

# Appendix D: Habitat Risk Assessment

This Appendix is provided in support to the following report:

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The report, submitted 18/09/2014, addresses comments made by the wider Lyme Bay Fisheries and Conservation Reserve Working Group at a Workshop 09/09/2014.

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# Acronyms and Abbreviations

AOI	Area of Interest
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CHS	Canadian Hydrographic Service
CRA	Crabbing
cSAC	Candidate Special Area of Conservation
CSUMB	California state University, Monterey Bay
CUT	Cuttlefish
DBRC	Devon Biodiversity Records Centre
DEFRA	Department for Environment, Food and Rural Affairs
DIV	Diving
DRE	Dredging
DSIFCA	Devon and Severn Inshore Fisheries Conservation Authorities
EDF	Environmental Defence Fund
EEZ	Exclusive Economic Zone
EMS	European Marine Sites
ESAS	European Seabirds at sea
FDF	Fully Documented Fisheries
FOCI	Features of conservation interest, including habitats and species
GEBCO	General Bathymetric Chart of the Oceans
GIS	Geographical Information Systems
HRA	Habitats Regulations Assessment
ICES	International Council for the Exploration of the Sea
IFCA	Inshore Fisheries and Conservation Authorities
IUCN	International Union for Conservation of Nature
JNCC	Joint Nature Conservation Committee
MCZ	Marine Conservation Zones
MMO	Marine Management Organisation
MPA	Marine Protected Areas
MPC	Marine Planning Consultants
MSC	Marine Stewardship Council
NAVTEQ	GIS provider
NBN	National Biodiversity Network
NERC	Natural Environment and Rural Communities
NET	Netting
NOAA	National Oceanic and Atmospheric Administration

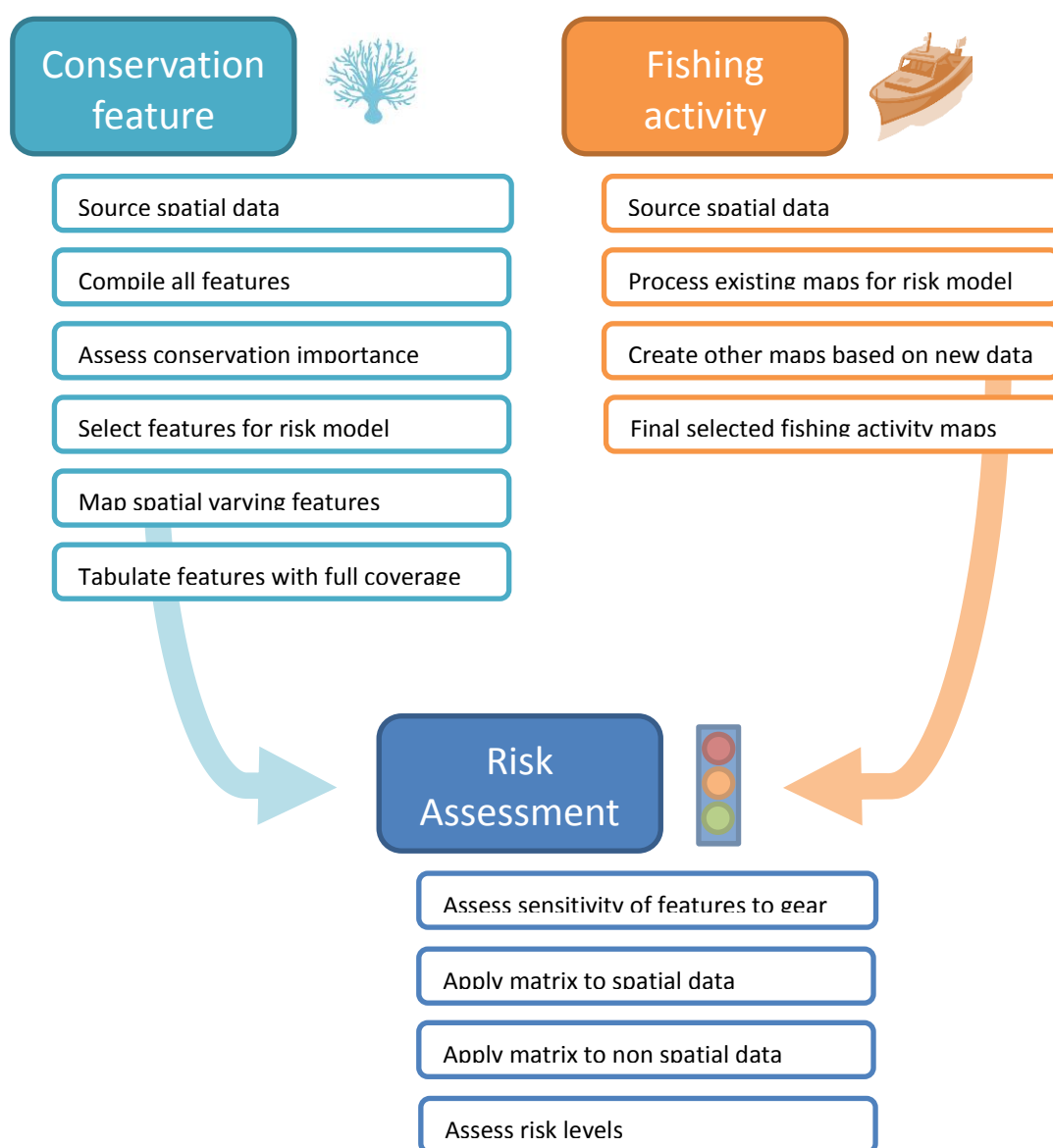
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic - List of threatened and / or declining species and habitats
POT	Potting
RAGB	Red, Amber, Green, Blue Categorisation
RAL	Rod and Line
RMU	Regional Management Units
SAC	Special Area of Conservation
SACFOR	provides a unified system for recording the abundance of marine benthic flora and fauna in biological surveys
SCA	Scalloping
SIFCA	Southern Inshore Fisheries and Conservation Authorities
SMP	Sea Bird Monitoring Program
SPA	Special Protection Area
SPUE	Sightings per Unit Effort
SSFC	Southern Sea Fishery Committee
TRA	Trawling
VMS	Vessel Monitoring Systems
WHE	Whelking



# Overview to Habitat Risk Assessment

## Approach

The primary focus of the risk assessment is to establish and map areas that are vulnerable to fishing activities as well as those that are not, to inform future management of fishing activity, whether voluntary or otherwise. Therefore it is necessary to assess i) the species and habitats of conservation interest ('conservation features') in Lyme Bay, ii) the patterns in fishing activity in terms of the gear types used locations and iii) what level of risk results when these interact. The processes followed to achieve this are summarised in **Figure D1** and detailed in the following sections.



**Figure D1:** Overview of processes taken in the risk assessment

The risk, or vulnerability, has been modelled as a function of 1) the level of sensitivity of features and 2) the level of fishing pressure. This includes all broad-scale habitats as well as selected habitats and species based on their various conservation interest / status. Species considered for selection included benthic/epibenthic species, algae and lichen, fish, marine mammals, turtles and birds, as agreed following the desk review showing selected species circulated 22 October 2013 and the methodology scope, 27 January 2014.

Note that originally, the vision of the Habitat Risk Assessment tool was to create a new risk matrix based on feature sensitivity and fishing pressure. However external to this project, but during its progression, a challenge from Client Earth/MCS was made to Defra to state that more fishing operations in SACs should be subject to impact assessment. They challenged to say that commercial fishing activities should be brought into line with other commercial activities, e.g. cable laying and capital dredging, which require a Habitats Regulations Assessment to inform whether they go ahead. This was made in the context of the European Union's Habitats Directive where any new plan or operation requires an impact assessment. Subsequently and as a result to the legal case that opened up, a risk matrix focused on fishing activities taking place in European Marine Sites was produced by Natural England, together with the IFCA, Cefas, the Marine Management Organisation (MMO) and a large number of specialists, in 2012. To avoid duplication of this and instead draw on the large amount of work carried out already and reference an agreed national methodology that was discussed at a number of workshops, the Lyme Bay risk assessment therefore uses the EMS risk matrix as a baseline on which to develop a project specific tool. The tool is still fit for purpose but focuses on all conservation features and not just the EMS (cSAC in the case of Lyme Bay) habitats and features. This has resulted in a number of species being added that were not addressed (owing to the legislation) in the EMS matrix, including benthic species, birds, marine mammals, fish and turtles. These have only been selected for inclusion in the study where there is evidence they use the area and have significant conservation status, considering not only national but also international designations.

The habitat risk assessment is supported by the desk review, which compiled and reviewed all relevant data in Lyme Bay, presenting these in maps and tables. Whilst this provides a significant input to the habitat risk assessment, the overarching findings of the desk review as relevant to the risk assessment are summarised here, together with new data since sourced that are more specifically focused on the risk assessment.

### Current understanding in Lyme Bay

To date a wealth of studies have focused on the impact of fishing activities on conservation features in Lyme Bay. Attention has been targeted on conservation features at the seabed, primarily those features protected by the candidate Special Area of Conservation (cSAC) that have been proposed under the Habitats Directive (92/43/EEC), i.e. the Lyme Bay and Torbay



cSAC<sup>1</sup>. As mapped in the main report (**Figure 1**), this cSAC protects Annex I reefs which, for the Lyme Bay part of the cSAC, includes bedrock reef and stony reef (Natural England, 2013). This designation means that evidence exists to support that the Lyme Bay reefs are worthy of protecting in the national context. This considers their contribution to the wider reef network, its condition and diversity, ensuring that the UK government fulfils its requirements under the Habitats Directive. In the case of Lyme Bay other features were not selective for designation either because they were not the best examples or that they had been covered elsewhere at other sites (Natural England, 2010).

In addition most of the cSAC area is protected by the Designated Area (Fishing Restriction) Order 2008 which prohibits dredging for shellfish and demersal trawling; but other areas have also been mapped as sensitive within the cSAC<sup>2</sup>.

Annex I Reefs have been the target of a large number of studies in the Lyme Bay area, with special attention given to slow growing gorgonian corals such as the Pink sea-fan (*Eunicella verrucosa*) due to their association with the Annex 1 reef community as well as their status in various other conservation lists<sup>3</sup>. However the Lyme Bay site is only designated for the Annex 1 reef within the cSAC boundary, as detailed further in the next chapter.

A large number of studies have surveyed, assessed and made significant progress into how the seabed and species have responded to fishing activities (Stevens et al. 2014, Mangi et al. 2011, Attril et al. 2010, Jackson et al. 2008). There have also been surveys carried out by the IFCA, Seafish and local fishermen together with Plymouth University, to increase evidence gathering. This has included underwater video surveys to target areas of the reef where confidence was low, both within and outside of the Designated Area where fishing restrictions apply to bottom towed gear, as well as outside of this, in consultation with Natural England. However there has been limited mapping of risk with full coverage across the region.

However a risk review of geogenic and biogenic reefs in Lyme Bay was carried out in 2011 to inform statutory management of the cSAC. This assigned categories of risk as High, Medium, Low or None to 19 fishing activities and 20 activities in other sectors (e.g. pollution, climate change, recreation)<sup>4</sup> in a tabular risk matrix. Since then, a more extensive risk matrix has been developed at a national level to encompass all EMS features in the

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<sup>1</sup> Whilst commonly stated as a cSAC, at present this is actually a Site of Community Importance (CSI), which is a site that has been adopted by the European Commission but not yet formally designated by the government. However to avoid any misunderstandings, the term cSAC has been used within this report.

<sup>2</sup>[http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme\\_bay/prohibited\\_sensitive\\_a.pdf](http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme_bay/prohibited_sensitive_a.pdf)

<sup>3</sup>OSPAR (2008), IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, UK Cons. Status (Rare & Scarce)

<sup>4</sup>[http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme\\_bay/110128\\_draft\\_rapid\\_risk.pdf](http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme_bay/110128_draft_rapid_risk.pdf)

‘revised approach to management of commercial fisheries in European Marine Sites’<sup>5</sup>. The Lyme Bay cSAC has therefore been assessed in further detail using this risk matrix (also tabular) to address the high risk ‘Red’ categories. The development of risk matrices is discussed further in later Chapters.

### Objectives to improve on current understanding

As recommended by the Devon Wildlife Trust (2007) and Defra (2008), there has been need for a larger number of species to be assessed, as well as including full spatial coverage of physical habitats and biotopes in a risk assessment. This needs to rely less on expert judgement and more explicitly linked to published research. This has been progressed to a certain degree in the risk matrix formed in the revised approach to management of commercial fisheries in European marine sites in England. However the following chapters now detail our approach taken to expand on this and produce a full coverage assessment, both spatially and in terms of examination of all habitats and species. This includes not only benthic/epibenthic species and habitats but also mobile species: fish, mammals, turtles and birds across the whole Project AOI. In addition it expands scope to beyond European Marine Sites to include a full breadth of national and international status ‘badges’.

