 2020 and 2021

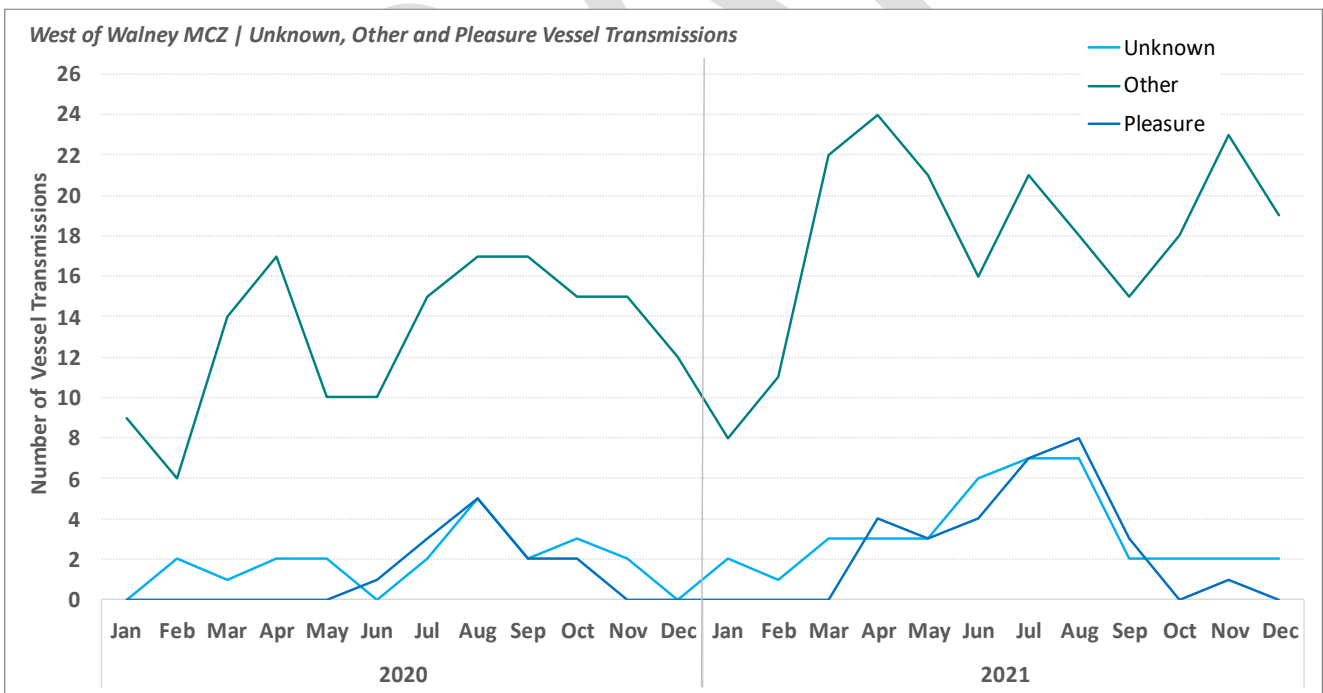


Figure 5 | Monthly unique unknown, other and pleasure vessel transmissions within the West of Walney MCZ and 3 NM buffer for the years 2020 and 2021

2.2 Lundy

2.2.1 Site Characteristics

The Lundy MPA⁶ encompasses several designations associated with different protections. The area was originally established as a Marine Nature Reserve in 1986 and in 2005 the area became a SAC⁷. The site is around 36 KM² in size. In 2010 it became a MCZ and in 2016 in the whole MPA was included within the much larger Bristol Channel Approaches SAC. The competent authority for this site is the Devon and Severn IFCA, including beyond 6NM as the site comprises an island which is part of Devon.

Features at the site include:

- Reefs
- Sandbanks which are slightly covered by sea water all the time
- Submerged or partially submerged sea caves
- Grey seal, *Halichoerus grypus*
- Spiny lobster, *Palinurus elephas* (MCZ)
- Harbour porpoise, *Phocoena phocoena*

2.2.2 Site Activity

Various fishing activities occur at the site. It is understood that dredging, bottom trawling, netting and potting occur in certain parts of the site. Historically, the site has had a considerable amount of scalloping; this activity has reduced in recent years, but there is potential for it to grow again in the future. Due to the remote nature of the site, there is limited quantitative information about site usage and fishing patterns. The vessels operating within the site range from under 10m to 15m, as the Devon & Severn IFCA district has a maximum fishing vessel size of 15.24m.

The site is subject to various types of recreational vessel activity, including recreational angling and charter boat angling. The levels of activity in Lundy are lower than seen in the surrounding area, likely due to the remote location of the site. The island is however a draw for tourists given the diverse fauna and flora and is therefore visited by various yachts and pleasure craft. Within the MPA are several popular dive sites which are visited by charter and local dive vessels.

2.2.3 Byelaws and local regulations

Activity based Permit byelaws have been introduced at this site. Currently, four such byelaws exist, concerning: Mobile Fishing, Potting, Netting and Diving.⁸ Permits are issued to fishers/vessels wishing to undertake these activities and each permit has conditions and management measures associated with it.

In the SAC, the reef areas have a prohibition on the use of demersal mobile gear (trawling and scallop dredging), and netting through the Mobile Fishing Permit Byelaw. Additionally, scallop dredging is prohibited in the northeast of the SAC to prevent the interaction with the sand bank feature.

In the MCZ (which is co-located with the SAC) there is a prohibition on the removal of spiny lobster by all methods, and a potting restriction (byelaw no. 15). Additionally, there is a byelaw (no. 13) prohibiting spear fishing.

⁶ [Lundy MCZ Factsheet](#)

⁷ [The Lundy Marine Conservation Zone Designation Order 2013](#)

⁸ [Current Permit Byelaws & Permit Conditions - Devon and Severn IFCA](#)

In the NTZ, there is a prohibition on the removal of any sea fisheries resources by potting, diving, netting and mobile fishing. There is a standalone byelaw (no. 28) which states that no person shall remove any sea fish from the NTZ.⁹

2.2.4 Historic AIS Review

Figure 6 shows the total number of unique AIS transmissions within the site and a 3 NM buffer as a proportion within the analysis years. The proportion of cargo and hazardous cargo vessel identities does not change significantly between years; however, the proportion of fishing and pleasure vessels is higher in 2021. The reason for the increased fishing vessel activity is unclear.

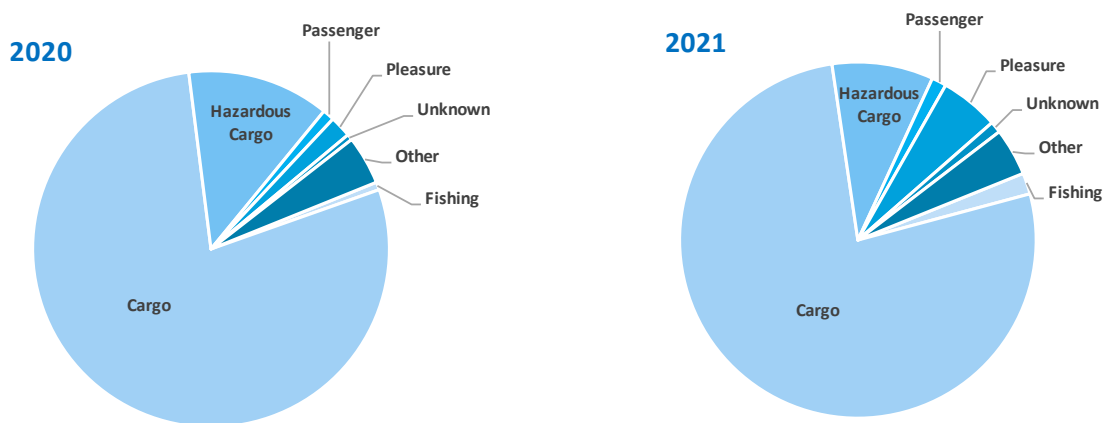


Figure 6 | Proportion of unique AIS identities within the Lundy MPA and 3 NM buffer for the years 2020 and 2021

The heatmap for all AIS activities within the area (Figure 7, All AIS) shows areas of high activity in the north and eastern area of the MPA. It also shows that the fishing vessel activity is concentrated on the eastern side of the MPA (see Figure 7, Fishing Slow Speeds AIS). There were a relatively low number of AIS transmissions within the AOI and very few from within the Lundy MPA.

2.2.4.1 Fishing vessel activity

Over the 2 year period a total of 16 vessels broadcast their identity as fishing vessels within the MPA and 3NM buffer. The low numbers of fishing vessels in the area in 2020 meant that no discernible trend in seasonality was shown in this year. However, in 2021 activity peaked April to July (Figure 8), with more fishing vessels active in the area (13) in 2021 compared to the previous year (2020, 4 vessels). Over the two-year period a total of 4 vessels had AIS positions within the MPA, of these 1 was likely a potting vessel, 2 were beam trawlers, and 1 was a likely netting vessel.

2.2.4.2 Pleasure vessel activity

Over the 2 year period a total of 45 vessels broadcast their identity as pleasure vessels within the MCZ and 3NM buffer. In 2020 activity peaked in July and August and in 2021 it peaked in June and July (Figure 9). The COVID-19 Pandemic and associated restrictions were the likely cause of the increase in 2021 compared to 2020 and are more representative of pre and post pandemic activity levels. Anecdotal evidence suggests that leisure vessel activity is much higher within the MCZ than the AIS transmissions indicate, suggesting AIS is not commonly used by the leisure, recreational or charter fleet.

⁹ [D&S IFCA Byelaw Book and Minimum Conservation Reference Size List - Devon and Severn IFCA](#)

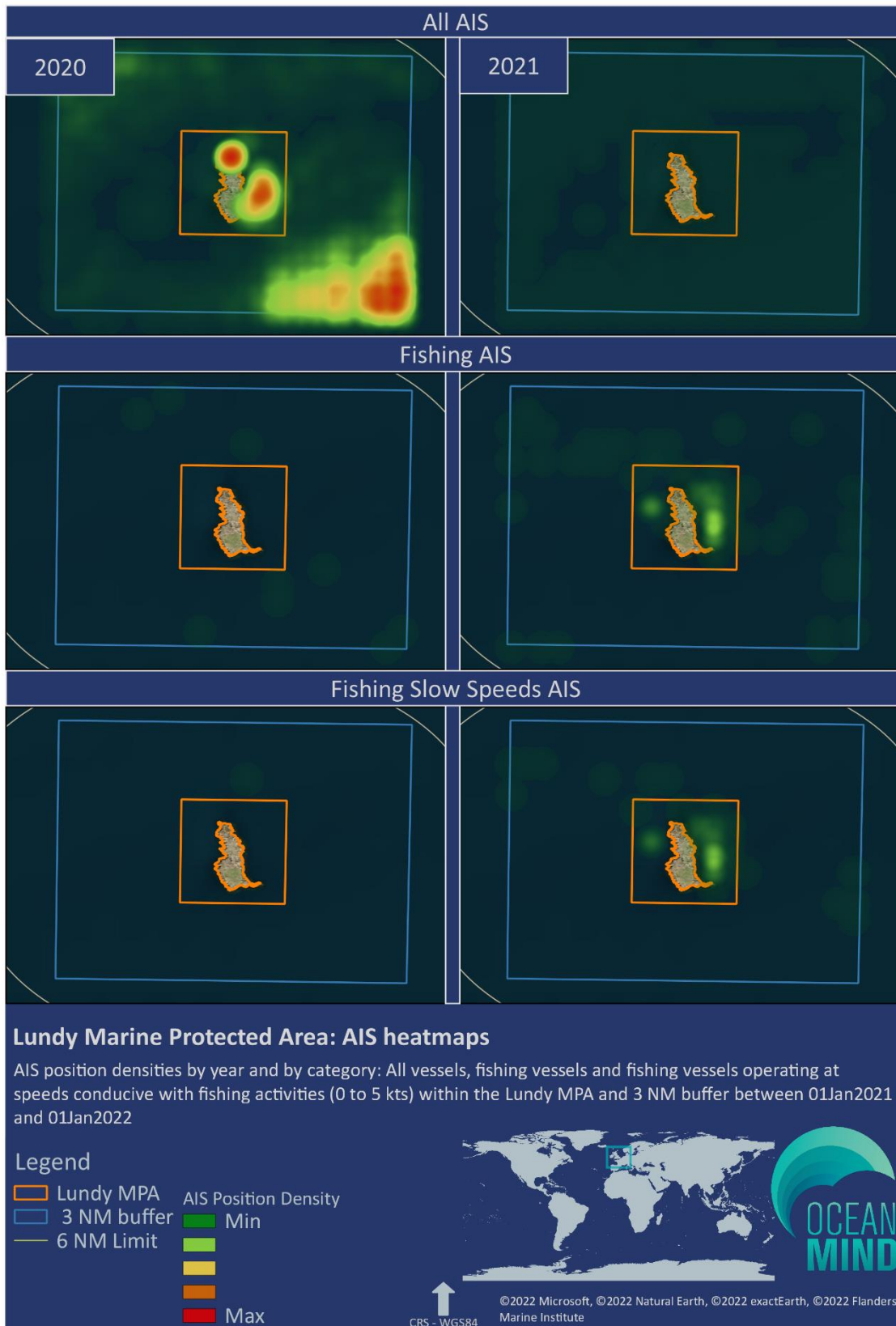


Figure 7| Heatmap showing activity of all vessels and then fishing vessels and fishing vessels at slow speeds inside the Lundy MPA and 3NM buffer for 2020 and 2021.