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<sup>5</sup>[http://www.marinemanagement.org.uk/protecting/conservation/ems\\_fisheries.htm](http://www.marinemanagement.org.uk/protecting/conservation/ems_fisheries.htm)

# Conservation Features

## What is a 'feature of conservation interest'?

As both habitats and species are often assessed within the same process, these are often called 'features'. Where these are threatened, rare, or declining and therefore require protection through conservation measures, they are termed 'features of conservation interest' (FOCI).

## Evidence for features in Lyme Bay

The desk review presented all habitats and species data that were sourced in the Lyme Bay AOI. For full details of the datasets identified below please refer to **Appendix A**.

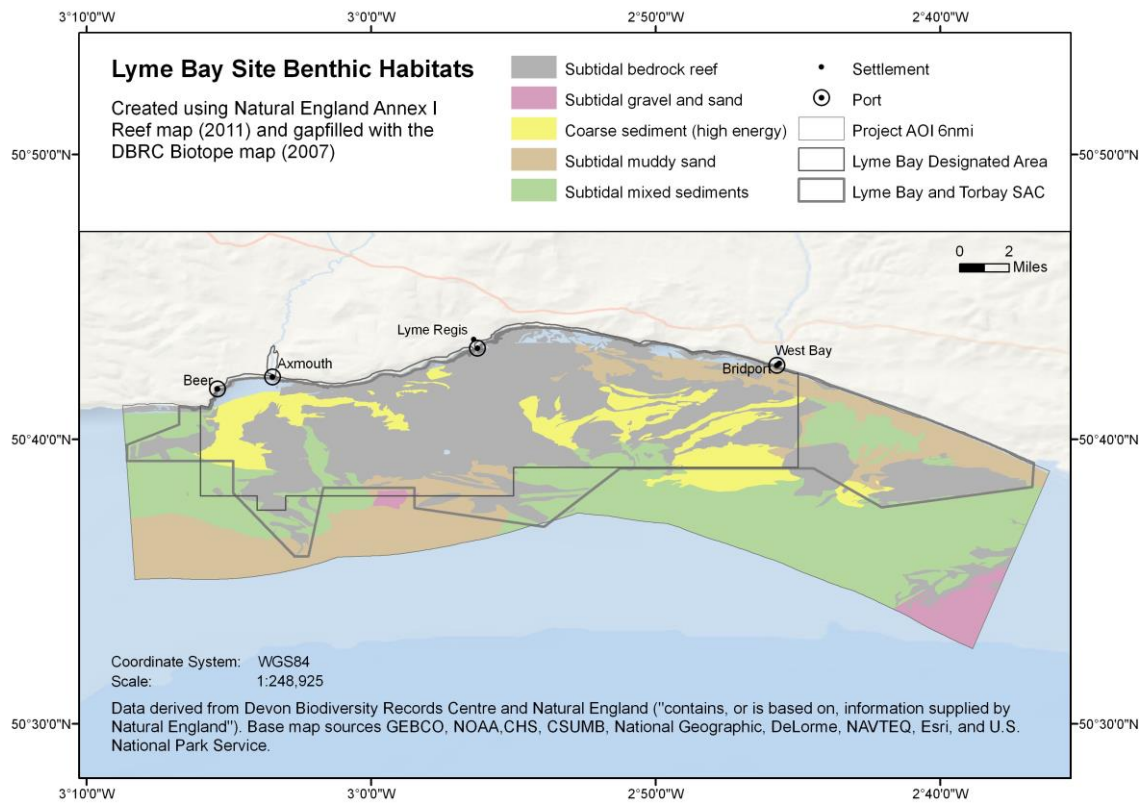
### Habitats

The best available habitat data, identified during the period of data collection, was considered to be from the surveys carried out by Cefas in 2010, as commissioned by Natural England to define boundaries of the Lyme Bay rocky and stony reef habitats in the Lyme Bay and Torbay candidate Special Area of Conservation (cSAC) (Vanstaen & Eggleton, 2011). Cefas have since updated this reef map through additional survey (Jenkins & Eggleton, 2014). Also Southern IFCA, together with local fishermen, have carried out a ground truthing video survey of the lower confidence areas in the southeast (Evans, 2013). However the data for each of these recent surveys was not made available in time to inform this assessment.

As the 2010 survey dataset only covers the reef habitats of Lyme Bay, the gaps were in-filled by the next best available habitat map, as completed by Ambios Ltd in 2007 on behalf of the Devon Wildlife Trust as shown in **Figure D2**. The approach used by the data providers to classify the habitats differed in each dataset and therefore the categories were homogenised as detailed in **Appendix F**. Habitats include:

- Subtidal bedrock & stony reef
- Coarse sediment (high energy)
- Subtidal gravel and sand
- Subtidal mixed sediments
- Subtidal muddy sand

Additional habitat data was sourced from point survey data of species (as detailed below) where there was potential for species to be habitat forming, e.g. Sabellaria reef species ('small-scale habitat features').



**Figure D2:** Combined habitat map (NE Annex I Reef and DBRC Biotope maps)

### Species

A large number of species were found to use the Lyme Bay AOI, comprising of 951 benthic species, 251 algae and lichen species, 80 fish species, 6 cetaceans, 3 turtles and 55 seabirds. These were sourced from the Devon Biodiversity Records Centre, the NBN Gateway / JNCC, Seasearch, Bangor University, Marine-LIFE and the University of St Andrews, as detailed further in **Appendix E**. Although not exhaustive, this includes all of the publically available species records as well as a number of records purchased specifically for use in this assessment.

### Coverage

The spatial coverage and definition of data collected for habitats and species varied from point observation/survey data to interpolated full coverage maps and wide scale characterisation units (**Table D1**).

**Table D1.** Coverage of habitats and species data sourced

Feature	Source Data Coverage
Habitats	Full coverage map Point observations
Benthic species	Point observations
Algae and lichen species	Point observations
Fish	Point observations Sub-rectangles of ICES statistical rectangles
Cetaceans and turtles	Point observations
Seabirds	Point observations (in flight, breeding and territory) Special Protected Area designations

## Process of selecting features for risk assessment

The habitats form the primary focus of risk modelling in the context of the Lyme Bay project and provide a baseline broad-scale assessment of risk. Therefore all habitats were taken forward in the assessment. However a number of species and small-scale habitat features have been identified within the AOI that are of particular conservation significance. The sensitivity modelling has therefore been extended to include a selection of species and small-scale habitat features to ensure the ongoing sustainability of the inshore fishing activities in this area.

## Conservation status

The full species inventory has been cross-checked against all of the conservation legislation and protected status lists which are applicable to the AOI. These include both national and international legislation, as identified through the JNCC conservation designations for UK taxa<sup>6</sup>. All species of conservation importance were taken forward to the following selection processes. **Table D2** below shows a summary of the implications of a species being on each conservation list.

Due to the number of different conservation status / legislation of habitats and species, the management put in place for these differ in nature and in terms of the public bodies responsible. For European Marine Sites (EMS) the legal duty of the IFCA and MMO is strictly adhered to in management of the cSAC. This is designated for subtidal reefs only (in the AOI), for which there is generally good up to date information. However other lists and conventions (e.g. Bern Convention, Bonn Convention, IUCN Red List) are generally high level and defined to feed into national legislation such as designation of EMS.

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<sup>6</sup> <http://jncc.defra.gov.uk/page-3408>

Aside from the designated cSAC Annex I reef, it is possible for legal offences to occur within the project Area of Interest under the Wildlife and Countryside Act 1981, the Natural Environment and Rural Communities Act 2006 (both national law) and The Conservation of Habitats and Species Regulations 2010 (National Law) which implements the EU Habitats Regulations 2010[2] (European law). These state various offences regarding listed species, including: deliberate capture, injuring or killing; intentional or reckless disturbance and impairment of a species functions; taking or destruction of eggs; damage or destruction of a breeding site/resting place; and keeping/transporting/selling/exchanging. For a full understanding of offences, the actual text of each statutory Act or Regulation should be referred to.

As each species may be covered by more than one source of conservation status, this may increase the case for its inclusion in the risk assessment, as shown in the full list of conservation species in **Appendix E**.

**Table D2.** Coverage of habitats and species data sourced

*In the last column, grey = no action; blue = public body action; green = risk being managed by public bodies; orange = private sector liable*

Conservation List / Legislation	Name in this Appendix	Type	Content	Relevance to private sector operating in the subtidal marine area
Bern Convention	Bern Convention	International Conventions and Directives	<ul style="list-style-type: none"> <li>• Conservation and protection of wild plant and animal species and their natural habitats; and regulation on their exploitation</li> <li>• Managed through contracting parties</li> <li>• Legal requirement addressed by Wildlife and Countryside Act (1981 as amended) in England</li> </ul>	See Wildlife and Countryside Act
Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals (CMS))	Bonn Convention	International Conventions and Directives	<ul style="list-style-type: none"> <li>• Conservation of migratory species and their habitats, strict protection for endangered migratory species</li> <li>• Managed through multilateral Agreements and joint research activities</li> <li>• Legal requirement addressed by Wildlife &amp; Countryside Act (1981 as amended) in England (Appendix I species)</li> </ul>	See Wildlife and Countryside Act
Council Directive 79/409/EEC on the conservation of wild birds	Birds Directive	International Conventions and Directives	<ul style="list-style-type: none"> <li>• Protects all wild birds, their nests, eggs and habitats within the European Community</li> <li>• Managed through classification of Special Protection Areas (SPAs) by member states to protect birds which are rare or vulnerable in Europe, as well as all migratory birds which are regular visitors</li> <li>• In England, predominantly implemented by the Conservation (Natural Habitats, &amp; c.) Regulations 2010 (as amended) with other pertinent regulations including the Offshore Marine Conservation (Natural Habitats &amp; c.) Regulations 2007, as well as the Wildlife and Countryside Act 1981 (as amended)</li> </ul>	See Conservation of Habitats and Species Regulations 2010, Wildlife and Countryside Act

Conservation List / Legislation	Name in this Appendix	Type	Content	Relevance to private sector operating in the subtidal marine area
European Commission - Convention on International Trade in Endangered Species (12.06.2013)	EC-CITES	International Conventions and Directives	<ul style="list-style-type: none"> <li>Control of international trade in selected species through a licensing system.</li> </ul>	Only relevant to species extracted, dealt more by the fisheries assessment ( <b>Appendix I</b> ).
UK Biodiversity Action Plan (UK BAP) (referenced in analysis as the English Natural Environment and Rural Communities (NERC) List)	UK BAP	Status	<ul style="list-style-type: none"> <li>Identifies habitats and species of principal importance to conservation of biodiversity in the UK</li> <li>Managed by public bodies when carrying out their normal functions</li> <li>Informs Local BAPs in terms of priority habitats and species targeted in management</li> </ul>	Addressed by public bodies through their normal functions and legal requirements to designate sites for protection through other legislation and to assist in directing planning applications. Depends on available spatial evidence.
Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora	Habitats Directive	International Conventions and Directives	<ul style="list-style-type: none"> <li>Conservation of endangered habitats and species.</li> <li>Managed by public bodies through EMS site designation and management, recently with addition of impact of fisheries</li> <li>Transposed in to law by the Conservation and Species Regulations 2010</li> </ul>	IFCAs are already addressing as legally required for the impact of fisheries on designated features (the cSAC for Lyme Bay).
International Union for Conservation of Nature Red List (2013.v1)	IUCN Red List	Status	<ul style="list-style-type: none"> <li>Conservation of species of higher risk of global extinction</li> <li>Mandate for use in national legislation, international conventions, conservation planning and scientific research, depending on proportion of the global population within the study area</li> <li>Managed by public bodies in conservation objectives and development control</li> </ul>	Addressed by public bodies through their normal functions and legal requirements to designate sites for protection through other legislation and to assist in directing planning applications. Depends on available spatial evidence.



Conservation List / Legislation	Name in this Appendix	Type	Content	Relevance to private sector operating in the subtidal marine area
OSPAR (Convention for the Protection of the Marine Environment of the North-East Atlantic) List of threatened and / or declining species and habitats	OSPAR (2008)	International Convention	<ul style="list-style-type: none"> <li>Protects marine threatened and/or declining species and habitats in north-east Atlantic</li> <li>Managed by international cooperation in setting priorities, informs on SAC designation, additional OSPAR MPAs being considered, potential for improving and monitoring status being considered, informs development of the Ecological Network Guidance (ENG) Habitats and Species List that is central to designation of Marine Conservation Zones</li> </ul>	Addressed by public bodies through their normal functions and legal requirements to designate sites for protection through other legislation and to assist in directing planning applications. Depends on available spatial evidence.
UK Conservation Status (Rare and Scarce)	UK Conservation Status (Rare & Scarce) list	Status	<ul style="list-style-type: none"> <li>Conservation of rare and scarce species, includes not only threatened species as on IUCN list, but also non-threatened that are rare or scarce, and provides early warning for potential future threat</li> <li>Criteria for rare species met if species only occurs in &lt;8 of 10x10km grid squares in the UK marine area, within the 3nm territorial limit, and for scarce species in 9-55 of 10x10km grid squares</li> <li>Used in designation of Special Sites of Scientific Interest (SSSI) and Common Standards Monitoring</li> </ul>	Addressed by public bodies through their normal functions and legal requirements to designate sites for protection through other legislation and to assist in directing planning applications. Depends on available spatial evidence.
Birds of Conservation Concern (referenced in analysis as the UK Conservation Status (Birds))	UK Cons. Status	Status	<ul style="list-style-type: none"> <li>Bird species of conservation concern reflecting global, European and UK status, recent decline, historical decline, rare breeders and localised species</li> <li>The population status of birds regularly found in the UK, Channel Islands and the Isle of Man is reviewed every five years to provide an up-to-date assessment of conservation priorities</li> <li>Lists presented against a 'traffic-light' scheme of red, amber and green status</li> </ul>	Addressed by public bodies through their normal functions and legal requirements to designate sites for protection through other legislation and to assist in directing planning applications. Depends on available spatial evidence.

Conservation List / Legislation	Name in this Appendix	Type	Content	Relevance to private sector operating in the subtidal marine area
Wildlife and Countryside Act 1981	Wildlife & Countryside Act 1981	Domestic Legislation	<ul style="list-style-type: none"> <li>• Conservation of wild and endangered species and habitats</li> <li>• Consolidates and amends existing national legislation to implement Bern Convention and Birds Directive</li> <li>• The Act provides for the notification and confirmation of Sites of Special Scientific Interest (SSSI)</li> </ul>	An offence to intentionally kill, injure, or take any wild bird (excludes Schedule 2 species) or wild animal on Schedule 5, and prohibits interference with places used for shelter or protection, or intentionally disturbing animals occupying such places. The Act also prohibits certain methods of killing, injuring, or taking wild animals; and is an offence to intentionally pick, uproot or destroy wild plants and take or destroy an egg of a wild bird.
The Conservation of Habitats and Species Regulations 2010	Habitats Regulations	Domestic Legislation	<ul style="list-style-type: none"> <li>• These regulations transpose the EU Birds and Habitats Directives into law in England</li> <li>• The Regulations provide for the designation and protection of 'European sites', the protection of 'European protected species', and the adaptation of planning and other controls for the protection of European sites</li> </ul>	<p>Animals and plants receiving protection under this legislation are known as European Protected Species (EPS).</p> <p>It is an offence to deliberately (taken to mean both intentionally and recklessly) capture, injure or kill any EPS or to deliberately take or destroy their eggs. It is an offence to damage or destroy a breeding or resting place of such EPS species.</p>

## Assessment criteria

All records for species of conservation importance were next assessed in terms of their vintage, abundance and their location relative to the AOI. Species that exclusively occupy or use the intertidal zone, for example, were excluded as this project only considers the subtidal environment.

It is worth noting that although the number of records has been used to inform decisions on the inclusion / exclusion of species from the sensitivity modelling, strict rules could not be applied due to the significant variance in species detectability and rarity as well as obvious biases in the survey data towards rocky reef species.

The vast majority of the species observations examined were recorded within the last 20 years and are therefore considered to be a good representation of current distributions although it is recognised that there are likely to have been changes in individual species distributions within this time period. In recognition of this, the sensitivity modelling has been set up in such a way that it can be easily updated with the inclusion of new distribution data; can be applied to adaptive management scenarios; and can be replicated in other areas

## Reef association

A number of the benthic / epibenthic conservation species, including algae and lichen, were found to be strongly associated, if not wholly associated with larger habitat features (such as the rocky reefs) and were not thought to be any more or less sensitive to fishing activities than the habitats in which they occur. These species were therefore assessed under the umbrella of the habitat with which they are associated, allowing a full coverage assessment using biotope maps. This offers a precautionary approach as clearly the species are not located exclusively across the reef. Where species were found to be strongly associated with one habitat but were found to occur on other habitats also, e.g. Pink Sea-fan, these were assessed separately.

## Mobile species

Highly mobile species which are not strongly associated with any one habitat and are likely to move through the area and use different parts of the area at different times of the year were grouped according to their life-histories and /or their use of the area.

## Final selection for risk modelling

The full database which identifies species of conservation and / or commercial interest, details of the number and vintage of records and notes of any additional information leading to their inclusion, or exclusion, in the sensitivity modelling is provided in the **Appendix E** table / electronic spreadsheet and is summarised below. It is important to note that species have initially been selected on a body of evidence, not the number of records, as there may be overriding factors than denote a species' importance. For example some

rare species will be low in records, but are protected due to this rarity and therefore warrant protection. However given the controversy over protecting species where only few records exist, especially where these are old, these have been marked as 'Tier 2' species/groups for the model assessment as shown in **Appendix E**. It was considered important to still report on these as they may be rare species and/or may have declined due to anthropogenic pressures. However only 'Tier 1' species/groups are shown in the tables below and these are the priority of the risk assessment.

### Habitats

Only Annex I reefs are designated for the site under the Habitats Regulations for the cSAC. However all habitats have been assessed throughout the site to provide a full coverage assessment and for future reference regarding sensitivity of feeding habitats. All habitats mapped in **Figure D2**, i.e. Subtidal bedrock reef, Coarse sediment (high energy), Subtidal gravel and sand, Subtidal mixed sediments and Subtidal muddy sand, are on the Ecological Network Guidance list provided for Marine Conservation Zone (MCZ) projects (JNCC, 2010). The MCZ process will ensure each habitat is suitably protected within each of the four geographical regions covering England's marine area. As no MCZs have been designated or proposed in the project AOI, these habitats do not officially require protection.

### Benthic and Epibenthic Invertebrate Species

A total of 29 benthic and epibenthic species of potential conservation significance were identified in the AOI. *Modiolus modiolus* was excluded from the risk model as there was no evidence to suggest the presence of beds that would qualify for protection and the lagoon snail. *Paludinella globularis* was excluded since it is very unlikely to occur in the areas targeted by the Lyme Bay inshore fishing fleet. The remaining 27 species were grouped into six assessment units as detailed in **Appendix E** and divided Tier 1 and Tier 2 species/groups to prioritise assessment.

A summary of the benthic species / groups taken forward for the Tier 1 risk assessment are shown in **Table D3**. To review Tier 2 species discussed in this section, which are limited by number of records and / or of old vintage, see **Appendix E**.

19 species (of which 6 are Tier 1) were found to be strongly or exclusively associated with the protected rock reefs, and these have been assessed by proxy under the habitat in which they occur. Two additional and potential habitat features were also strongly or exclusively

**Table D3.** Benthic and epibenthic species selected for Tier 1 risk assessment

Species Group	Latin Name (WoRMs Accepted Scientific Name)	Common Name	Conservation Status	Project Model Assessment Unit
Benthic / Epibenthic	<i>Phallusia mammillata</i>	A sea squirt	UK Cons. Status (Rare & Scarce)	REEF
Benthic / Epibenthic	<i>Aiptasia mutabilis</i>	Trumpet Anemone	UK Cons. Status (Rare & Scarce)	REEF
Benthic / Epibenthic	<i>Caryophyllia (Caryophyllia) inornata</i>	Southern Cup Coral	OSPAR (2008), UK Cons. Status (Rare & Scarce)	REEF
Benthic / Epibenthic	<i>Caryophyllia (Caryophyllia) smithii</i>	Devonshire Cup Coral	OSPAR (2008)	REEF
Benthic / Epibenthic	<i>Leptopsammia pruvoti</i>	Sunset Cup Coral	OSPAR (2008), English NERC List, UK Cons. Status (Rare & Scarce)	REEF
Benthic / Epibenthic	<i>Nucella lapillus</i>	Dog Whelk	OSPAR (2008)	REEF
Benthic / Epibenthic	<i>Eunicella verrucosa</i>	Pink Sea Fan	OSPAR (2008), IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, UK Cons. Status (Rare & Scarce)	REEF & PINK SEAFAN
Benthic / Epibenthic	<i>Tritonia nilsodhneri</i>	A sea slug	UK Cons. Status (Rare & Scarce)	PINK SEAFAN

associated with rocky reef: *Sabellaria* and *Mytilus* species. Potential (but not necessarily actual) Sabellaria reef includes both *S. spinulosa* and *S. alveolata*, species locations for which were recorded within the AOI and both may interact with inshore fishing activities. Records of *Sabellaria* species were within the last 20 years and with a high number of observations per species (<50) at each survey point, which is indicative of (but not necessarily) a reef. Similarly, *Mytilus* species were also high in number (<100) but with older vintage (up to 2004) and may indicate *Mytilus* beds.

Owing to the abundance and conservation status of both species, as well as the knowledge that *Mytilus* beds occur in the wider Lyme Bay region (Natural England 2010), these have been included as potential *Sabellaria* reefs and *Mytilus* beds, though limited to Tier 2.

This is due to the lack of evidence as to whether these form long term or ephemeral (short lived) reefs/beds; or if none at all, as well as uncertainty in the spatial representation of these habitat features. However it is recommended that they are targeted in future surveys,

especially in the vicinity or previous records with the highest abundances (S/A/C/F on the SACFOR scale)<sup>7</sup>.

Three species were identified as being suitable modelling assessment units overall (i.e. considering both Tier 1 and Tier 2 assessments), the pink seafan, *Eunicella verucosa*, the native oyster, *Ostrea edulis*, and the ocean quahog, *Arctica islandica*. The Pink Seafan, whilst strongly associated with rocky reef, has been found in areas not shown as rocky reef from the recent Natural England reef surveys (Vansteane & Eggleton, 2011) and so this, combined with the conservation status of this species (listed as vulnerable on the IUCN Red List as well as T&D Ospar list and others), warrants a species level assessment at Tier 1 as well as the more general reef assessment. Two cryptic species associated with the pink seafan will also be assessed by proxy, the sea slug, *Tritonia nilsodhneri* (Tier 1) and the seafan anemone, *Amphianthus dohrnii* (Tier 2). For the second and third species selected, the native oyster and ocean quahog, there were very few records and therefore these are Tier 2 assessments. However given their high conservation status and the likelihood of these species being overlooked by video and diver surveys they were considered to be of sufficient significance for selection.

Whilst the location of rocky reef is provided in **Figure D2**, a map showing the location of all other benthic model assessment units, i.e. the grouped or singular species, is shown in **Figure D3**<sup>8</sup>.

This also includes Maerl as described below (though this is Tier 2). The location of these species is point based as relies on surveys carried out where these were detected. Therefore the risk assessment of these species will be point based so will show the minimum extent of risk. However there are likely to be other areas the species are found that weren't surveyed, potentially extending from these points, as well as other locations. Therefore should additional distribution data become available in the future the risk matrix could easily be applied to the relevant spatial data.