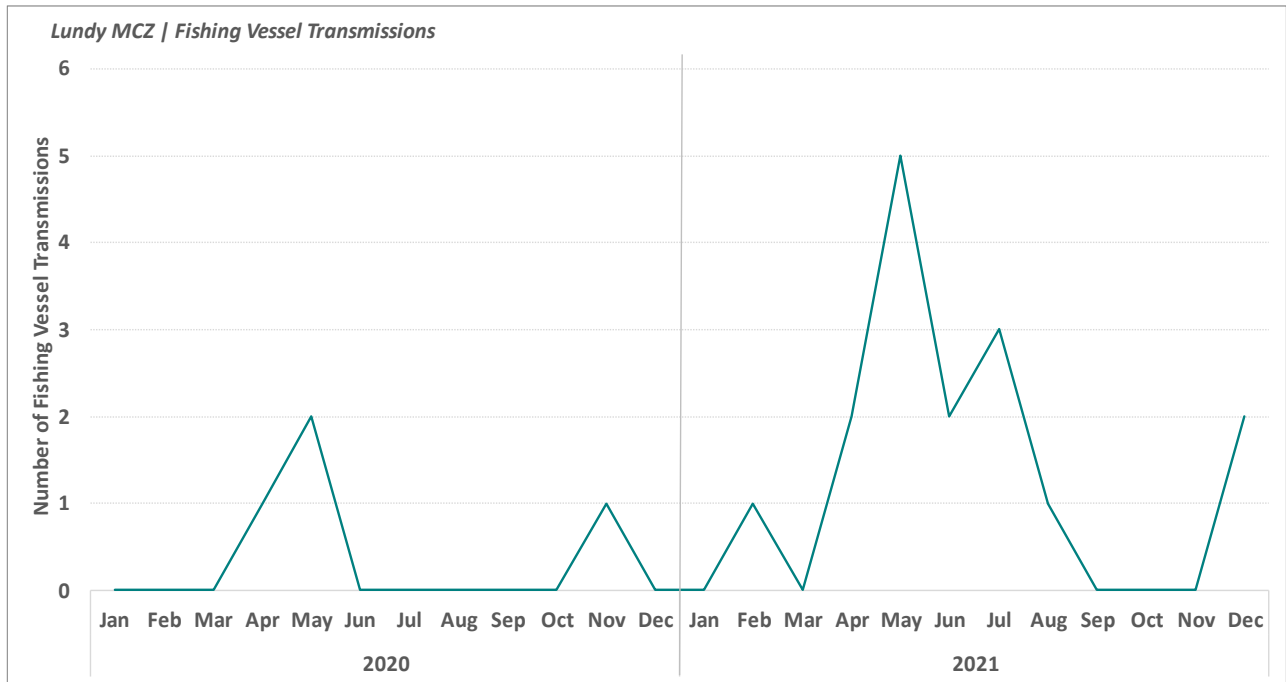


Figure 8 | Monthly unique fishing vessel transmissions within the Lundy MCZ and 3 NM buffer for the years 2020 and 2021

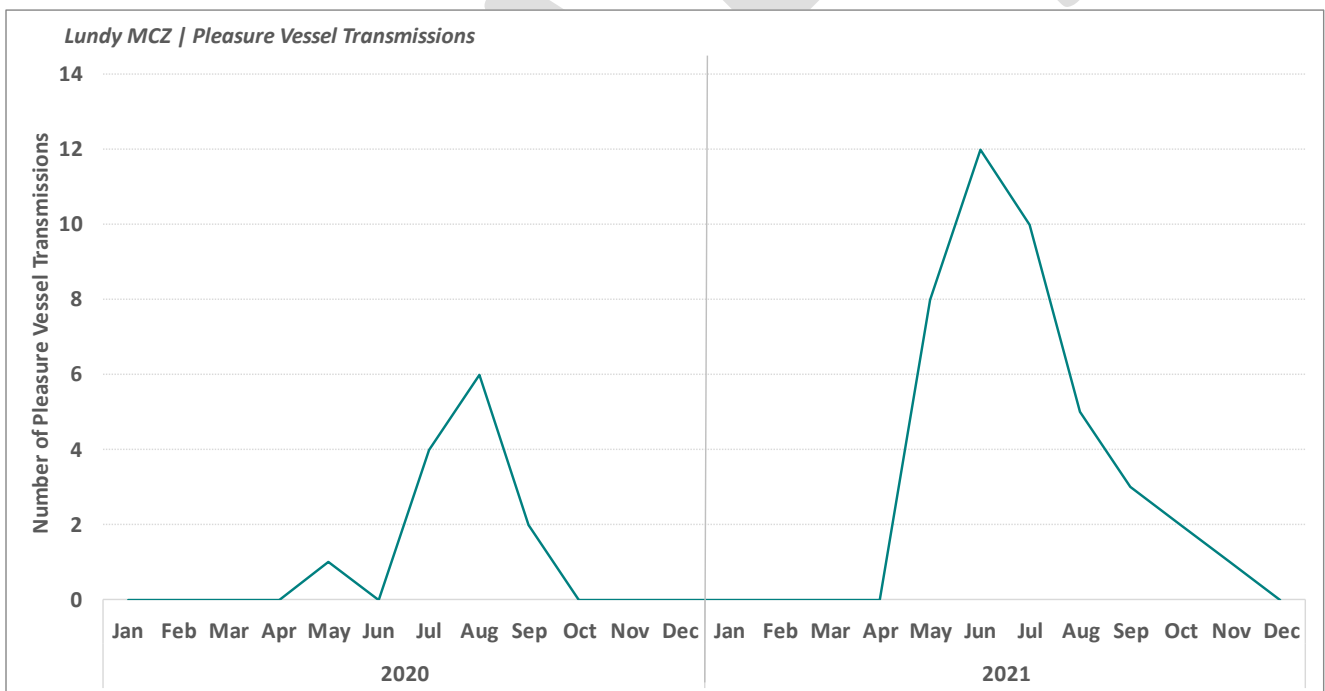


Figure 9 | Monthly unique pleasure vessel transmissions within the Lundy MCZ and 3 NM buffer for the years 2020 and 2021

2.2.4.3 Cargo/ Hazardous Cargo Proximity

Over the 2 year period a total of 812 vessels broadcast their identity as cargo vessels and 112 as hazardous cargo vessels within the MCZ and 3NM buffer. There was no discernible seasonal peak in vessel activity during the period of analysis although vessel activity was higher in 2021, likely COVID-19 related (Figure 10). Cargo vessel activity was primarily seen in the buffer rather than the MPA itself as vessels travelled through the Bristol Channel (Figure 7, All AIS). This reduces the overall risk (environmental impact) to the MPA from these vessel types.

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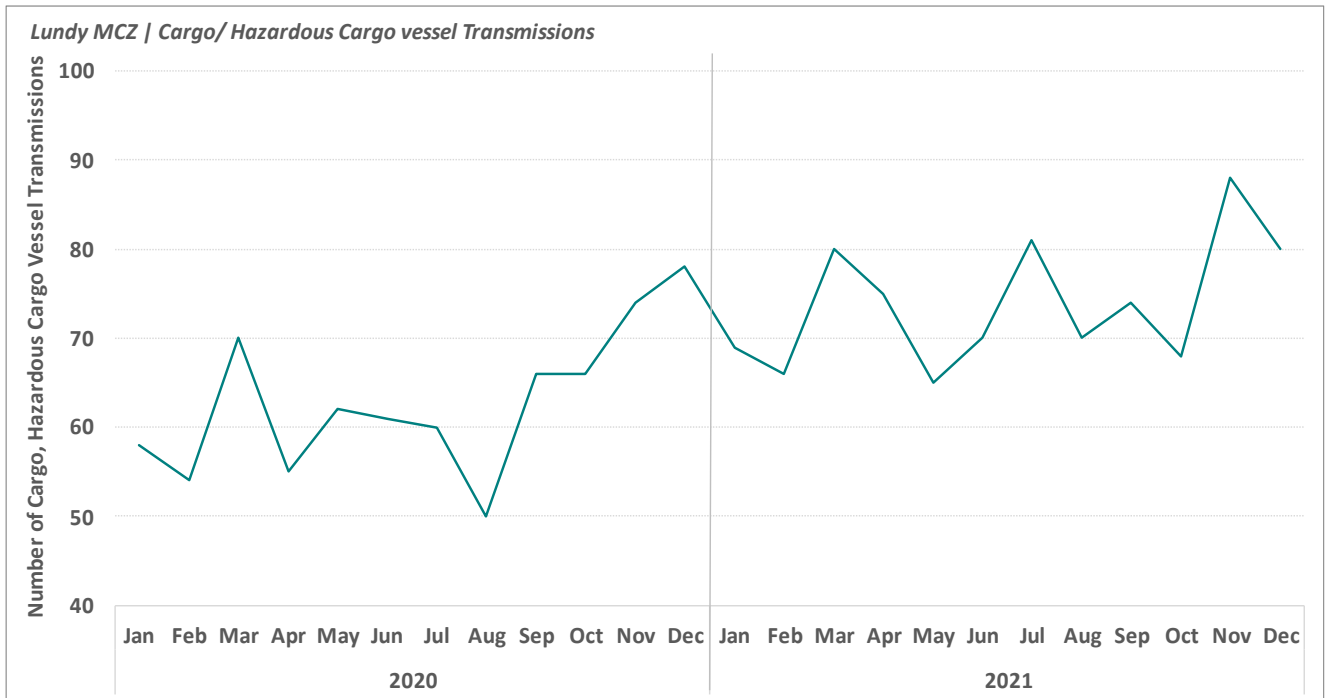


Figure 10 | Monthly unique cargo, hazardous cargo vessel transmissions within the Lundy MCZ and 3 NM buffer for the years 2020 and 2021

2.3 Start point to Plymouth Sound and Eddystone

2.3.1 Site Characteristics

Start Point to Plymouth sound and Eddystone is designated as SAC and spans 340.89 KM². The area is a straddling site with multiple competent authorities namely Devon and Severn IFCA, Cornwall IFCA and the MMO. The site has three distinct areas, Eddystone (Area A), Bigbury Bay to Plymouth Sound (Area B) and Start Point to West Rutts (Area C)¹⁰. Features at the site include numerous areas of inshore and offshore reef, notably bedrock reef. As the site straddles the 6NM limit, both the MMO and Cornwall IFCAs are the competent authorities, and have similar byelaws in place.

2.3.2 Site Activity

There is a high amount of fishing activity within the site. There is often conflict within the area between static and active gears (for example trawlers towing through pots, or potting vessels obstructing trawl areas through the setting of gear). The following gear types are in use within the site:

- Bottom towed gear (beam trawls, otter trawls)
- Dredging (scallop)
- Potting
- Netting
- Longlining
- Handwork

¹⁰ Further information regarding the site features can be found [here](#).

The heatmap for all AIS activities within the area (Figure 12, All AIS) shows areas of high activity throughout the area with a slight bias towards the eastern areas. It also shows that there is activity by fishing vessels broadcasting on AIS (Figure 12, Fishing AIS) throughout the area including within the MPA sites.

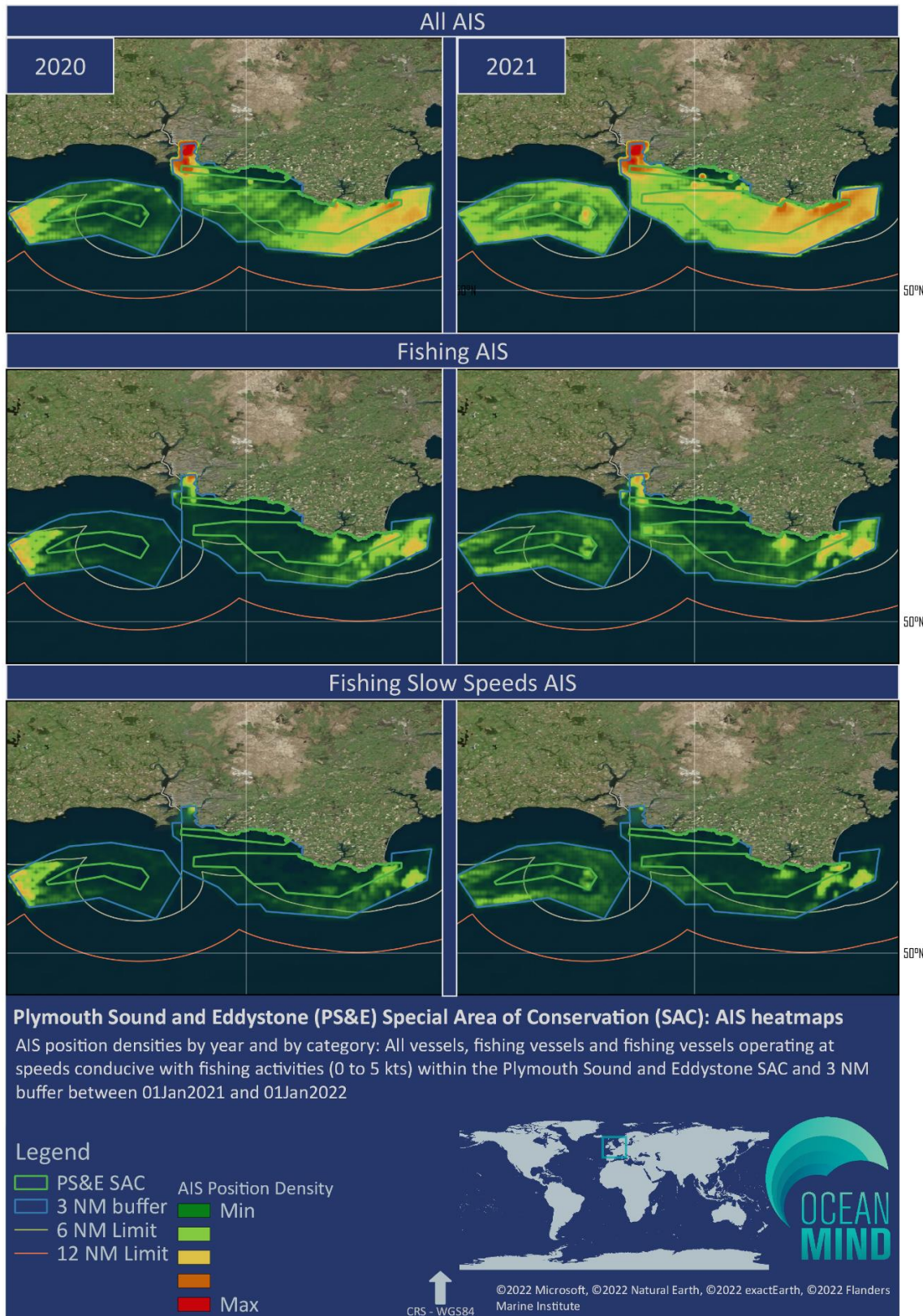


Figure 12 Heatmap showing activity of all vessels and then fishing vessels and fishing vessels at slow speeds inside the Plymouth Sound and Eddystone SAC and 3NM buffer for 2020 and 2021.

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2.4.1.1 Fishing vessel activity

Over the 2 year period a total of 209 vessels broadcast their identity as fishing vessels within the MPA and 292 within the SAC and 3NM buffer. In 2020 activity peaks in March and September, whereas in 2021 activity in March is low with a peak in activity during the summer months, beginning to decrease in September (Figure 13). There is a concentration of fishing vessel transmissions to the east and west of the area possibly attributed to the proximity of larger fishing ports in the area including Plymouth, Newlyn (to the west) and Brixham (to the east). There are fishing slow speed transmissions within each MPA with higher densities around Start Point which may need further investigation to determine gear type and subsequent compliance with the local byelaws.

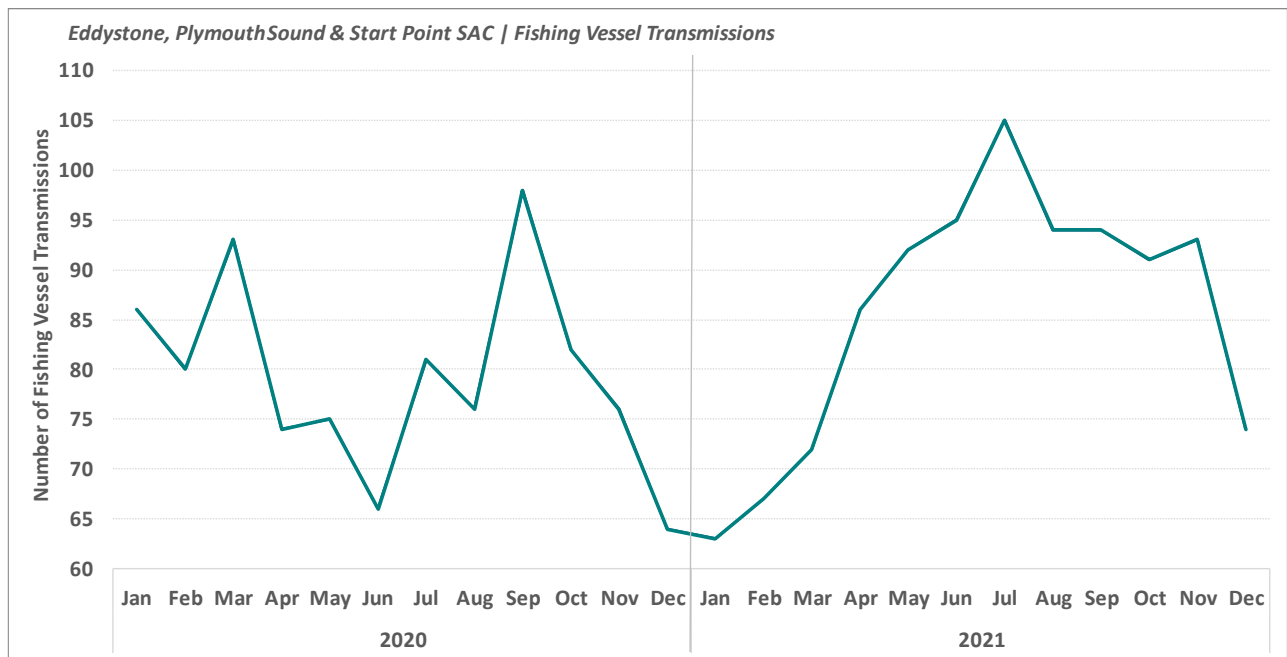


Figure 13 | Monthly unique fishing vessel transmissions within the Eddystone, Plymouth Sound and Start Point SAC and 3 NM buffer for the years 2020 and 2021

2.4.1.2 Pleasure vessel activity

Over the 2 year period a total of 3377 vessels broadcast their identity as pleasure vessels within the MCZ and 3NM buffer. In both 2020 and 2021 activity peaked in July and August (Figure 14). 2021 has a higher the number of pleasure boats active in the area (2734) compared to 2020 (1620). The risk to the SAC from these vessel types is generally thought to be low as there is limited scope for interaction between vessels and designated features. However, vessel activity in the area is relevant in relation to both effectiveness and efficiency of carrying out remote sensing in the area.

2.4.1.3 Cargo/ Hazardous Cargo Proximity

Over the 2 year period a total of 1112 vessels broadcast their identity as cargo vessels and 269 as hazardous cargo vessels within the SAC and 3NM buffer. Vessel activity was higher in 2020 (788 cargo and 183 hazardous cargo) whereas 2021 had 747 cargo, 166 hazardous cargo total. There was no consistent annual trend in vessel transmissions and in 2021 activity within the site remained steady with very little variation in numbers throughout the year (Figure 15). Collision risk within the site is low, with a low environmental impact.

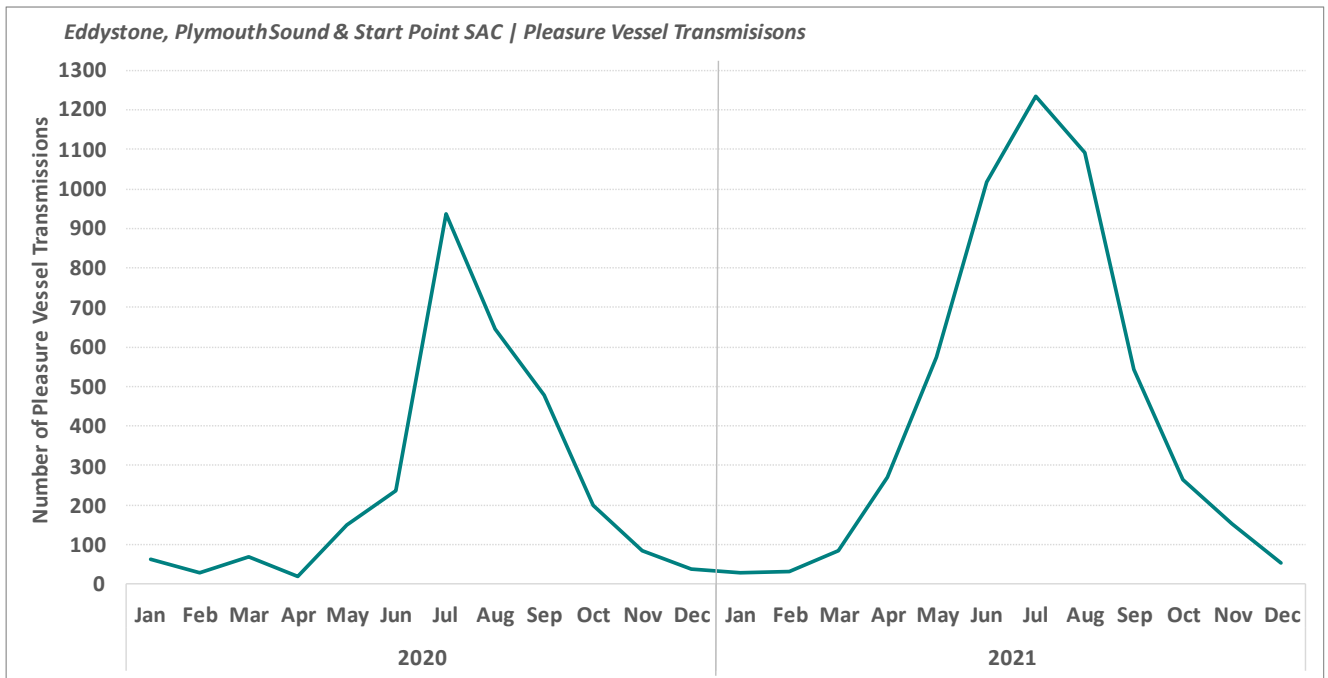


Figure 14 | Monthly unique pleasure vessel transmissions within the Eddystone, Plymouth Sound and Start Point SAC and 3 NM buffer