## Algae

Four species of algae that have some conservation significance were identified within the AOI. Two of the algal species identified are strongly associated with rocky habitats and as such have been assessed by proxy through assessment of the rocky reef habitat. The remaining two species are maerl, which are protected both as species and as a habitat where they form extensive beds. Note that maerl was found strongly associated with the rocky reef habitat. However it requires assessment alone due to its higher conservation status, is a habitat in its own right and has different levels of sensitivity. A limited number of records indicate that maerl is abundant at some locations although it is unclear whether or

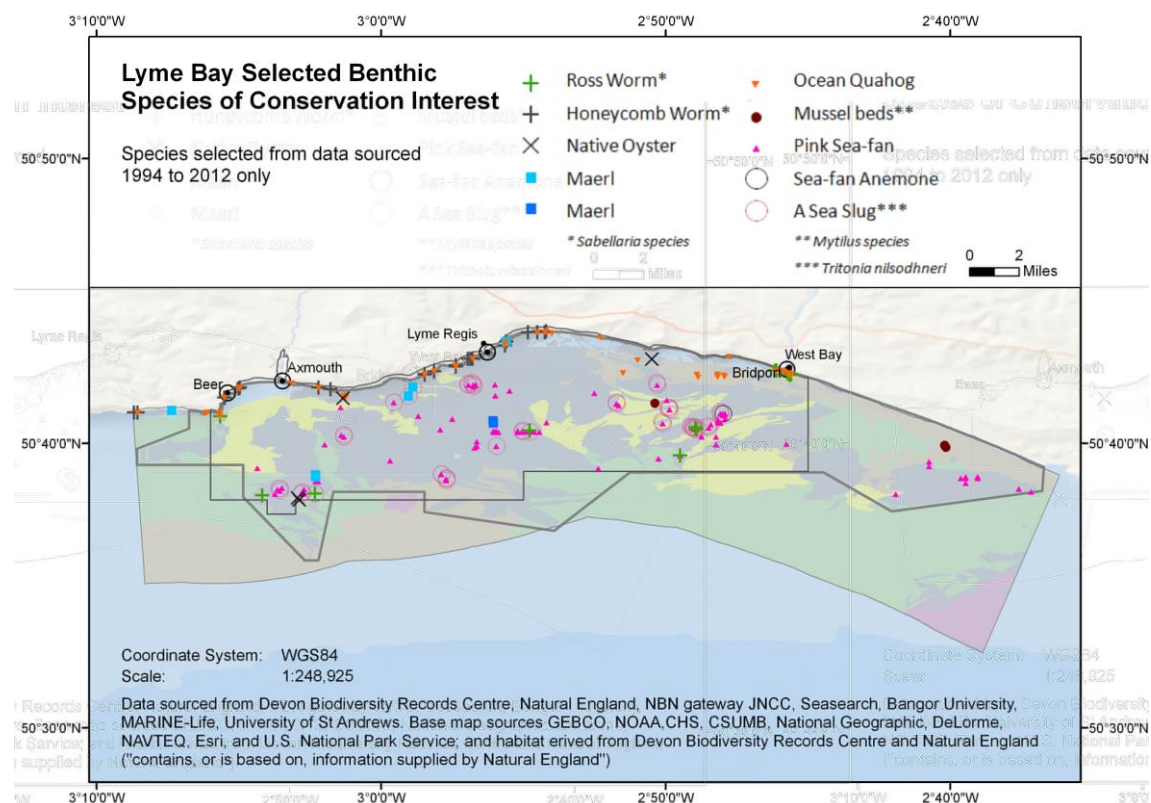
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<sup>7</sup> Superabundant, Abundant, Common, Frequent, Occasional, Rare

<sup>8</sup> **Figure D3** is reproduced in **Appendix E** in two figures, one showing Latin names and a second with older vintage data that was excluded from the assessment (pre-1994)

not there are significant beds. These algal species are also capable of growing in a crustose form rather than as the free living nodules which are characteristic of maerl. However, this growth form is relatively rare in these two species and as a microscope is required to identify crustose algae it is thought to be unlikely that crustose algae would have been recorded as these species by Seasearch divers. The locations of these observations shown in **Figure D3** below and are available to the IFCAs electronically as a potential target for future survey work which will help elucidate the presence of maerl within the AOI.

The maerl species selected were limited to Tier 2 due to the weakness in evidence and are therefore shown in **Appendix E** only.



**Figure D3:** Location of Tier 1&2 benthic species selected for risk assessment (common names)

**Note** Only the Pink Sea-fan *Eunicella verrucosa* and sea slug *Tritonia nilsodhneri* were selected for Tier 1 assessment

## Fish

Whilst the species inventory for fish in the Lyme Bay AOI was compiled from some sightings data, these were not targeted fish surveys and were gap filled by coarser scale data based on ICES rectangles (Ellis, *et al.*, 2012). Therefore this group is likely to be underrepresented. Fish are highly mobile and are easily disturbed by divers and or video equipment and hence are not well sampled using these techniques. Nevertheless where there were records of protected fish species these were selected for the risk modelling. Since the observations are

few and far between these species are included in the risk matrix only, as distribution data are thought to be very unreliable. Highly transient species such as sharks and rays (limited to Tier 2 except for the Basking shark) have been grouped but all other fish are included as individual species to ensure that as information regarding local breeding grounds becomes available the assessment can be updated.

A summary of the fish species / groups taken forward for the Tier 1 risk assessment are shown in **Table D4**. Out of these, only sole was selected for the fisheries sustainability assessment (**Appendix I**). To review Tier 2 species discussed in this section, which are limited by number of records and / or of old vintage, see **Appendix E**.

Since spatial records are very sparse for fish and due to their high mobility, their assessment will be matrix based and their sensitivity will be assumed to be constant across the AOI.

**Table D4.** Fish species selected for Tier 1 risk assessment

Species Group	Latin Name (WoRMs Accepted Scientific Name)	Common Name	Conservation Status	Project Model Assessment Unit
Fish	<i>Gadus morhua</i>	Atlantic Cod	OSPAR (2008), IUCN Red List, English NERC List	COD
Fish	<i>Merlangius merlangus</i>	Whiting	English NERC List,	WHITING
Fish	<i>Pleuronectes platessa</i>	Plaice	IUCN Red List, English NERC List	PLAICE
Fish	<i>Cetorhinus maximus</i>	Basking shark	Bern Convention, Bonn Convention, OSPAR (2008), EC-CITES , IUCN Red List, English NERC List, Wildlife & Countryside Act 1981	BASKING SHARK

\* Selected for the fisheries sustainability assessment



## Mammals & Turtles

14 species of marine mammals and turtles have been recorded within or closely adjacent to the AOI between 1938 and 2011. All of these species are highly transient making any accurate assessment of their distribution difficult. There have been a number of targeted marine mammal monitoring surveys carried out in this area but nevertheless the use of the AOI by these species is likely to be underestimated as surveys have been generally sporadic and short in duration.

The project database contains 59 sightings of bottlenose dolphins within the AOI. Also it has been suggested there is a semi-resident south coast population of bottlenose dolphin from records collected from MarineLife and Devon and Dorset Wildlife Trusts, possibly the principal inshore mammal species in Lyme Bay (Edwards, 2010), though the species is very under-recorded throughout the English Channel. As this population is likely to be more dependent on the fish resources the AOI supports, this species has been included in the risk modelling as a standalone species.

Otherwise, the most common species observed in offshore waters have been harbour porpoise. However the white-beaked sightings within Lyme Bay, whilst low, are particularly important as this is near the southerly extreme of its distribution and may be the most southerly resident population in Europe (Edwards, 2010). MarineLife surveys 2005-2009 reported that white-beaked dolphins regularly visit Lyme Bay, especially during summer; the majority are juveniles and may indicate dispersing away from calving grounds and exploitation of abundant food sources. However it is considered that that they are likely to be under recorded in Lyme Bay and throughout the English Channel (Brereton et al, 2010).

All other marine mammals and turtles have been grouped to reflect their likely use of the area and common sensitivity to fishing activities.

Since spatial records are very sparse for mammals/turtles and due to their high mobility, their assessment will be matrix based and their sensitivity will be assumed to be constant across the AOI.

A summary of the mammals and turtles species / groups taken forward for the Tier 1 risk assessment are shown in **Table D5**. These include dolphins and porpoise (including common dolphin and harbour porpoise), bottlenose dolphins and seals. To review Tier 2 species discussed in this section, which are limited by number of records and / or of old vintage, see **Appendix E**. These include additional dolphin / seal species and all whale / turtle species assessed.

**Table D5.** Mammals and turtles selected for Tier 1 risk assessment

Species Group	Latin Name (WoRMs Accepted Scientific Name)	Common Name	Conservation Status	Project Model Assessment Unit
Mammals & Turtles	<i>Delphinus delphis</i>	Common dolphin	Bern Convention, Bonn Convention, Habitats Directive, EC-CITES , IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, Cons. of Hab&Spp Regs 2010	DOLPHINS & PORPOISES
Mammals & Turtles	<i>Phocoena phocoena</i>	Harbour porpoise	Bern Convention, Bonn Convention, Habitats Directive, OSPAR (2008), EC-CITES , IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, Cons. of Hab&Spp Regs 2010	DOLPHINS & PORPOISES
Mammals & Turtles	<i>Tursiops truncatus</i>	Bottlenose dolphin	Bern Convention, Bonn Convention, Habitats Directive, EC-CITES , IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, Cons. of Hab&Spp Regs 2010	BOTTLENOSE DOLPHIN
Mammals & Turtles	<i>Halichoerus grypus</i>	Grey seal	Bern Convention, Bonn Convention, Habitats Directive, IUCN Red List, Cons. of Hab&Spp Regs 2010	SEALS

## Birds

A total of 41 bird species protected by the various legislation and species lists have been recorded within the Lyme Bay AOI, or are reported as a feature of adjacent SPAs (none of these are a designated feature protected for the cSAC itself). The majority of the protected seabirds sighted in the area were recorded in low numbers and appear to simply be passing through the area or using it sporadically to feed. Where protected bird species are known to feed exclusively in intertidal or estuarine areas they were excluded from the sensitivity assessment since there are very unlikely to be impacted by inshore fisheries in the subtidal environment. Other birds were grouped according to their main feeding behaviours. Where there was evidence of significant reliance on areas adjacent to the AOI for breeding or nesting, i.e. Tier 1 species, these were put forward as a first draft for assessment at the species level as shown in **Table D6**. All bird species considered (i.e. both Tier 1 and 2) are shown in **Appendix E**.

To inform the spatial footprint of bird species in the marine environment, the foraging distance from breeding/territory grounds as well as from SPAs within Lyme Bay was sourced from the literature. Therefore all other Tier 1 species records that were not sighted at breeding/territory grounds or were not listed as SPA species within Lyme Bay were removed from the foraging distance assessment.

The resulting foraging footprints are shown in **Figure D4** whilst the method is detailed fully in **Appendix F**. Where the foraging footprint of those species initially selected extended across the whole AOI or did not enter the AOI, these species were excluded from a species specific assessment and are marked in **Table D6** below with one asterisk. Where the foraging footprint of species initially selected did vary across the AOI with particular areas used, these have been put forward for a species specific assessment and are marked by two asterisks and are in bold, shown in **Figure D5** separately.

To review Tier 2 species discussed in this section, which are limited by number of records and / or of old vintage, see **Appendix E**.

**Table D6.** Birds selected for Tier 1 risk assessment

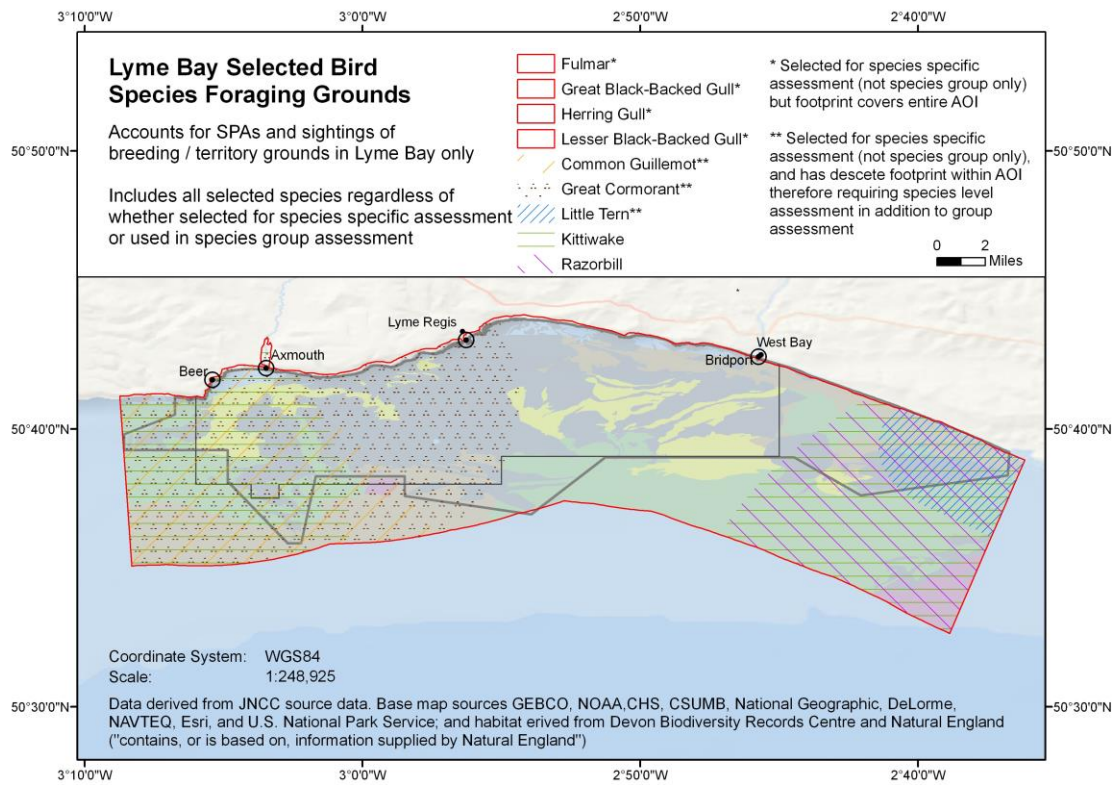
Species Group	Latin Name (WoRMs Accepted Scientific Name)	Common Name	Conservation Status	Project Model Assessment Unit
Birds	<i>Fulmarus glacialis</i>	Northern Fulmar*	Bern Convention, IUCN Red List, UK Cons. Status (Birds)	FULMAR & SURFACE FEEDING BIRDS
Birds	<i>Puffinus mauretanicus</i>	Balearic Shearwater*	Bern Convention, Birds Directive, OSPAR (2008), IUCN Red List, English NERC List, UK Cons. Status (Birds)	BALEARIC SHEERWATRE & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Puffinus puffinus</i>	Manx Shearwater	Bern Convention, IUCN Red List, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Alca torda</i>	Razorbill	Bern Convention, Bonn Convention, IUCN Red List, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Uria aalge</i>	Common Guillemot	Bern Convention, Bonn Convention, IUCN Red List, UK Cons. Status (Birds)	COMMON GUILLEMOT & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Larus argentatus</i>	Herring Gull*	Bonn Convention, Birds Directive, IUCN Red List, English NERC List, UK Cons. Status (Birds)	HERRING GULL & SURFACE FEEDING BIRDS
Birds	<i>Larus fuscus</i>	Lesser Black-backed Gull*	Bonn Convention, Birds Directive, OSPAR (2008), IUCN Red List, UK Cons. Status (Birds)	LESSER-BLACK-BACKED GULL & SURFACE FEEDING BIRDS
Birds	<i>Larus marinus</i>	Great Black-Backed Gull*	Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	BLACK-BACKED-GULL & SURFACE FEEDING BIRDS
Birds	<i>Larus canus</i>	Common Gull	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	SURFACE FEEDING BIRDS
Birds	<i>Larus ridibundus</i>	Black-headed Gull	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	SURFACE FEEDING BIRDS
Birds	<i>Stercorarius parasiticus</i>	Arctic Skua	Bern Convention, IUCN Red List, UK Cons. Status (Birds)	SURFACE FEEDING BIRDS
Birds	<i>Stercorarius skua</i>	Great Skua	Bern Convention, Bonn Convention, IUCN Red List, UK Cons. Status	SURFACE FEEDING BIRDS