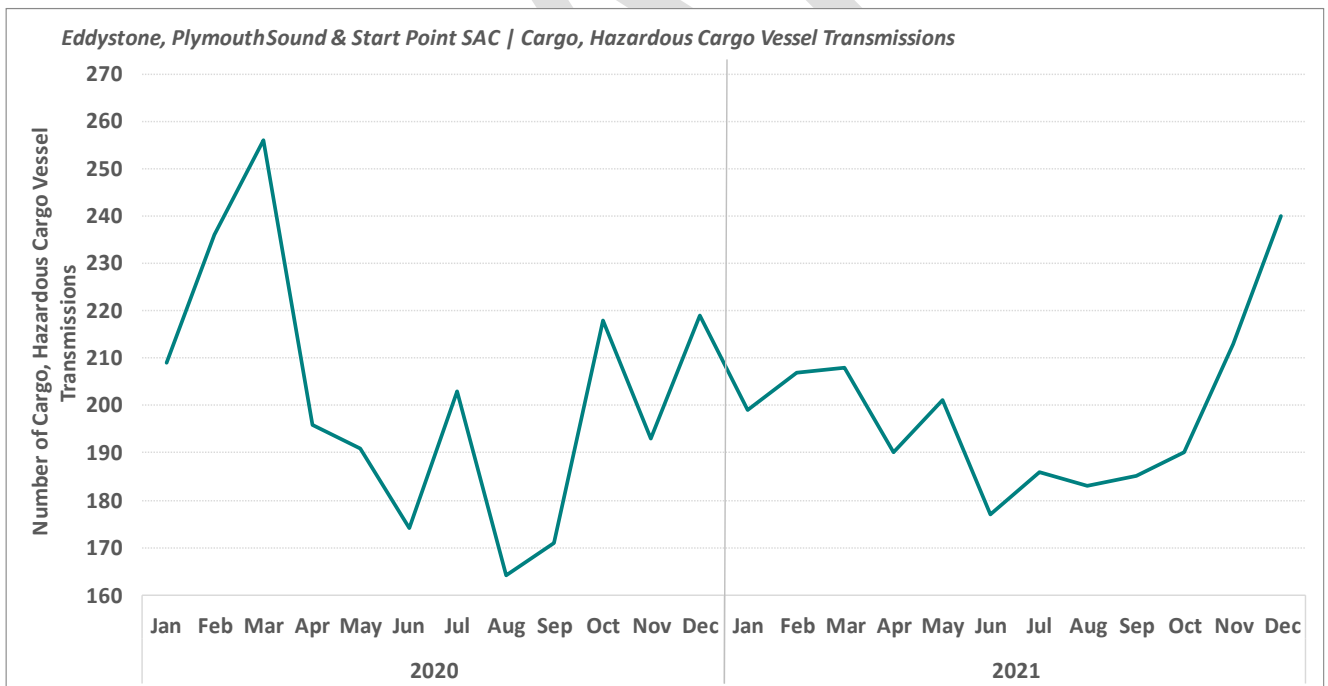


Figure 15 | Monthly unique cargo, hazardous cargo vessel transmissions within the Eddystone, Plymouth Sound and Start Point SAC and 3 NM buffer for the years 2020 and 2021

2.5 South Wight Maritime

2.5.1 Site Characteristics

South Wight Maritime SAC sits wholly within 6NM in the Southern IFCA district and spans over 198 km². Features at the site include:

- Bedrock and chalk reefs
- Vegetated sea cliffs of the Atlantic and Baltic Coasts
- Submerged or partially submerged sea caves

2.5.2 Site Activity

There is a presence of nomadic vessels carrying out fishing activities in the site. Dover sole and other benthic species are mainly targeted by commercial trawling gear (stern trawling), the spring months are the prime fishing period. Along the south coast of the island the main fishery conducted is potting, which currently has limited monitoring. Additionally, there are active commercial rod and line, net and trap fisheries within the site. Recreational fishing takes place at the site as do a range of other recreational activities. The site is subject to commercial vessel traffic, which could result in some potentially damaging activities such as cruise ship anchoring.

2.5.3 Byelaws and local regulations

The Southern IFCA has to date followed a feature-led approach to the management of fishing activities within this site, closing sensitive features to damaging fishing techniques while allowing the existing fishing grounds to continue being harvested as this is economically very important to the industry. Both dredging and trawling activities are managed to ensure they do not interact with the sensitive habitats found within the site.

The site is covered by a byelaw which protects vulnerable features from bottom towed gear. It currently extends to about a quarter of the site, spanning over 288 km².¹⁵ The closed areas is bound by a buffer zone to add an additional layer of protection, although, due to shallow water depth, in most areas the buffer only extends to a maximum of 125m in width. The byelaw first came in to force in 2012, was updated in 2016, and is due to be reviewed again in 2022. Adjacent to the closed area in the West of the site is a trawl corridor in which towed gear fishing activity by vessels ≤12m is allowed.

Fishing vessels over 12m are not permitted to fish within the Southern IFCA district.¹⁶ There is a curfew in place for towed gear use at night. There is also a code of conduct closure in place for scallop fishing, which is a temporary measure, the voluntary compliance with this measure has been low limiting its effectiveness.

2.5.4 Historic AIS Review

The heatmap for all AIS activities within the area (Figure 16, All AIS) shows areas of high activity predominantly in the eastern portion of the site and buffer. It also shows that the fishing vessel transmissions are concentrated on the eastern side of the MPA (see Figure 16, Fishing Slow Speeds AIS).

¹⁵ [The Southern IFCA bylaws booklet](#): Bottom Towed Fishing Gear Bylaw 2016 (Page 10-24)

¹⁶ [Vessel-Used-In-Fishing-Byelaw.pdf \(toolkitfiles.co.uk\)](#)

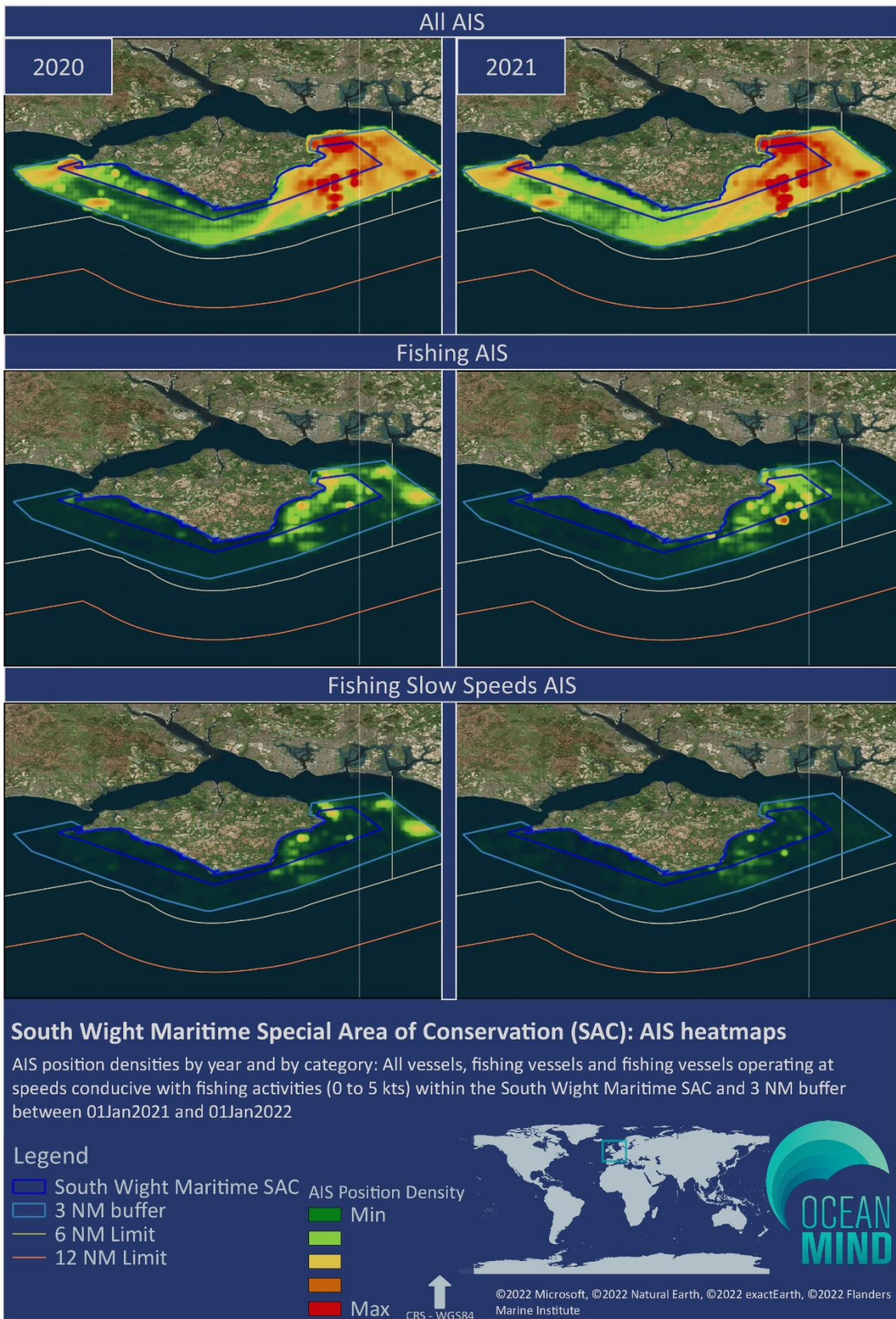


Figure 16 | Heatmap showing activity of all vessels and then fishing vessels and fishing vessels at slow speeds inside the South Wight Maritime SAC and 3NM buffer for 2020 and 2021.

Figure 17 shows the total number of unique AIS transmissions within the site and a 3 NM buffer as a proportion within the analysis years. The proportion of vessel identities does not change significantly between years. As expected within this AOI, the largest proportion of transmissions are from pleasure vessels. The proportion of fishing vessels remains largely unchanged between years; however this is the only vessel category which sees a decrease (though small <10%) in transmissions from 2020 to 2021.

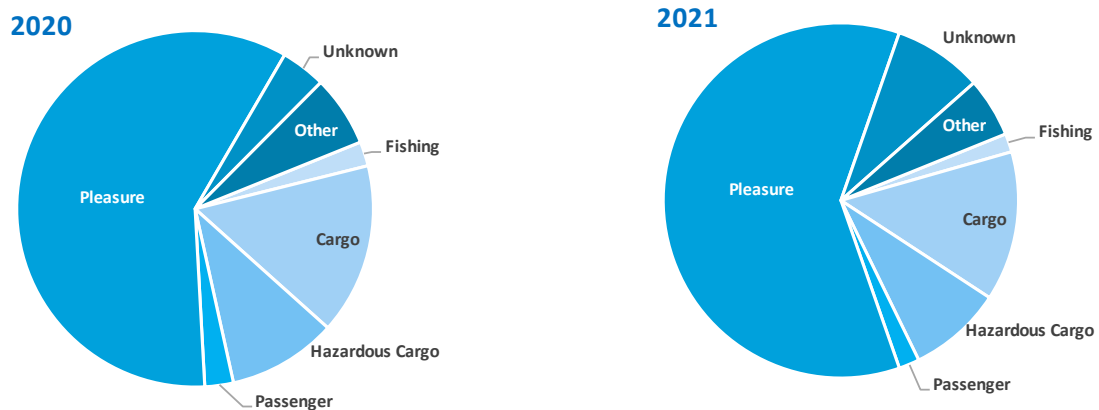


Figure 17 | Proportion of unique AIS identities within the South Wight Maritime SAC and 3 NM buffer for the years 2020 and 2021

2.5.4.1 Fishing vessel activity

Over the 2 year period a total of 163 vessels broadcast their identity as fishing vessels within the SAC and 3NM buffer. In 2020 activity peaks in July and August, and in 2021 it peaks in April though to July (Figure 18). More fishing vessels were active in the area (118) in 2020 than in 2021 (108). The concentration of slow speed transmissions to the eastern portion of the MPA suggests fishing activity occurs more predominantly in this area which is contrary to anecdotal evidence which suggests fishing also occurs in the western areas.

81 vessels broadcast their identity as fishing vessels within the SAC, of these 77 were confirmed as likely fishing vessels and 26 were confirmed as vessels likely to use bottom towed gear. These vessels are the main vessels of interest and further investigation into these vessels would determine likely activity within the SAC i.e. transit, fishing etc.

2.5.4.2 Pleasure vessel activity

Over the 2 year period a total of 4997 vessels broadcast their identity as pleasure vessels within the SAC and 3NM buffer. In both years activity peaked during the summer months (July and August) (Figure 19) as expected, with COVID-19 being the likely reason for higher numbers of pleasure boats active in the area in 2021 (3878) compared to 2020 (3158). These vessels are likely to have some impact on site features, both geological and biological dependent on each vessel's specific activity or interaction with the site i.e. anchoring, diving, angling, disturbance (noise etc.).

2.5.4.3 Cargo/ Hazardous Cargo Proximity

Over the 2 year period a total of 1189 vessels broadcast their identity as cargo vessels and 870 as hazardous cargo vessels within the SAC and 3NM buffer. There was no discernible seasonal peak in vessel activity during 2021, however during 2020 there was a steep decline in Cargo vessels in the area April-June, likely COVID-19 related as global commerce adjusted (Figure 20). The Heat Map (Figure 16, All AIS) shows no discernible shipping lane, it is likely that cargo vessels are transiting to and from the major ports along this coast, or anchoring before deployment. Anchoring within the site may impact on site features, dependent on proximity.

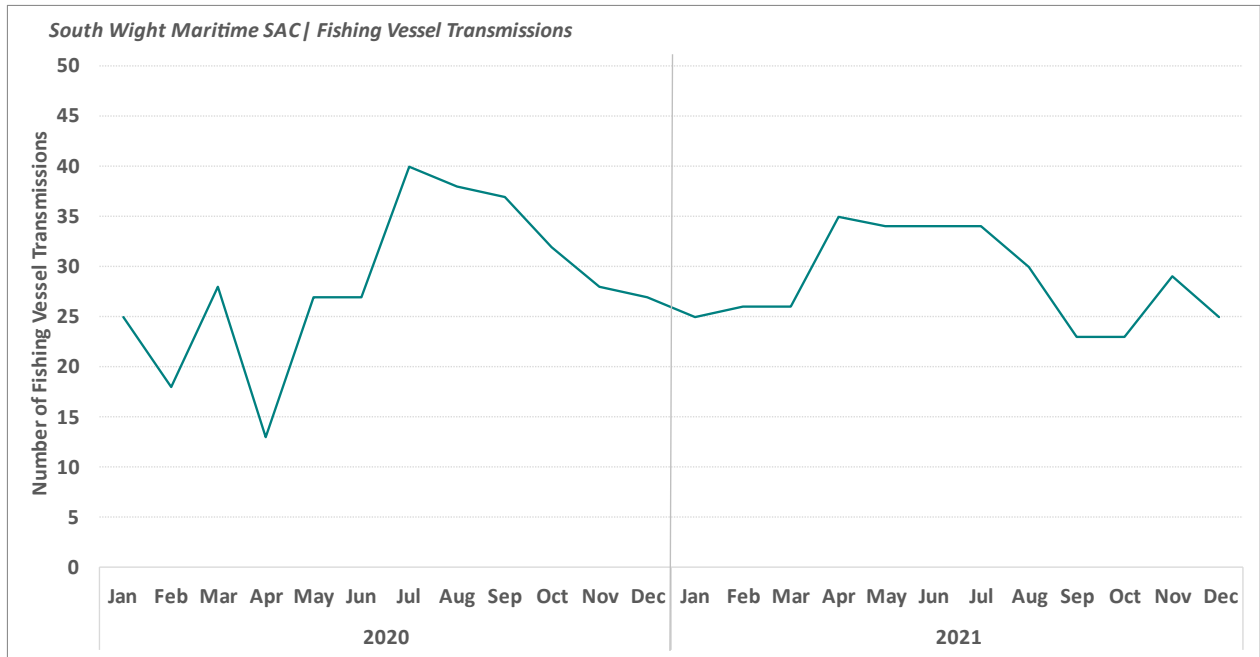


Figure 18 | Monthly unique fishing vessel transmissions within the South Wight Maritime SAC and 3 NM buffer for the years 2020 and 2021

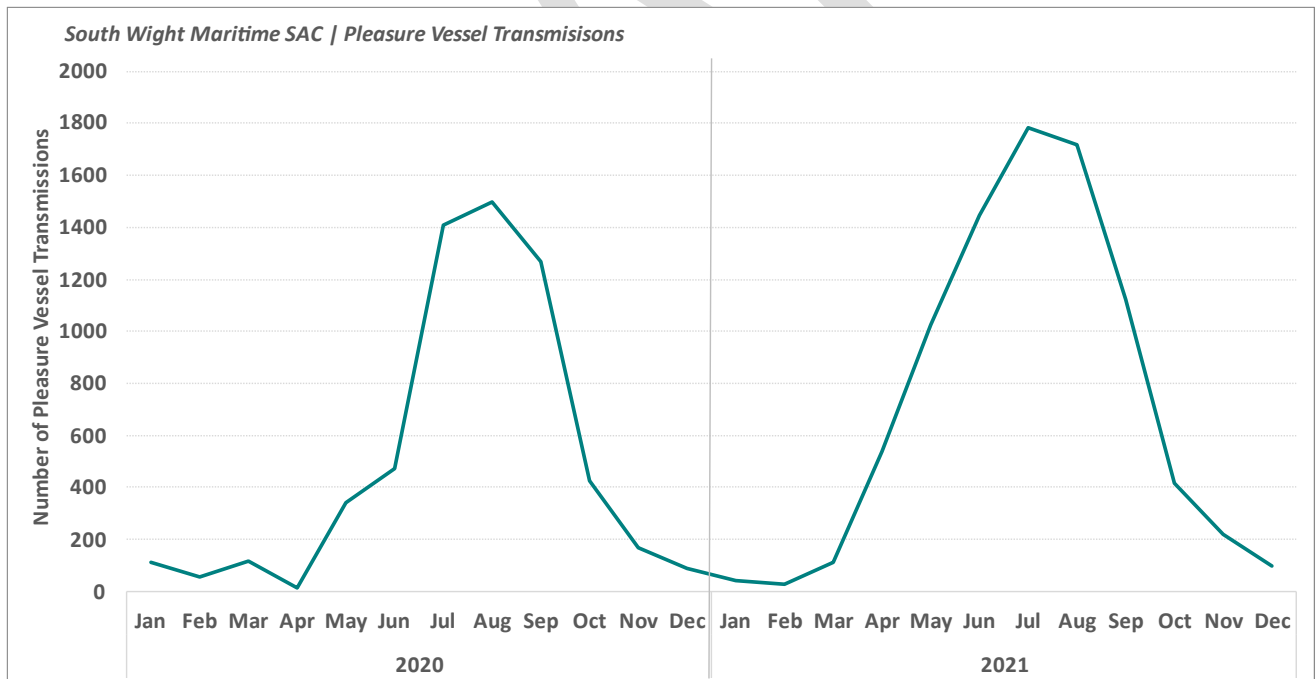


Figure 19 | Monthly unique pleasure vessel transmissions within the South Wight Maritime SAC and 3 NM buffer for the years 2020 and 2021

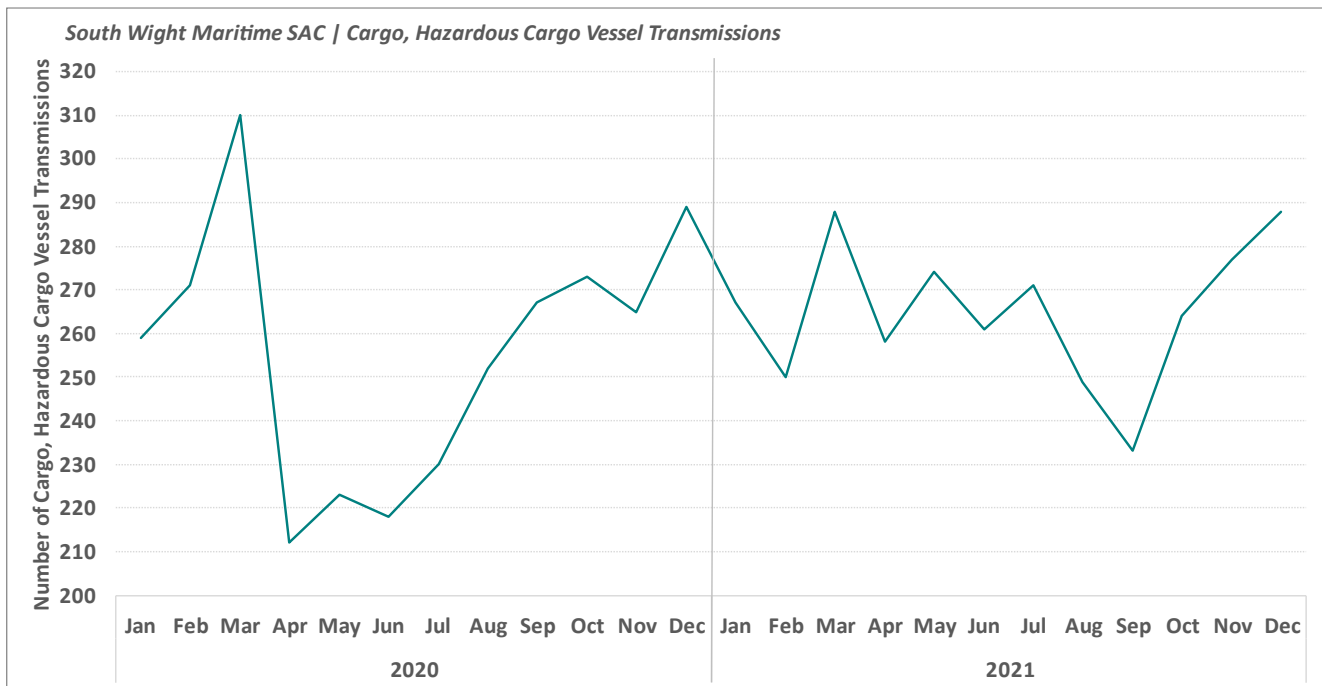


Figure 20 | Monthly unique cargo, hazardous cargo vessel transmissions within the South Wight Maritime SAC and 3 NM buffer for the years 2020 and 2021

2.6 Wight Barfleur

2.6.1 Site Characteristics

The Wight-Barfleur SAC sits between 6 NM and 12 NM in the English Channel and is managed by the MMO. The SAC was established in 2019 and covers an area of 138 km². Features at the site include:

- Bedrock and stony reefs with rocky outcrops, which support a large array of reef fauna¹⁷
- Bedrock ridges
- Channels

2.6.2 Site Activity

All fishing activity is from large and industrial vessels. Sizes range from 10 to 15 m to up to 80 m. Both national and foreign flagged vessels (from the EU) are operational within the site. National vessels are mainly potting vessels operating to the west outside of the SAC. Other methods include dredging and beam trawl, however this is more common in the foreign flagged vessels operating in the vicinity. Due to its offshore location, there is limited recreational activity in the vicinity. The site is subject to high volumes of merchant vessel activity, including through multiple shipping lanes, due to its location in the channel between France and England.

2.6.3 Byelaws and local regulations

There are no byelaws currently in place at this site. The potential need for future management is currently under review by the MMO.

¹⁷ Further information about the Wight-Barfleur Reef can be found in the [JNCC Final Impact Assessment](#).

2.6.4 Historic AIS Review

Figure 21 shows the total number of unique AIS transmissions within the site and a 3 NM buffer as a proportion in the analysis years. The proportion of vessel identities does not change significantly between years. The heatmap for all AIS activities within the area (Figure 22, All AIS) shows areas of high activity through the centre of the MPA, this is driven by the high volume of Cargo traffic. High activity is primarily around the shipping lane with an even spread of fishing activity throughout the SAC and buffer (see Figure 22, Fishing Slow Speeds AIS).