			(Birds)	
Birds	<i>Sterna hirundo</i>	Common Tern*	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	COMMON TERN & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Sterna paradisaea</i>	Arctic Tern	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Sterna sandvicensis</i>	Sandwich Tern*	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, UK Cons. Status (Birds)	SANDWICH TERN & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Morus bassanus</i>	Gannet	Bern Convention, Bonn Convention, IUCN Red List, English NERC List, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Phalacrocorax carbo</i>	Great Cormorant**	Bern Convention, Bonn Convention, IUCN Red List, UK Cons. Status (Birds)	CORMORANT & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Melanitta nigra</i>	Common Scoter*	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, English NERC List, Wildlife & Countryside Act 1981, UK Cons. Status (Birds)	COMMON SCOTER & PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Gavia immer</i>	Great Northern Diver	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, Wildlife & Countryside Act 1981, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS
Birds	<i>Gavia stellata</i>	Red Throated Diver	Bern Convention, Bonn Convention, Birds Directive, IUCN Red List, Wildlife & Countryside Act 1981, UK Cons. Status (Birds)	PURSUIT & PLUNGE DIVING BIRDS

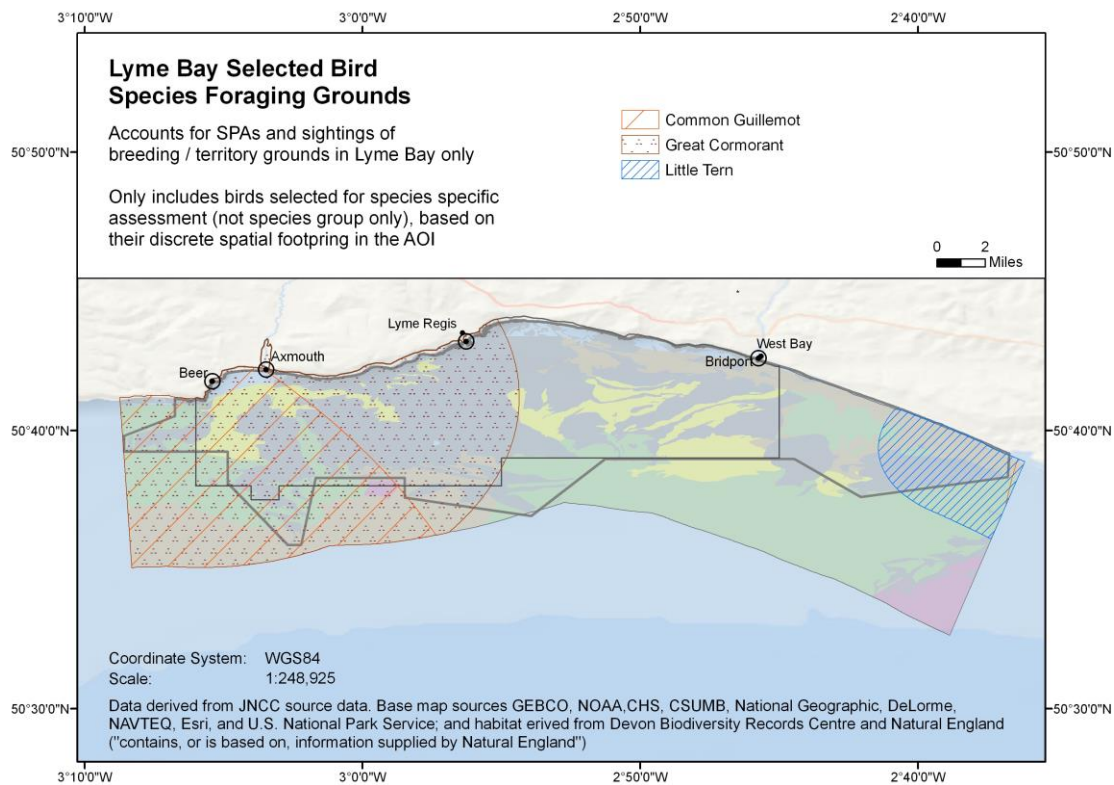
\* Included in foraging distance assessment but footprint covers entire AOI or none at all

\*\* Included in foraging distance assessment and has a discrete footprint within AOI, therefore requiring species level assessment in addition to group assessment

No asterisk indicates that there were no sightings at breeding / territory grounds specifically, or that the species was not listed within the Lyme Bay SPAs.



**Figure D4:** Bird foraging distances for all bird conservation species



**Figure D5:** Bird foraging distances for birds selected for species specific assessment  
*Note the Common Guillemot and Great Cormorant were selected as Tier 1 species; and the Little Tern as Tier 2. Therefore only the western area is of interest as Tier 1.*

# Fishing Activity

To map areas of current risk to habitats and species it is necessary to map out where fishing takes place and what gear types are used. Other characteristics that would be preferential include the level of pressure imposed by the fishing activities, e.g. duration of fishing; and areas used for access from shore. However the extent of the risk assessment is dependent on the data availability as discussed below.

To date fishing activity has been mapped out in a number of ways including Vessel Monitoring Systems (VMS), sightings by patrol vessels / aircraft and through consultation i.e. defining boundaries through workshops and questionnaires. Available data has been researched and informed through consultation with the Devon & Severn and Southern IFCA's, the MMO and Cefas, to ensure the best available fishing activity data is used in the project, post-closure of the Lyme Bay Designated Area (Fishing Restrictions) Order 2008.

## Existing data on fishing activity in Lyme Bay

### Vessel Monitoring Systems

#### Offshore VMS

In English marine waters, the Marine Management Organisation requires all commercial fishing vessels >12m to be fitted with Vessel Monitoring Systems to comply with EU law<sup>9</sup>. These satellite-based systems communicate the position, time and course and speed of vessels. However this length of vessel has a relatively small presence in the Lyme Bay AOI, present in the 3-6nm section generally and with low fishing effort (duration of exposure to fishing).

The VMS data may be interpreted to inform when mobile gear are fishing by extracting those records for vessels travelling at speeds >0 to 6 knots. In Lyme Bay this infers up to 10 days per year fishing in any one location in the outer part of the Lyme Bay AOI. Whilst for static gear it is not known whether vessels are fishing or not, there is very minimal coverage of static gears in VMS anyhow within the Lyme Bay AOI.

For the reasons outlined above, VMS has not been used to inform the fishing activity in the Lyme Bay AOI. In addition, whilst it could be combined with sightings data in theory, this can produce duplication, though is discussed in further detail below.

#### Inshore VMS

Due to the lack of legislation for having VMS on <12m vessels, the mapping of inshore waters have relied on sightings and questionnaire data to date. Inshore VMS (iVMS) has

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<sup>9</sup> VMS has been compulsory since 2004 for 18m vessels, with increasing control for smaller vessels until 2011 (12m)

recently been trialled in Lyme Bay, as an MMO licence variation for vessels working within the Torbay and Lyme Bay cSAC, where they want to fish with towed gear in spatially restricted areas. However iVMS will not inform an overview of all fishing activity until fitted to a majority of vessels.

The Lyme Bay Reserve project is currently running a Fully Documented Fishery study that will fit inshore VMS (iVMS) to 45 participating vessels. It is envisaged that eventually this data may be used to update the risk model and better describe the true fishing spatial footprint. As described below the current resolution of fishing activity information is poor and the FDF study represents the best available approach to gathering this data.

### Sightings

Sightings of fishing vessels are made by surveillance vessels/aircraft operated by the IFCA, MMO and Royal Navy and compiled by the MMO. However it is not compulsory for IFCA to submit sightings to the MMO. The MMO sightings data sourced in this project (see below) was contributed to by the Devon and Southern IFCA (as well as MMO / Royal Navy); however these had a very wide coverage over Lyme Bay in both the West and East parts of the project AOI. There is certain bias on the sightings data as to what areas are patrolled each year. This may relate to emerging policy impacting on focus areas, enforcement costs, the chosen enforcement strategy and an intelligence-led risk-based approach.

### National SPUE maps

Further to what areas are visited on patrol, a second consideration is the frequency of patrol effort at any one location. This has been addressed in part by normalising the number of sightings in an area based on patrol effort, where sightings per unit effort (SPUE) = number of sightings ÷ surveillance effort (Clark 2004, Eastwood, 2006, Vanstaen and Silva, 2010).

SPUE maps have been produced across all of England's inshore marine waters on a ~3 by 3km grid<sup>10</sup> by Cefas as commissioned by Defra for the MB0106 project (Reports 3 and 5). These incorporated sightings only to map out different gear types nationally (Vanstaen and Silva, 2010); and sightings combined with VMS to map out two summary gear types of static and mobile only, nationally (Vanstaen, 2010). However these are now out of date in Lyme Bay as use data from 2007-2009 which straddles the implementation of the Lyme Bay Designated Area in July 2008 and closure to bottom towed gear. In addition, whilst some gears were well represented by data in Lyme Bay (dredging, trawling, potting) others were less so well (netting, lining and angling) (Vanstaen and Silva, 2010). Production of these datasets takes into account a certain number of assumptions and processing is substantial comprising of a number of steps amalgamating data from a range of sources (Koen Vanstaen, pers. comm.) Due to these limitations such sources of data were out of scope of this project. However should this be carried out in the future the maps may be incorporated into a revised run of the risk model.