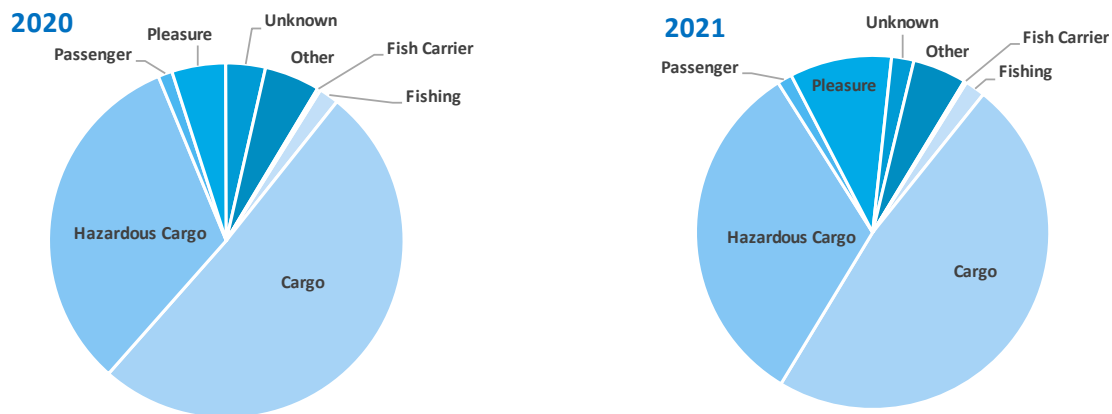


Figure 21 | Proportion of unique AIS identities within the Wight Barfleur SAC and 3 NM buffer for the years 2020 and 2021

2.6.4.1 Fishing vessel activity

Over the 2 year period a total of 291 vessels broadcast their identity as fishing vessels within the SAC and 3NM buffer. Activity peaks in March, July and September in 2020 and in March – April, June and August in 2021 (Figure 23). This is as expected as the main fishing season for *Nephrops norvegicus* occurs primarily in the spring and summer^{18,19}. More fishing vessels were active in the area (218) in 2021 than in 2020 (190). Over the 2 years a total of 249 vessels broadcast their identity as fishing vessels within the SAC, their nationalities/ flag states are shown in Table 2. Track analysis was completed for vessels that had flag states not from the UK or EU. These vessels were found to only be transiting through the area.

Table 2 | Flag state of fishing vessels transmitting on AIS within the Wight Barfleur MPA and 3 NM buffer in 2020 & 2021

Flag State	Number of Identities	Proportion (%)
United Kingdom	77	27%
Belgium	77	27%
France	38	13.3%
Netherlands	19	6.7%
Russian Federation	14	4.9%
Germany	6	2.1%
Ireland	6	2.1%
Panama	6	2.1%
Belize	5	1.8%
Marshall Islands	5	1.8%
Other ²⁰	32	11.2%

¹⁸ <https://www.nw-ifca.gov.uk/managing-sustainable-fisheries/nephrops-norvegicus/>

¹⁹ <https://www.daera-ni.gov.uk/sites/default/files/publications/daera/Overview%20of%20NI%20Sea%20Fishing%20Sector%202019.pdf>

²⁰ Other represent flag states/countries with less than 5 vessels

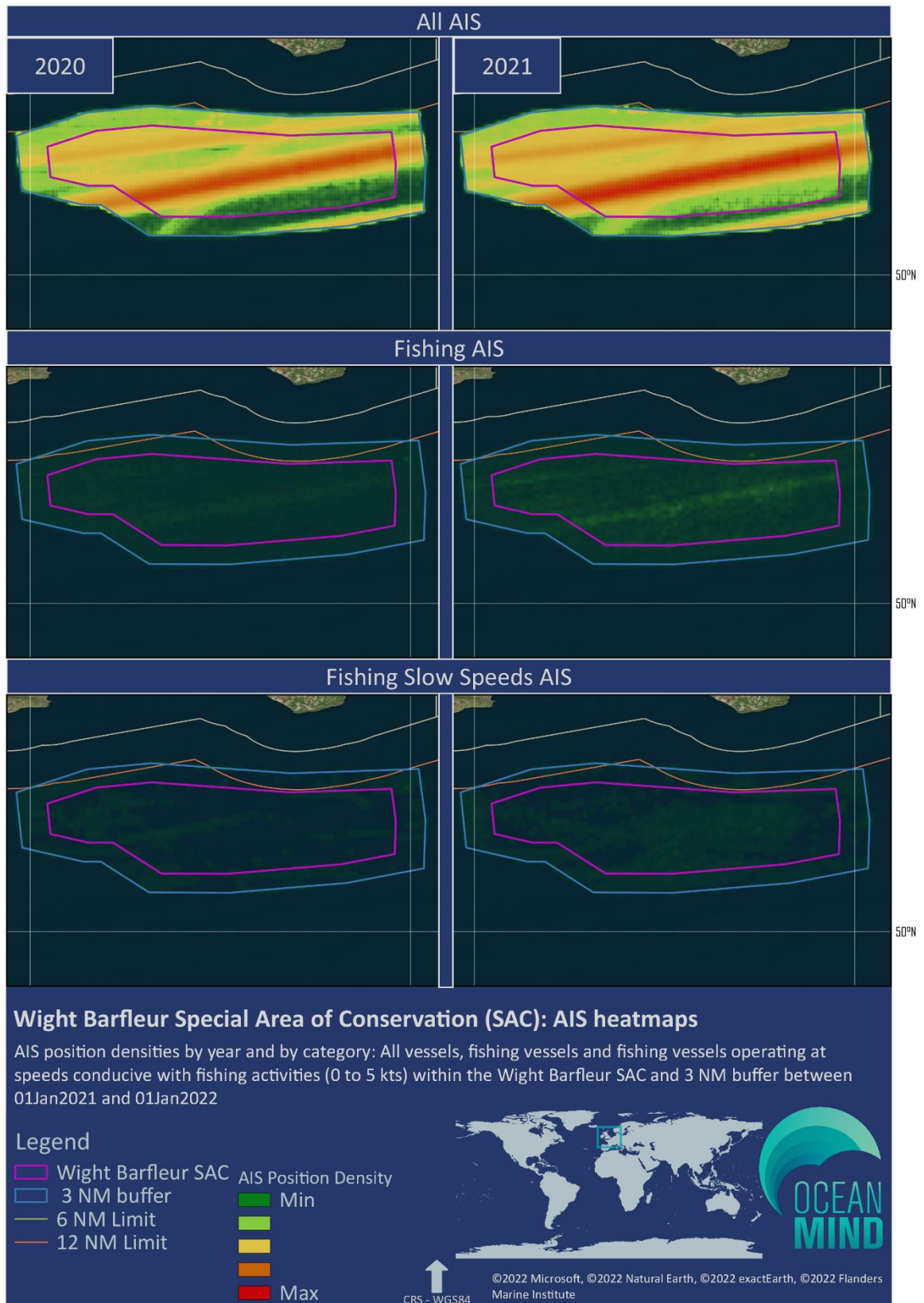


Figure 22 | Heatmap showing activity of all vessels and then fishing vessels and fishing vessels at slow speeds inside the Wight Barfleur SAC and 3NM buffer for 2020 and 2021.

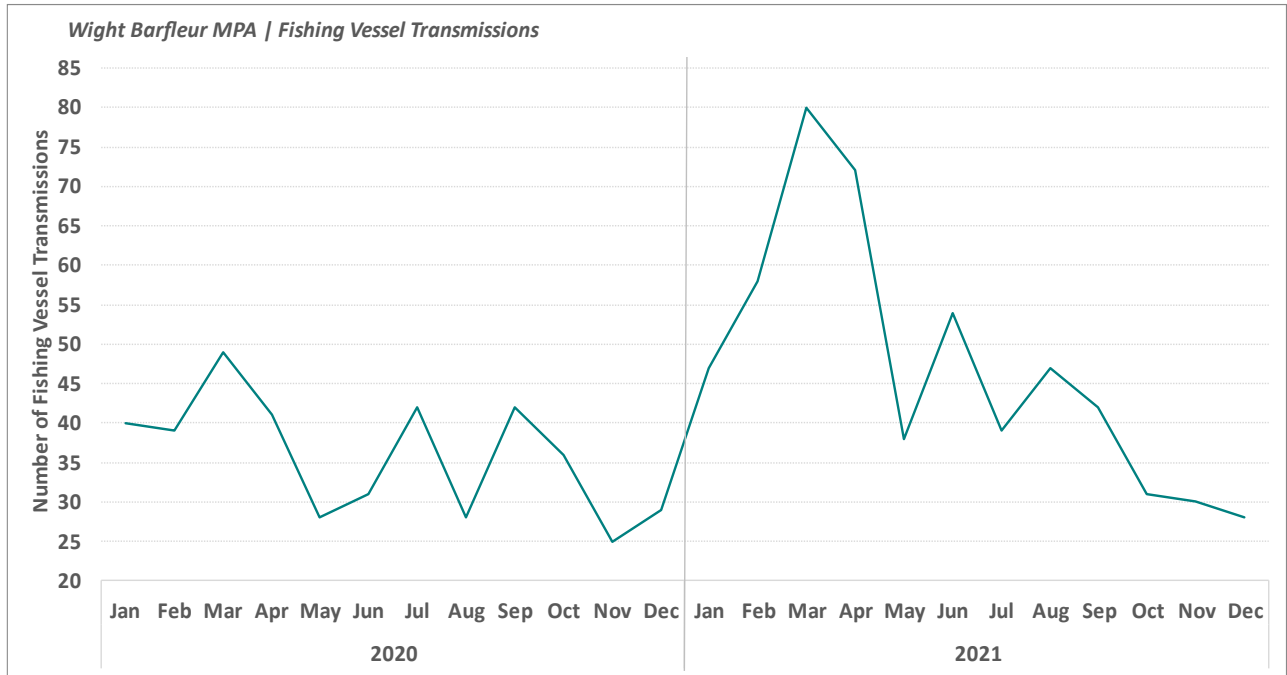


Figure 23 | Monthly unique fishing vessel transmissions within the Wight Barfleur MPA and 3 NM buffer for the years 2020 and 2021

2.6.4.2 Cargo/ Hazardous Cargo Proximity

Over the 2 year period a total of 7582 vessels broadcast their identity as cargo vessels and 5175 as hazardous cargo vessels within the SAC and 3NM buffer. There was no discernible seasonal peak in vessel activity during the period of analysis (Figure 24). Vessel activity was higher in 2021 (5615 cargo, 3795 hazardous cargo total), whereas 2020 had 5321 cargo and 3776 hazardous cargo in total.

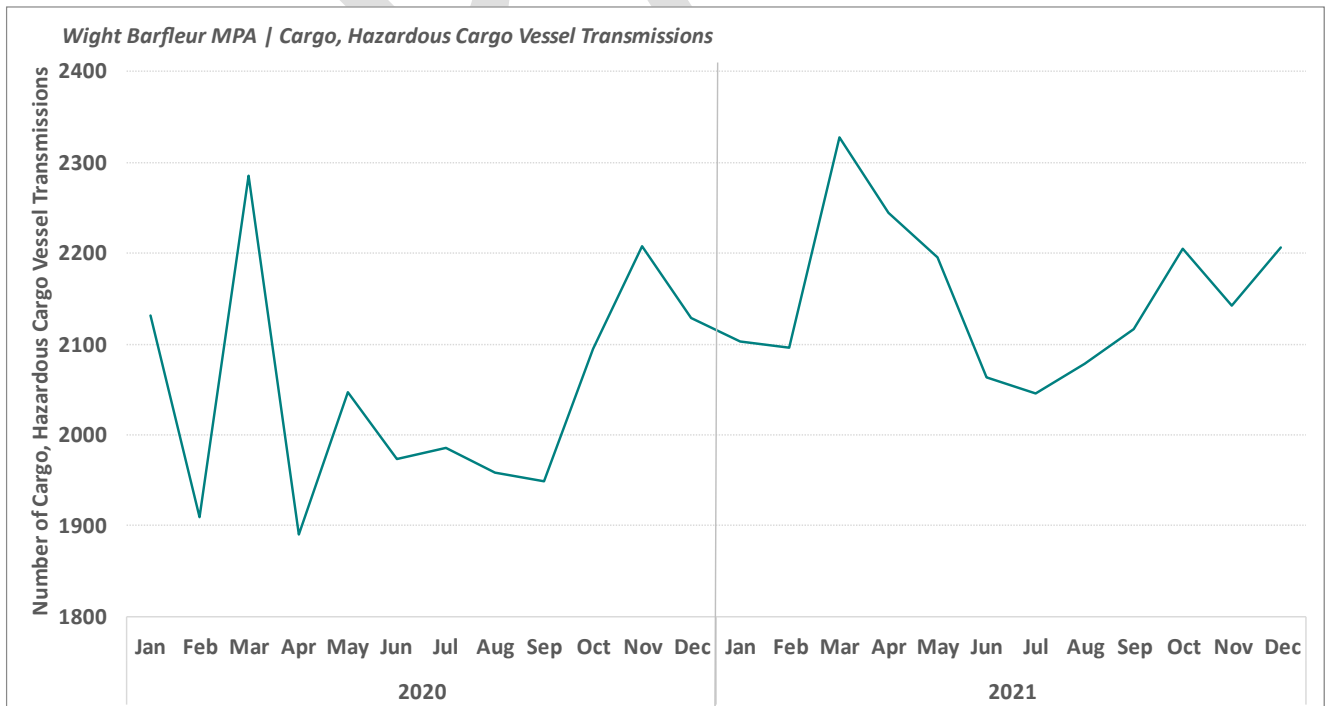


Figure 24 | Monthly unique cargo, hazardous cargo vessel transmissions within the Wight Barfleur MPA and 3 NM buffer for the years 2020 and 2021

Remote Sensing Pilot Application

2.7 SAR

SAR is an active sensor which sends pulses of electromagnetic waves over a targeted area. A portion of each pulse is reflected back to the sensor. The strength of this reflection is dependent on the material properties of the object; metal objects reflect well, where other materials like fibreglass reflect weakly.

SAR satellites provide the most cost-effective way to obtain data on 'dark vessel' detections, while holding a high resilience to weather conditions, images are also available frequently. Imagery will be collected in the highest possible resolution, known as 'Wide Ultra Fine' (WUF) Mode and the resolution specifically developed for ship detection, Extra Fine (XF) Mode. An algorithm supports the analysis and provides thumbnails of possible detections (targets which are consistent with vessels in size and profile) which are visually assessed by an analyst.

2.7.1 Site Application

As the selected sites and vessels operating within the sites are relatively small, high resolution SAR imagery can be used for ship detection. Single frames in the highest resolution (WUF-Mode) will cover the entire MPA in most cases (Figure 25). Wight and Barfleur and South Wight Maritime can be covered with a single image in XF-mode. Depending on the site's requirements and effectiveness of SAR either 8 or 12 images will be collected between April and June (Table 3) to provide repeated weekly coverage of the site.

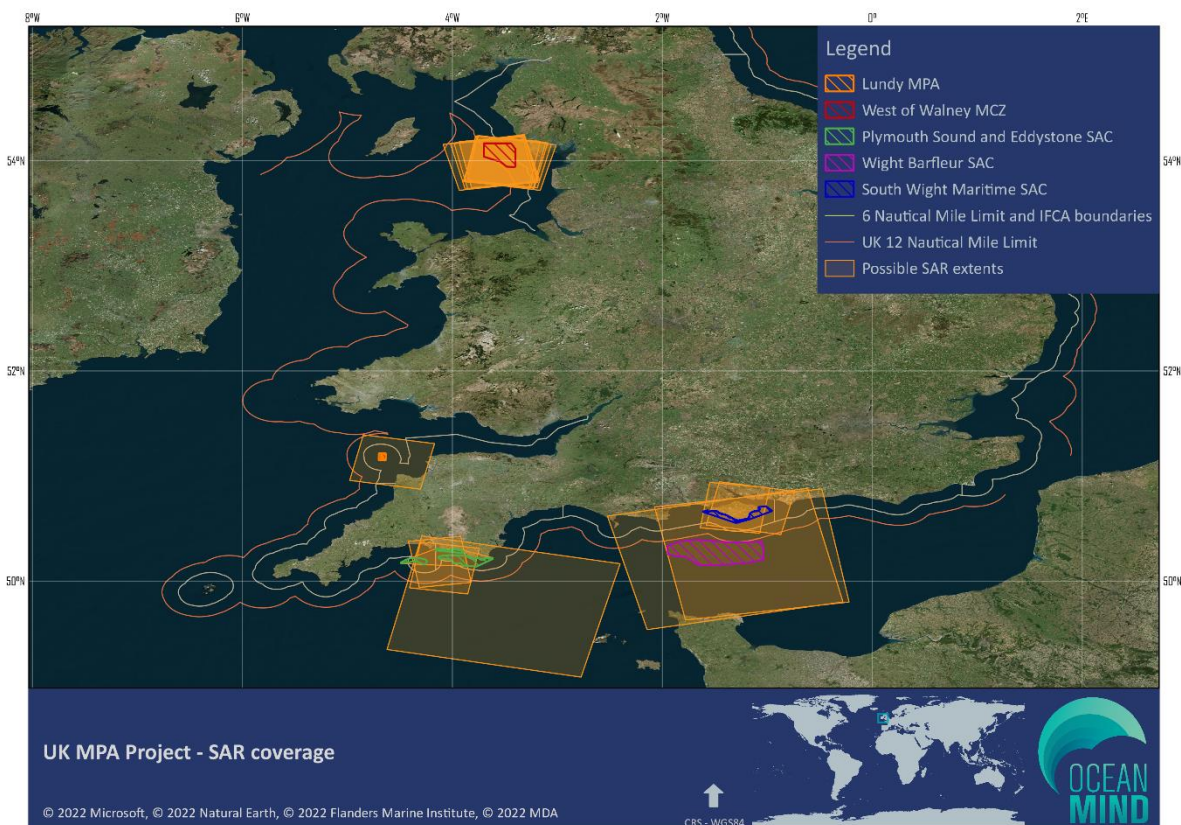


Figure 25 | Possible SAR swath over the selected MPAs within the orbit of the MDA SAR satellite RADARSAT-2. Larger frames correspond to imagery in XF-mode, smaller frames to WUF-Mode.

Table 3 | Sites and collection details of the SAR acquisition

Site	Start Date	Maximum Duration	WUF Images (Weekly)	XF Images (Weekly)	Total Images
South Wight	25Apr	5 weeks	2	1	12
Wight and Barfleur	04Apr	7 weeks	0	2	8
Eddystone	09May	5 weeks	2	1	12
Lundy	16May	6 weeks	2	0	8
West of Walney	04Apr	8 weeks	3	0	12

2.7.2 Challenges and Solutions

Remote Sensing data needs to be correlated to other sources to ensure that the context of the imagery is well understood. While SAR is effective in detecting vessels, the type and activity cannot be determined. It is therefore important to know the environment in which the detection occurs and to compare the findings to different data sources to increase the analytical confidence.

Due to the nature of the orbit that the SAR satellite RADARSAT-2 uses, imagery will be taken at the same points in time. This limits the acquisition and does not allow for flexibility, e.g., a specific time when a vessel of interest is known to enter the MPA. Furthermore, multiple sites can be in parallel to the satellite's gravitation. This results in a conflict where only one site can be obtained by the satellite until the point is revisited.

To overcome these challenges OceanMind extended the time of acquisition to ensure conflicting times can be resolved. Furthermore, other data sources and satellites will be considered to allow for more variety in the acquisition times and to determine vessel types and activity more accurately.

2.7.3 Intelligence Cycle

OceanMind has a long partnership in reporting to the MMO for intelligence-based enforcement. This partnership will help to provide relevant intelligence and effective monitoring control and surveillance. Reports will highlight the analytical confidence and risk associated to detections and how it correlates with other data sources. It will be consolidated to focus on the information which supports the IFCA and MMO to form the right decisions. This process will be developed through consultation with the relevant IFCA and MMO authorities to meet their specific requirements.

2.7.4 Tasking Timeline

Image collections are tasked from the 04Apr2022 to 27Jun2022 (Table 3). Where possible, start dates and durations for acquisition were selected to coincide with high-risk time periods i.e. times when the MPA's were at the most risk of potential IUU activity, as discussed with the relevant authorities during previous phases of the project. There were some project timeline restrictions to this approach as monitoring could start no earlier than April 2022 and must end before July 2022.

The tasking windows have been extended to account for conflicts with tasking the satellites in the area and ensures that a high overall amount of imagery is collected and reduce loss of coverage.

2.8 EO

A range of different Electro-Optical imagery will be available and in use at each of the 5 sites. This technology will be employed at all the sites due to its utility and capability of collecting high resolution images which

provide positive insight into the types of vessel and activity which may take place at each site. This has the potential to provide valuable intelligence to the IFCA's and MMO.

At all 5 sites imagery will be speculatively tasked for the duration of phase 4²¹. In addition to this imagery has been directly tasked for collections over Lundy for the duration of the phase, with the aim of collecting 9 images over the site and surrounding area. More information about the constellation of satellites used can be found [here](#).

For speculative tasking images will be available for analysis by OceanMind analysts on an online platform, this platform allows analysts to pan around and zoom into images, measure and take snapshots of vessel detections for further analysis and processing. Directly tasked imagery (over Lundy) is also available online, but the entire frame is also available for downloading, which means that further data and image processing techniques can be applied.

2.8.1 Site Application

Lundy is the smallest MPA selected in the project, as such its full extent and an appropriate buffer can be covered by a single image, as shown in Figure 26 below.

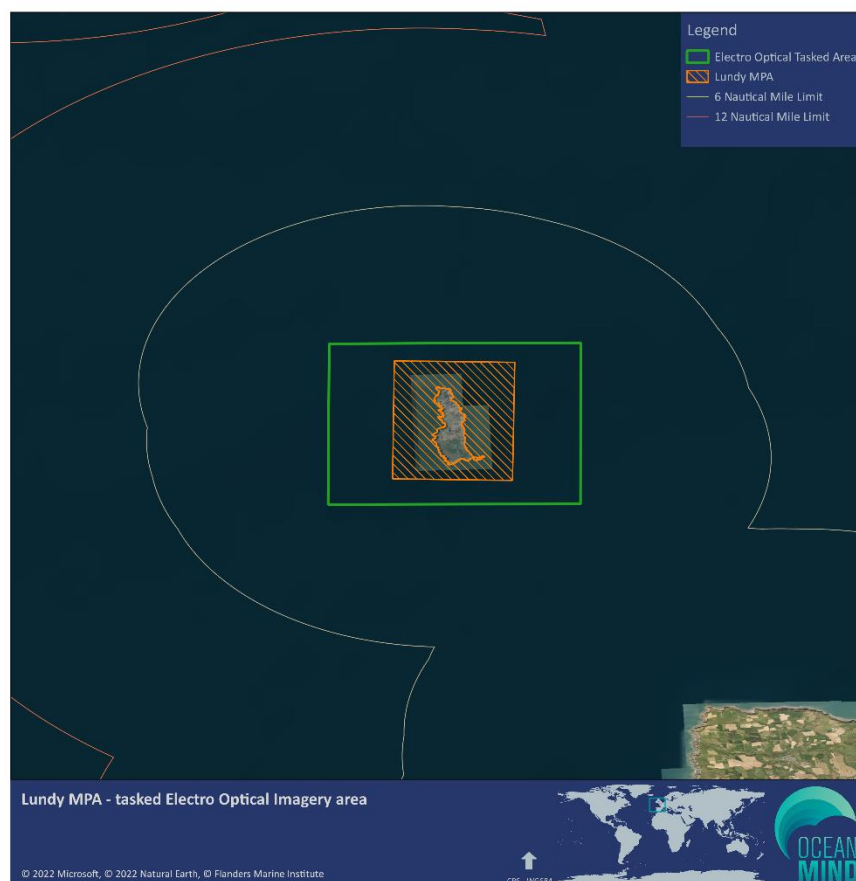


Figure 26 | Image of the Lundy MPA and the extent of the tasked imagery. The minimum area to task is 100 km² therefore the entire MPA is covered under one requested image.

²¹ Speculative tasking is a request to the image provider to collect images from an area when conditions are right and there are no conflicts with paid requests from other customers. There is no guarantee an image can be taken and no way to know when an image will be captured before delivery to the viewing portal.