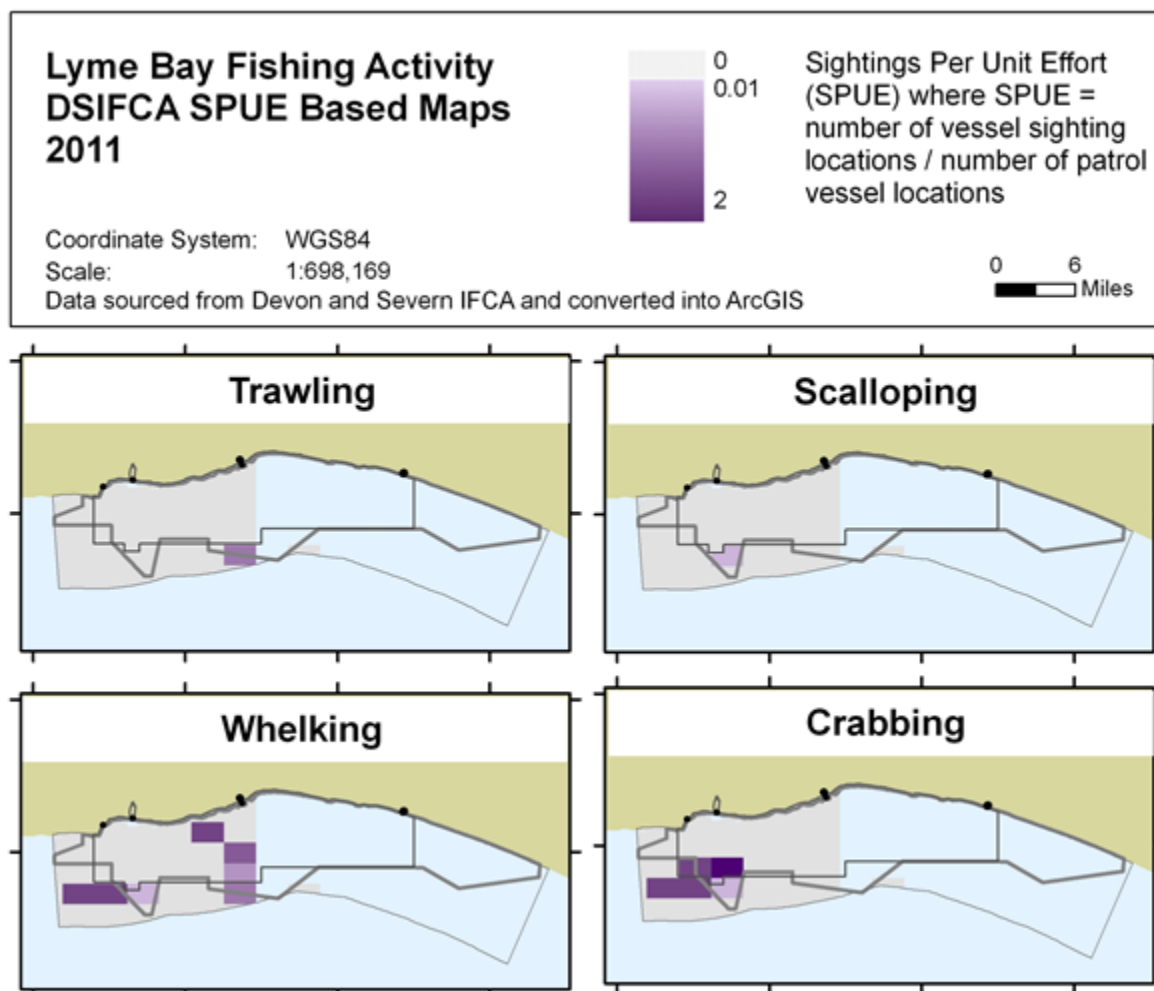
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<sup>10</sup> Grid cell equal to 1/400th of an ICES rectangle = 3x3km = 0.05 lon x 0.025 lat



### Local SPUE maps

The Defra MB0106 project equipped individual IFCAs with a GIS toolbox to update the maps in the future as required (Vanstaen, 2010). The Devon and Severn IFCA provided a more recent SPUE map for 2011 for use in this project based on IFCA sightings. However it is important to note that the data is still wholly reliant on whether any patrol has reached an area and as such is therefore still biased by survey effort, despite the normalisation to survey effort in areas the patrol has been. Also the SPUE maps do not always account for the MMO sightings, which are far greater in number than the IFCA sightings, therefore leaving out a significant source of information. Despite these issues and the 3x3 km resolution. DSIFCA SPUE maps are still of value to the project and provide the best readily available picture of fishing activity in the western part of Lyme Bay, as shown in **Figure D6**. Any bottom towed gear that was plotted within the Designated Area in the original source data has been removed as was likely to be an error in the data or as a result of the processing to a coarse grid (SIFCA Pers. Comms).



**Figure D6:** DSIFCA SPUE based map showing survey sightings per unit effort per gear type

A further Defra project, MB0101, has gathered sightings and VMS data specifically for the Lyme Bay region to assess impacts of the closure restrictions (Mangi et al. 2011; Attril et al 2010). Whilst this study notes the issues with survey patrol effort, it does show some marked patterns in use of the Designated Area before and after closure, suggesting the data as useful as a general insight to fishing activities. This work shows that numbers of vessels stabilised in 2009/10. This therefore provides the minimum year for data gathering on fishing activity, though more recent data has been sought where possible (see below).

### Consultation informed fishing activity data

A consultation approach to data gathering on fishing activity has been used in regional assessments that cover Lyme Bay: for Fishermap, to inform the Marine Conservation Zone Project for the southwest of England (des Clers et al. 2008) as part of the wider nationwide study; to inform a methodology in two trial areas for UK wide shellfish mapping (Woolmer 2009); and Southern IFCA's own regional mapping of various gears in southern England (2013, unpublished). In addition a pan-Wales study has been completed (Eno et al. 2013). The confidence of data collected in this way is dependent on the number and proportion of fishermen responding by region / gear type.

### Fishermap

Whilst Fishermap is out of date for the purposes of this study, it is of note that the confidence of data in Lyme Bay is shown as moderate; and that due to technical reasons related to the Fishermap source data, a subsequent assessment of the study (Vanstaen, 2010) considered that only presence or absence could be used, as opposed to fishing effort. This study found that FisherMap generally had lower confidence than their sightings data and concluded that MMO and SFCs (now IFCAs) sighting informed fishing effort maps should be used in preference to FisherMap as this allows increased differentiation by gear type.

## SIFCA Maps

In the SIFCA region, the annual questionnaire is sent out to all registered vessels, i.e. <12m. The fishermen shade in the area of a map in which they fish per gear type, where gear types equal to the MMO sightings categories. It is estimated that approximately 25% of registered vessels in the SIFCA region responded in 2011/12 (approximately 100 of the 425 vessels), with varying degrees of the level of detail responded (e.g. gear type and spatial definition). Most gear types have been mapped to inform this current risk assessment report, apart from long lining and rod and line which were compiled into one mapped fishing activity in error by SIFCA. By counting the number of vessels / questionnaires reporting presence of a particular fishing gear type in any one cell shaded in, a count has been made of the related gear intensity there. However as the response rate was not consistent for all gear types, the intensities cannot be compared between gear types, but instead serve as an overview of the relative variation within an individual gear type, as shown in **Figures D7 and D8**. Any bottom towed gear that was plotted within the Designated Area in the original source data has been removed as was likely to be an error in the data or as a result of the processing to a coarse grid (SIFCA Pers. Comms). Whilst this data is subjective and noting the difference in level of detail acquired as above, these maps are considered by SIFCA to provide the best available spatial data on fishing activity within the area, which covers the eastern and central parts of the Lyme Bay AOI.

However, the data provider SIFCA noted some inaccuracies in their data supplied with regards to use of towed gear in the Designated Area (these are unpublished maps provided in draft format to MPS's project). The maps were therefore been edited here to remove towed activities from the Designated Area. However it is recommended that all these maps are Quality Assured as a priority.