2.8.2 Challenges and Solutions

Based on the site assessments we determined that Lundy would be the most suitable location for tasked electro-optical imagery. Specifically, this is because the area has several byelaws in place that require an understanding of the activity type (both fishing and gear type), and electro-optical imagery allows for a detailed understanding of this and enables OceanMind to provide valuable intelligence to D&S IFCA. Additionally, there are other restrictions around site use around the MPA (recreational vessels, anchoring, angling etc) and high resolution EO images will allow OceanMind to monitor compliance with these in addition to the fisheries related monitoring.

Based on this we proceed to request imagery to be collected on a weekly basis for the duration of phase 4 of the project. Initial requests were based around gaining the highest resolution imagery available (30cm), as this provides the most valuable intelligence on fishing and other activities. Due to the level of cloud cover that is present on average in the UK it was assessed that there was a lower than 5% chance of collecting the imagery on a weekly basis as desired. To overcome this potential issue, we edited the request and opened collections up to the full constellation, for the full Pilot period. This increased the likelihood of obtaining a suitable number of collections during the project. This may mean that some imagery is monochromatic (black and white), or that the resolution will be lower (50cm), however the alternative option would have been to allow a higher threshold of cloud cover, which would decrease the overall amount of usable imagery.

Furthermore, we established check in points with the provider, to ensure that they were collecting the right amount of imagery during the analysis period, so that we could react accordingly as the project progresses.

2.8.3 Intelligence Cycle

Information about and location of detections from Electro-Optical imagery will be provided to either the relevant IFCA or MMO by email within 1 working day of image delivery to ensure the information can be used effectively. The delivery method and timescale was established through dialogue with the working group, and based on the quickest turnaround consistently achievable throughout the project.

2.8.4 Tasking Timeline

Image collections are tasked from the start of April to June 2022, with the aim of collecting 1 image per week (up to 9 images total). This extended tasking was selected to ensure that sufficient overall imagery was collected noting the limitations caused by cloud cover

2.9 UAV Applications (West of Walney (WoW) and Eddystone, Plymouth Sound to Start Point (E/PS-SP) only.

During phases one and two OceanMind scoped out the various UAV options available for use. There are a range of technologies on the market. In terms of design these options can broadly be broken down into two main categories:

- Quadcopter – helicopter design with 4 rotors.
- Fixed wing – an aircraft which operates without a pilot on board

Both have their own relative methods and limitations, generally speaking, fixed wing can travel greater distances and are also capable of longer flights but require a larger area to take off and land. Quadcopters are

capable of shorter flight times, require less training and logistic planning for operation and they can also be launched and landed from small platforms (i.e. a vessel).

It is the case for both design types that their flight distance capabilities far exceed what they are legally allowed to do, without additional permits. 'Off the shelf' quadcopter drones and fixed wing drones are able to operate at distances beyond visual line of sight (BVLOS) however it is not possible to operate beyond 500m without either an extended visual line of sight (EVLOS) permit (allows distance of up to approx. 1 km) or a BVLOS permit (allows distance beyond 1 km) from the Civil Aviation Authority (CAA).

Furthermore, the capabilities of both drone types are very much dependent on the payload²² that is fitted. The greater a payload the drone can carry, the more flexible and fit for purpose we can make the system; fixed wing drones are capable of carrying much larger payloads and as such can operate an array of sensors on a single flight. Sensors can include Imaging equipment (wide zoom lenses, thermal imaging cameras, multispectral sensors etc), mapping tools or GPS units,

For the current project the focus was on cameras with good optical and digital zooms, cameras that can collect high resolution imagery. A live feed from the camera would also be required for accurate and reliable deployment. As our trials will not be conducted at night or under low light conditions, thermal imaging cameras were not required, but it is anticipated that this would be a desirable sensor for maritime enforcement.

In order to fully test the various types of UAV's commercially available OceanMind will operate a fixed wing UAV beyond visual line of sight in the Plymouth Sound and Eddystone SAC, and a quadcopter within visual line of site in the West of Walney MCZ from the NWIFCA Patrol Vessel.

Operating a UAV BVLOS requires the permission of the CAA. This is because a pilot of an unmanned aircraft must provide 'see and avoid' mitigation for potential conflicts at a distance and relies on the device itself to provide the 'detect and avoid' function normally performed by a pilot. BVLOS permits are more easily obtained where operations are conducted in segregated airspace which is typically provided by a temporary danger area. For the project, this would have meant applying for a temporary danger area license to operate in an area of UK airspace which is not segregated.

Figure 27 shows the danger areas which cover the Eddystone, Plymouth Sound to Start Point MPA.

The airspace around Plymouth is a permanent danger area due to the military operations in the area; this implies that the airspace can be closed for exercises by other airspace users and we are able to operate BVLOS drones with the regulatory approval from CAA. More information regarding Beyond Visual Line of Sight operations can be found [here](#)²³.

2.9.1 Site Application

A fixed wing UAV is to be deployed at the Plymouth Sound and Eddystone SAC. It will be flown from a carefully selected shoreside location suitable for take-off and landing, with the required permits for BVLOS operations. It therefore can be used to cover the majority of the SAC, and specifically will be able to operate over the offshore (Eddystone) part of the site. The primary limitation will be poor weather, and due to the distinct locations of the parts of the site it is unlikely that the vessel will be able to be operated in both areas on the same day, so multiple site visits are planned with up to 6 days on site expected.

A Quadcopter is to be deployed from the patrol vessel within the West of Walney MCZ. The key drivers for this was, interest in innovative tools from the NWIFCA, the position of the site (spanning both the 6 and 12 NM limits, and the availability of the NWIFCA patrol vessel to launch the UAV from. This latter innovation and

²² The weight a drone or UAV can carry such as cameras, sensors or packages for delivery.

²³ <https://publicapps.caa.co.uk/docs/33/CAP%201861%20-%20BVLOS%20Fundamentals%20v2.pdf>

testing is important as only the innermost area of the MCZ is within flight range of shore launched fixed wing UAVs, with no access to the outer boundary where incursions have been indicated. Under current regulations, use of a UAV from a vessel is likely to negate the requirement for BVLOS permits and may ultimately inform a streamlined process for NWIFCA/MMO planning to use UAVs in the region and elsewhere within the UK in the future.

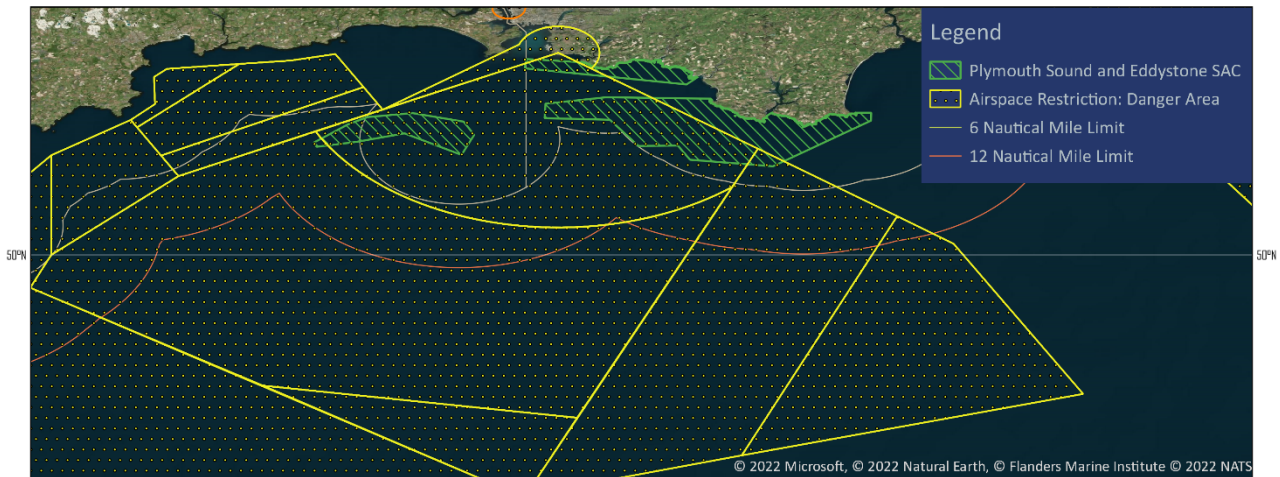


Figure 27 | Danger areas around the Devon, Cornwall coast which cover the Eddystone, Plymouth Sound and Start Point MPA.

2.9.1.1 BVLOS Permit application

Beyond Visual Line of Sight (BVLOS) denotes the ability to conduct unmanned aerial vehicle (UAV) operations without the need for pilots to maintain constant visual proximity to the UAVs at all times. To acquire a permit for BVLOS operations is a lengthy process, for the project this process was started in January 2022 with the expectation of having permits in place by June 2022.

In order to obtain a BVLOS permit from CAA, there are distinct steps which need to be followed, the process will take a minimum of 8-12 weeks from the initial submission of the Operational Safety Case (OSC) to the CAA before a permit is issued. The OSC is a document that consists of 3 sections:

- Operations Manual
- Systems
- Safety Risk Assessment Guidance

The document details the procedures of the operation, the technical information regarding the UAV and its 'detect and avoid' capabilities and the safety assessment of the operation. More information about OSC's can be found [here](#)²⁴.

Pre-approval can be sought which provides an overview assessment of a draft document and an administrative audit of the submitted documentation to speed up processing.

Feedback on the OSC is usually provided within 8 weeks of submission of the completed OSC, though there is no service level agreement for the CAA to return the feedback within this time-scale.

If the documentation is returned with 'Level 1' feedback, changes will be required before approval can be granted and the document needs to be re-submitted to the CAA with a 2 week return anticipated. If the feedback is returned as 'Level 2' there are advisory requests which should be considered but are not required for successful application.

Our Pre-approval OSC was submitted in March 2022 with the final edits to be submitted in April 2022.

²⁴ <https://publicapps.caa.co.uk/docs/33/CAP722A-UASOSC.pdf>

2.9.2 Challenges and Solutions

Phase 3 identified challenges regarding the process of obtaining the BVLOS license for West of Walney MCZ. The challenge primarily was around establishing a temporary danger area for the purposes of the permit for all flights over the MCZ. The process extended the application period which would mean flights would be undertaken at less favourable times. The solution is as discussed above regarding the use of the quadcopters in conjunction with vessel launches within the site. The length of time required to obtain and BVLOS permit, and associated permissions is a barrier to using the single wing drone to its full capacity and capability.

2.9.3 Intelligence Cycle

Data collected from UAV flights will be streamed to the relevant IFCA/MMO representatives via livestream, therefore providing live intelligence, but also informing future patrol and enforcement activities. For the UAV flights in the West Of Walney it is expected that the skipper of the patrol vessel will be able to react to any live intelligence gained through the use of the UAV. Furthermore, footage will be available should the IFCA's or MMO wish to showcase the work carried out.

2.9.4 Tasking Timeline

In the West of Walney flights will be carried out in June and will be subject to vessel availability. Flights will be carried out for a minimum of 3 days. It is anticipated that several hours of flying will be achieved each day.

We expect to have the BVLOS permit approval in place by early June 2022 taking into account potential delays as a result of the feedback process. This will allow for operation over the Plymouth Sound, Start Point and Eddystone SAC in late June, early July 2022 up to a maximum of 6 days onsite.

Timeline | Remote Sensing Plan

Activity	Task	January	February	March	April	May	June	July	August
AIS Analysis	Historic AIS analysis				■	■			
	Report key findings and concerns at each site				■	■			
VMS/ iVMS	Receive iVMS/VMS Data from MMO			■	■	■	■		
	Data checking and cleaning			■	■	■	■		
	Data analysis				■	■	■	■	
	Report key findings							■	■
SAR	Lundy				■	■	■		
	Wight Barfleur				■	■	■		
	South Wight				■	■	■		
	West of Walney				■	■	■		
	Eddystone and Plymouth Sound to Start Point					■	■	■	
EO	Lundy (Tasked)				■	■	■		
	All Sites (Speculative)				■	■	■		
UAV's	Operational Safety Case Drafted	■	■	■					
	Completed OSC Submitted to CAA				■				
	On-site Risk Assessment				■				
	Flight Plans					■	■		
	Plymouth Sound and Eddystone Deployment							■	■
	West of Walney deployment							■	■
Reporting	Interim Report							■	■
	Final Report (Phase 5)								■