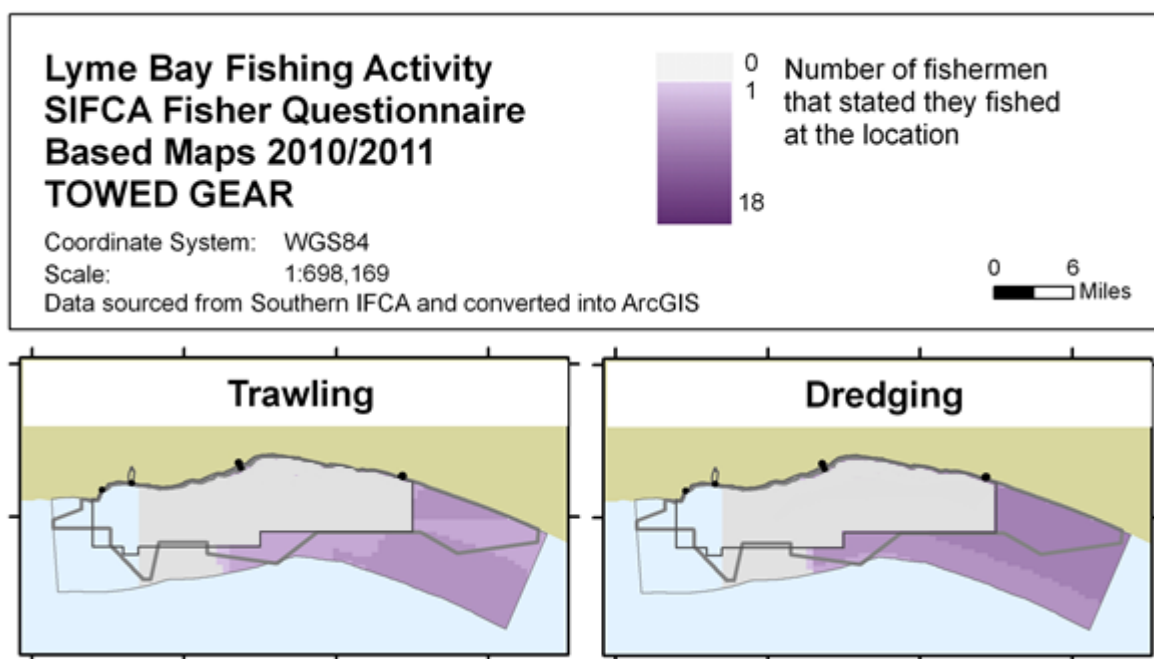


Figure D7: SIFCA questionnaire based map: Towed fishing

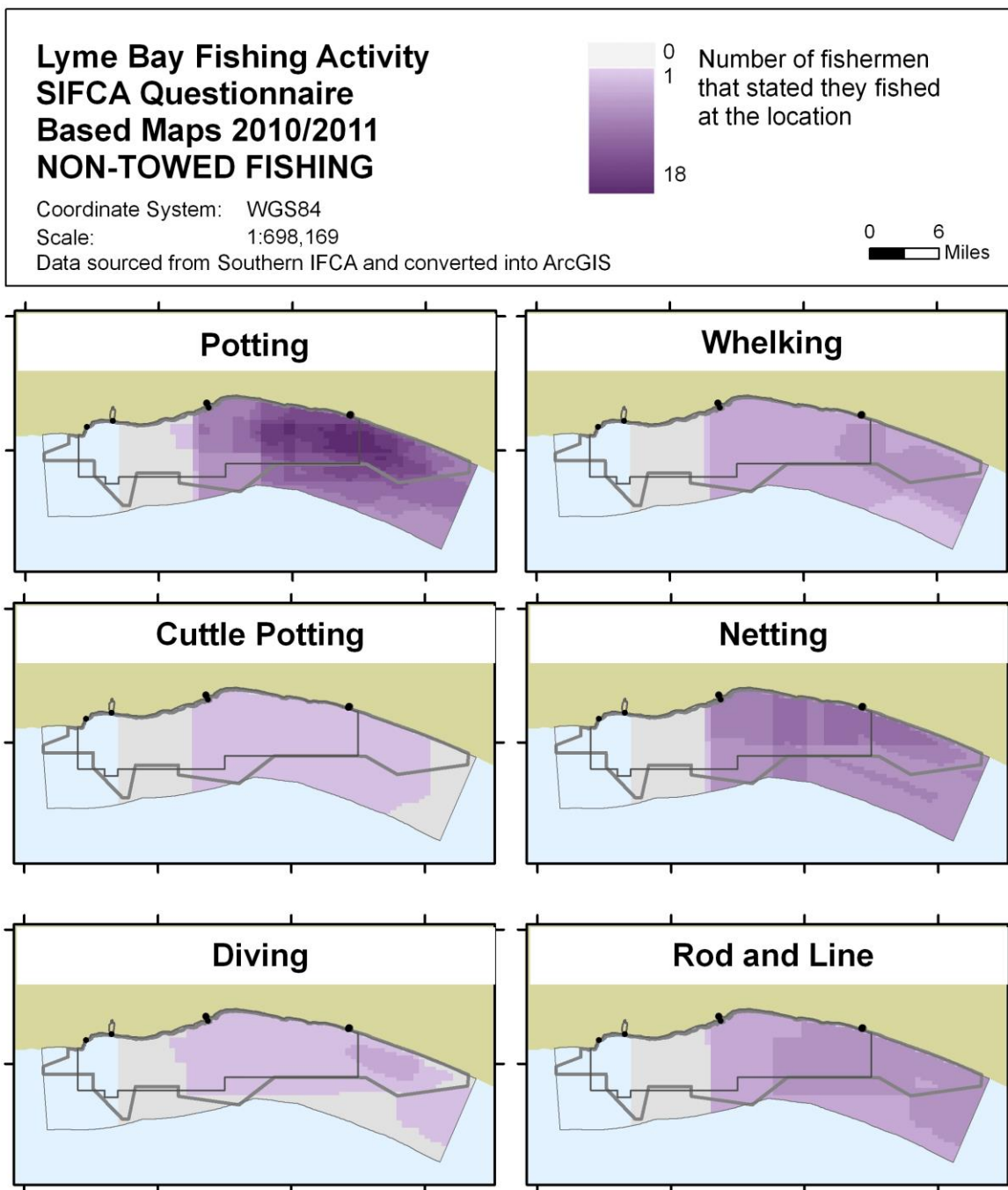


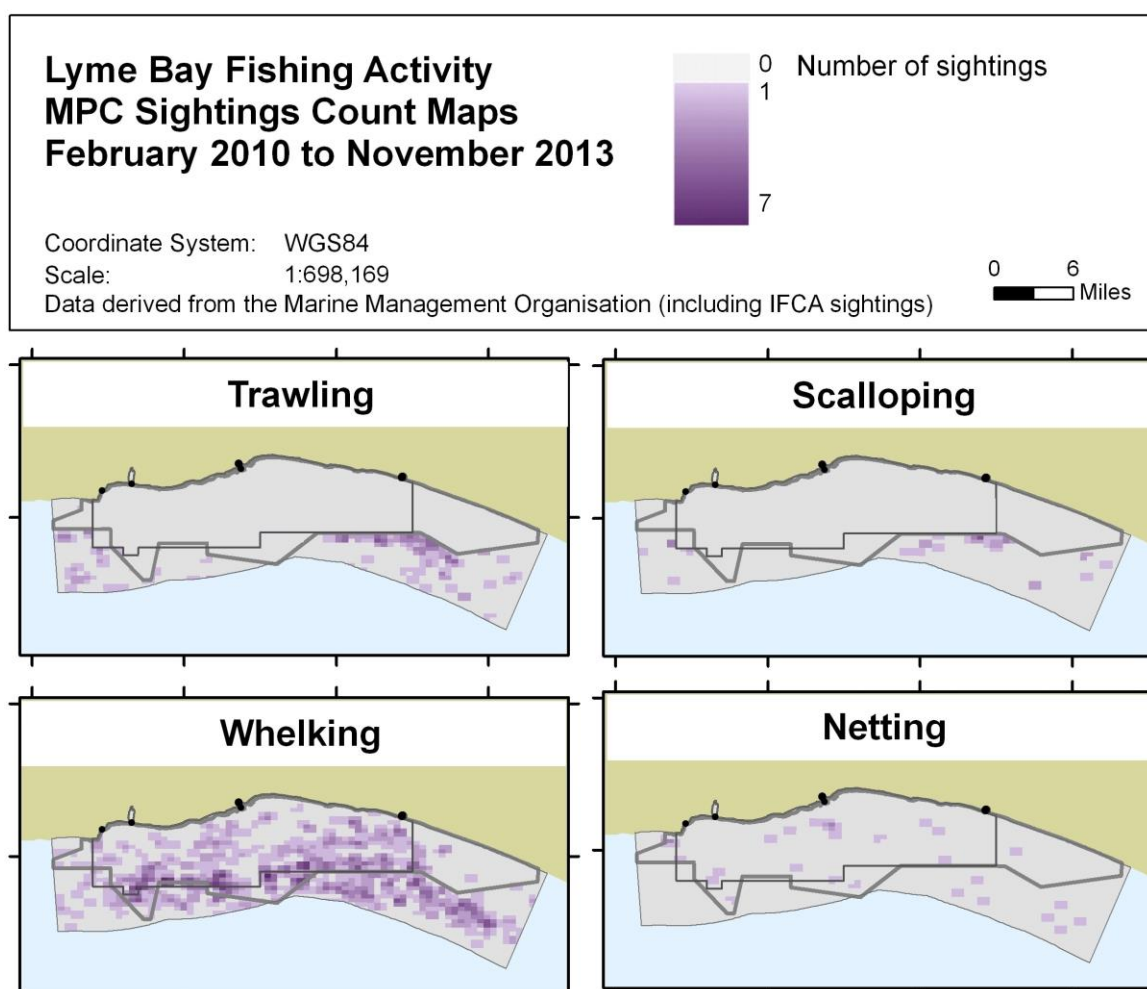
Figure D8: SIFCA questionnaire based map: Non towed fishing

*Note "rod and lining" was provided as a combined fishing activity by SIFCA. However this was combined in error and is due to be split apart in the future owing to the different approaches to fishing.*

## Data processed within this study

Whilst the Devon and Southern IFCA SPUE maps and the Southern IFCA questionnaire based maps provide the best available data to inform this project, a third sightings based map (**Figure D9**) has been produced as part of this project using readily available data and rapid processing methods. This allows a full coverage map across the whole of the Lyme Bay AOI to combine both IFCA districts, and uses a greater number of sightings data from all available sources. This dataset covers the period to February 2010 to November 2013 and it was confirmed this includes SIFCA data but DSIFCA data had not been submitted to the database.

As sightings cover up to 6nm offshore, the limit of the project AOI, these are a reasonable source of data to inform the project and have therefore been sourced direct from the MMO for the period. Furthermore, the sightings data seem to have more density 3-6nm than 0-3nm offshore so the outer band is clearly covered sufficiently by patrol vessels.



**Figure D9:** MPC based sightings map showing count of sightings per fishing gear type

Data were classified to a more generic gear type to that provided in the gear listings to make them compatible with the other fishing activity data sources. This resulted in four gear

types: netting, scalloping, trawling and whelking. (Rod and line was not included as was not provided in IFCA maps so is not comparable.) As outlined above, there are certain limitations to scaling the level of pressure from fishing activities using the SPUE approach, resulting in a presence-absence approach in the risk assessment. Therefore a simplified approach was taken to produce a gridded map of resolution 500 x 500m, with each cell providing a count of sightings per gear type. Only sightings where the vessel was recorded as fishing were used.

The choice of a smaller grid resolution (500 x 500m) to that used in recent SPUE mapping (one SPUE grid cell = 3x3km so 9km<sup>2</sup>) was chosen to avoid large areas showing presence of a given fishing activity type which would result in a large area of habitat showing potential risk when this may not be the case.

It should be noted that some bottom gear was found logged in the Designated Area and as this area is closed to such gear types, this is unlikely and may be due to errors in the sightings data provided to MPC, e.g. a change in gear codes over the period. These have therefore been removed.

### Summary of fishing spatial footprint

As the Lyme Bay AOI is predominantly used by the under 12m fishing vessel fleet and these vessels are not required to operate vessel positioning equipment by law (unless to use bottom towed gear in protected areas), there is no continuous record of fishing activities in the area. Spatial use of the area is instead informed from sightings and questionnaires, albeit with certain uncertainties relating to patrol effort and sample size / bias respectively.

In broad terms, as informed through questionnaire data collected by the Southern IFCA, bottom towed gear are operated in the area outside of the Designated Area, so long as these are not restricted by IFCA byelaws for sensitive parts of the cSAC reef. In decreasing order or intensity these include dredging, than trawling. However the sightings data (MPC processed) indicate that these activities are somewhat focused on the outside perimeter of the closed area. This is particularly true on the south-east where reefs extend beyond the Designated Area, suggesting gravitation towards the richer wildlife found here; and the west.

Non-towed gears take place mostly throughout the AOI with a certain focus on the reefs, including potting, whelking and rod and line. Whelking, whilst also taking place throughout the AOI, has conflicting spatial footprints, with the questionnaire data indicating slight focus on the eastern reefs; whilst the sightings data indicate greater attraction to the offshore environment and around the perimeter (both inside and outside) of the Designated Area. It is possible this may be caused by a focus of patrol effort on this boundary.

Lastly, diving is focussed on the reef area and is not reported in some areas offshore.

## Final fishing activity maps selected for risk assessment

Whilst it was initially planned to use one set of fishing activity maps to inform the risk assessment, it is clear that no one approach provides a fully comprehensive approach and neither IFCA maps provide full coverage. Therefore three maps were used:

- SIFCA questionnaire based fishing activity map
- DSIFCA SPUE based fishing activity map
- MPC sightings based fishing activity map

The intensity of fishing activities, i.e. fishing 'pressure', was originally planned to inform the risk assessment where made available through e.g. the number of sightings, duration of fishing activity etc. Where fishing pressure is known to a suitable confidence / spatial coverage, it may be used to decide the risk of impact to certain features. However fishing pressure was ruled out for a number of reasons. A significant part was owing to the low confidence in the data as detailed above. However the second reason was due to the EMS risk approach adopted, as discussed in the next chapter. By not considering the fishing pressure scale, a precautionary approach is taken; however should fishing activity data be improved in the future then these risk categories may be reduced where activity is low, as relevant to the specific gear–feature combination.

# Risk Matrix

## Components of a risk matrix

### What requires consideration in the risk matrix?

The risk matrix provides a means of assessing the level of risk to features when they are exposed to certain pressures. In this case, it is the level of risk to conservation features (whether resulting from the cSAC features or other legislation / lists) when exposed to different fishing gear activities. The risk therefore depends on the habitats and species' 'sensitivity' and the fishing presence/pressure or 'exposure'.

### Sensitivity

Sensitivity comprises of a number of characteristics of the habitats and species, but is most often represented by their ability to withstand pressures ('resilience') and their ability to recover after impact ('recoverability') within the ecosystem. Whilst these are commonly used terms it should be noted that recovery can imply change back to a pristine un-impacted state and this is not the intended use of the term. 'Restoration' may be used instead (e.g. Stevens et al. 2014) to account for returning to more of a reasonable or 'good' status, i.e. one that allows sustainable use of the seas. However to allow reference back to previous studies, the term recovery is used.

### Exposure

The level of exposure pressure for each fishing gear type can be determined by either the presence, sightings or time spent by fishing vessels in the regions. However as discussed below, studies to date have rarely incorporated pressure and instead present risk based on presence/absence of fishing activity. The reason for this is the lack of data on pressure to a suitable confidence level as discussed previously.

### Risk

Risk, vulnerability and degree of impact/threat are terms that are used interchangeably for risk as both rely on the sensitivity and exposure, i.e. they inform the result when the two interact. It is worth noting here that the broad definitions of risk, sensitivity and exposure are used for the purposes of this project and conform to a majority of other studies. However other studies do at times use different meanings to these terms.

Risk is often presented as up to 4 categories including none, low, medium or high. As such it is commonly presented as a 'traffic light' colour system, enabling a 'heat-map' presentation of results, as used here.



## Recent developments in assessing risk

There have been a number of studies to date assessing risk to habitats and species from fishing activities. These tend to be for broad scale seabed habitats (e.g. Roberts et al. 2010) or species specific (e.g. cetaceans, Brown et al. 2013), with more recent advancements made in providing a full assessment of all features of conservation interest in European Marine Sites (EC 2012, NE 2013). Whilst the latter of these has been running in parallel to this project and provides the most up to date and relevant methodology to this project, a brief overview of the other sources is provided in comparison.

## Revised approach to management of commercial fisheries in European marine sites in England

In England, a risk matrix has been in development since 2012 to support the management of commercial fisheries in European Marine Sites. This was initiated by the Department for Environment, Food and Rural Affairs (Defra), carried out by Natural England, reviewed by Cefas, has sought close working with leading experts including IFCA through the Fisheries in EMS Implementation Group and is managed by the MMO. Therefore the IFCA members of the Lyme Bay Working Group have had significant involvement in its development.

The aim of this work is to promote sustainable fishing in European Marine Sites (EMS) while meeting conservation objectives for important features, by providing a tool to the IFCA and MMO to identify and prioritise risks at the site level. This provides a spreadsheet matrix of gear types against EMS habitat / species, resulting in red (high), amber (medium), green (low) and blue (no) risk as follows<sup>11</sup>:

**“Red:** Where it is clear that the conservation objectives for a feature (or sub-feature) will not be achieved because of its sensitivity to a type of fishing, - irrespective of feature condition, level of pressure, or background environmental conditions in all EMSs where that feature occurs - suitable management measures will be identified and introduced as a priority to protect those features from that fishing activity or activities.

(Where there is uncertainty but potential for harm then the precautionary approach is adopted and an activity is rated red or amber.)

**Amber:** Where there is doubt as to whether conservation objectives for a feature (or sub-feature) will be achieved because of its sensitivity to a type of fishing, in all EMSs where that feature occurs, the effect of that activity or activities on such features will need to be assessed in detail at a site specific level. Appropriate management action should then be taken based on that assessment.

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<sup>11</sup>Content of box quoted from the following source (with summary information in brackets)  
[http://www.marinemanagement.org.uk/protecting/conservation/documents/ems\\_fisheries/matrixbackground.pdf](http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/matrixbackground.pdf)

(Where the evidence of expert opinion does not clearly demonstrate that a fishing activity should be categorised as red, green or blue, an assumption will be made that an activity is amber.)

**Green:** Where it is clear that the achievement of the conservation objectives for a feature is highly unlikely to be affected by a type of fishing activity or activities, in all EMSs where that feature occurs, further action is not likely to be required, unless there is the potential for in combination effects.

(This assumes current maximum levels of commercial fishing effort.)

**Blue:** For gear types where there can be no feasible interaction between the gear types and habitat features, a fourth categorisation of blue is used, and no management action should be necessary.”

The definition of the EMS risk level and associated confidence was sourced from a literature review carried out by Cefas (Breen, 2013); these were put forward at subsequent workshops for a wider agreement with the Working Group. Whilst the justification and data sources used to assign red risks (i.e. fishing gear type-feature interaction) have been published on the MMO website<sup>12</sup>, the remainder of the risks remain with ratings only, lacking the formalised and published justifications. Overall, 22% of interactions (gear type-feature combinations) have been sourced from primary literature and 88% from expert judgement (Breen, 2013). Evidence was lacking mostly for static gear types, nets and longlines.

The risk assessment does not consider level of pressure or natural variation in feature sensitivity; nor does it account for multiple gear impacts in combination. However in the first stage it provides a focus for site specific management for red activities and helps inform the quantification of impacts for amber and green risks. In a second stage it allows for site level assessments of amber risks in compliance with Article 6 of the Habitats Directive. The Habitats Regulations Assessment (HRA) that will be carried out with the amber risk feature gear interactions will however examine the fishing pressure/effort to assess the appropriateness of the activity in relation to the designated feature and the management necessary to ensure the conservation objectives are met.

It is important to note that the risk categories do not consider the feasibility of achieving specific management and is instead a recommendation based on sensitivity. Also the EMS matrix is a generic tool to help managers assess the risks of the wide range of fishing activities that take place within the UK; and the following describes how this is implemented at the site specific level.

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<sup>12</sup> [http://www.marinemanagement.org.uk/protecting/conservation/ems\\_fisheries.htm](http://www.marinemanagement.org.uk/protecting/conservation/ems_fisheries.htm)

## Application of the EMS risk approach in Lyme Bay IFCA's to date

Under Article 6(2) of the Habitats Directive, IFCA's must ensure that existing fishing activities within EMS are compatible with the conservation objectives for that site. This means that the fishing activities will be assessed against the Favourable Condition Tables for the designated features within the site (i.e. bedrock and stony reef within Lyme Bay).

All IFCA's have a duty to manage any marine EMS within their district, through management of the features for which each site is designated for. Initially, IFCA's have been required to bring in management of those fishing activities that have been highlighted as having the greatest impact on the most sensitive designated features of EMS. Both IFCA's in Lyme Bay have therefore been assessing the EMS features at risk within their district since publication of the EMS risk matrix, primarily working with the red risk categories to date (e.g. SIFCA<sup>13</sup>), and mitigating risk through evidence of interactions and management practices, with Byelaws introduced in 2014. This process has been underway in parallel to the MPC led risk assessment, both striving to reach similar goals in identifying features at risk and management practices to address these. However the MPC-led assessment does not address any statutory requirements and instead provides an independent review of risk to features with conservation status (whether designated for the cSAC or not) within the Lyme Bay AOI. This was carried out with evidence available to support the process, together informing the wider remit of the project to assess fisheries sustainability and management scenarios.

## Other Studies

The EMS risk matrix draws on a significant number of studies in defining sensitivity of habitats and species. Whilst a number of these are directly in relation to specific fishing gear impacts, others look more broadly at sensitivity to pressures by looking at the action it imposes on the features, e.g. physical change to the seabed, abrasion, removal etc.

One key study leading up to the EMS risk matrix was a review of existing approaches to evaluation marine habitat vulnerability to commercial fishing activities (Roberts et al. 2010), which classed seabed habitats as either sensitive, or not, to different gear types; and classified their sensitivity to fishing overall (irrespective of gear type) from very low to very high. A second key study was developed by JNCC to advise on fisheries impacts on Marine Conservation Zone habitat features (Blasdale et al. 2011), which extended the assessment beyond habitats to include key species also, e.g. the Native Oyster (*Ostrea edulis*).

Beyond these two primary studies, there are many more, too many to justify in a short summary here. Instead these have been drawn on in the development of the Lyme Bay Risk Matrix developed as part of this project and are fully documented for each feature-gear type interaction in **Appendix C**.

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<sup>13</sup> <http://www.southern-ifca.gov.uk/wp-content/uploads/2013/10/Annexes1.pdf>

## Format of the Lyme Bay risk matrix

### Fishing gear types

The data obtained from the various sources for fishing data discussed previously do not provide the level of detail for those included in the original EMS Fisheries Matrix. The matrix was therefore adapted to provide a generalised gear type. However all original gear types are retained (but greyed out) to show comparison to the allocated risk and check compliance. To assist with this a tick box scheme has been used to show which sub gear types have been used to inform the more generalised gear types used in this project.

The gear types include all those in the fishing activity maps. As these come from different sources, in some cases one gear type will include component of another, e.g. scalloping is mapped only for Devon and Severn IFCA and therefore is excluded from their dredging; whereas in the Southern IFCA scalloping is not included and so scalloping is included in dredging. This is all fully documented and is traceable from the matrix.

### Conservation Features

The EMS Fisheries Matrix provides risk categories for all habitats and some species selected for assessment in this project (as defined in the previous Chapter) except for the following species/groups which have been selected for Tier 1 (priority assessment):

- Pink Sea-fan
- Atlantic Cod
- Whiting
- Plaice
- Sole
- Basking Shark
- Dolphins & Porpoise
- Bottlenose Dolphin

In addition, a second tranche of species/groups were selected in Tier 2. However due to the lack of strong evidence (e.g. number of records and vintage), these are recorded in the Appendices (A) only:

- Native oyster
- Ocean quahog
- Sharks
- Rays
- Dogfish
- European Eel
- Ling
- Anglerfish

- Sand goby
- Whales
- Turtles

However these still have significant conservation status and the number of records may be low due its rarity (and hence conservation status) and anthropogenic pressures, including fishing, in Lyme Bay.

All additional species/groups, whether Tier 1 or Tier 2 have therefore been added to the risk matrix and are shown in red text. In some cases a more generalised feature has been added to represent more than one feature originally shown in the matrix. This only occurs once for *Mytilus* (mussel) beds.

### Transposed format

To aid GIS analyses it was necessary to transpose the matrix so that the features are recorded down and the gear types across. Every attempt was made to avoid this to ensure consistency / transparency with the original; however this was considered absolutely necessary to allow repeatable work to update the assessment by the IFCA post project.

## Review of Impacts

### Risk category allocation

These have therefore undergone a review of evidence to inform the risk categories allocated to each feature-gear type combination and are fully documented in **Appendix G**. This draws on a wide range of peer reviewed publications, grey literature and expert opinion.

The source of evidence for all other features already completed in the EMS Fisheries Matrix was made available to the project team by Cefas in spreadsheet format. However the only fully documented evidence provided in public currently is for red risk categories<sup>14</sup>.

### Confidence

Where evidence was lacking, categories have been assigned from similar features or gear types. This is reflected in the confidence category allocated. The protocol for assigning confidence is also presented in **Appendix G**. This conforms to the EMS Fisheries Matrix method but presents a more structured approach.

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<sup>14</sup> [http://www.marinemanagement.org.uk/protecting/conservation/ems\\_fisheries.htm](http://www.marinemanagement.org.uk/protecting/conservation/ems_fisheries.htm)

## Modified Lyme Bay matrix

**Table D7** below shows the modified Lyme Bay matrix. All features that were not selected for assessment are not shown (whether Tier 1 or 2); however these are still on the matrix in spreadsheet format. The first three columns describe the conservation feature assessed in this project together with the type of assessment (e.g. spatial format or if full AOI). Those in red are new features assessed in this project.

The top row to the right shows the fishing gear type. The relationship to the original gear type scores in the EMS Fisheries Matrix are shown in **Appendix F. Table D8** clarifies which gear types from the original have been used to inform the scores. Due to the different types of fishing gears provided in the source data and the use of more than one source in the assessment, there is some overlap between gear types, e.g. dredging and scalloping. This has been kept in the table for ease of reference back to the source data and to allow the GIS modelling to proceed smoothly.

**IMPORTANT:** The risk categories shown in **Table D7** appear similar in format to the EMS Risk Matrix for ease of reference. However it is important to point out a few key differences. Firstly, it is not the intention of this work to state what management measures must be adopted where these interactions occur. This is the role of the Government and IFCAs. Instead the risk categories are simply a measure of high, medium, low or none as follows:

**Red:** Score 3 = high risk, will certainly pose a risk if interact

**Amber:** Score 2 = medium risk, will interact but the extent of risk unknown

**Green:** Score 1 = low risk, interaction possible but unlikely, unlikely to pose a risk if interact

**Blue:** Score 0 = no risk, interaction will not take place

Therefore to maintain comparison, the same colouring has been used.

**Table D7:** The Lyme Bay Risk Matrix

			Trawling	Dredging	Scalloping	Potting	Cuttle potting	Whelking	Crabbing	Netting	Diving		
Full coverage map	Habitat	Coarse sediment (high energy)	Amber	Amber	Amber	Green	Green	Green	Green	Green	Green		
		Subtidal sand (high energy)	Amber	Amber	Amber	Green	Green	Green	Green	Green	Green		
		Subtidal mixed sediments	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Subtidal gravel and sand	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Subtidal muddy sand	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Subtidal mud	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Brittlestar beds	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Subtidal bedrock reef	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Amber		
		Subtidal boulder and cobble reef	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Amber		
		Sabellaria spp reef	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Amber		
Point locations	Benthic	Maerl	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
		Mytilus beds	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
		Pink Sea-fan	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
		Native oyster	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
		Ocean quahog	Amber	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
Assumed to cover the whole AOI	Fish	Sharks	Red	Red	Red	Green	Green	Green	Green	Red	Green		
		Rays	Red	Red	Red	Amber	Amber	Amber	Amber	Red	Green		
		Dogfish	Red	Red	Red	Amber	Amber	Amber	Amber	Red	Green		
		Basking Shark	Red	Amber	Amber	Amber	Amber	Amber	Amber	Red	Green		
		European Eel	Red	Amber	Amber	Amber	Amber	Amber	Amber	Red	Green		
		Cod	Red	Amber	Amber	Amber	Amber	Amber	Amber	Red	Green		
		Whiting	Red	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Ling	Red	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Anglerfish	Red	Red	Red	Amber	Amber	Amber	Amber	Amber	Green		
		Sand goby	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
		Plaice	Red	Red	Red	Amber	Amber	Amber	Amber	Red	Green		
		Foraging distance	Mammals & Turtles	Grey and Common Seal	Amber	Blue	Blue	Amber	Blue	Blue	Blue	Blue	Blue
				Dolphins & Porpoise	Amber	Amber	Amber	Green	Green	Green	Green	Red	Green
Bottlenose Dolphin	Red			Amber	Amber	Green	Green	Green	Green	Red	Green		
Whales	Amber			Amber	Amber	Amber	Amber	Amber	Amber	Amber	Green		
Turtles	Amber			Amber	Amber	Green	Green	Green	Green	Red	Green		
Foraging distance	Birds	Surface feeding birds	Green	Blue	Blue	Amber	Blue	Blue	Blue	Blue	Blue		
		Pursuit and plunge diving birds	Amber	Blue	Blue	Amber	Blue	Blue	Blue	Blue	Blue		

**Notes:**

- a) High risk = red (score of 3), medium risk = amber (2), low risk = green (1), no risk = blue (0).
- b) Blue text is shown for species added by this project since the EMS risk matrix
- c) Habitats and species are highlighted as light grey for Tier 1 species taken forward to risk assessment; and dark grey for Tier 2 where spatial evidence was weaker
- d) Due to the different types of fishing gears provided in the source data and the use of more than one source in the assessment, there is some overlap between gear types.





# Risk Assessment

The risk levels for habitats and species set out below is governed entirely by the project risk matrix. However it is important to note that each feature has a different conservation status. Of all the habitats assessed, only Annex I reefs are designated for the site. All habitats are however on the Ecological Network Guidance list of habitats and species provided for the Marine Conservation Zone (MCZ) projects (JNCC, 2010) and have been included on the EMS risk matrix. They have been included here to provide a full coverage assessment and inform any future assessment of species' feeding grounds.

All species in the risk assessment carry conservation status from various national and international legislation and conservation lists as shown in **Tables D3-6**. However the only species that are related to a site specific designation are those that are associated with the Annex I reef assemblages within the cSAC boundaries. Of the Tier 1 species discussed below this only includes the Pink Sea-fan. Whilst the section below sets out the level of risk from different fishing gears, the relevance of the different conservation statuses is discussed in the conclusions section.

Finally, to recap, Tier 1 species were the primary focus of the assessment owing to their strong evidence base. Tier 2 species were removed during the assessment due to their low evidence base. However this is often due to few records and it should be remembered that this may result from its rarity for which the species is known and therefore contained on certain lists and legislation for protection. In general, it is recommended that Tier 2 species are subject to further survey and data gathering to assess a more solid evidence base.

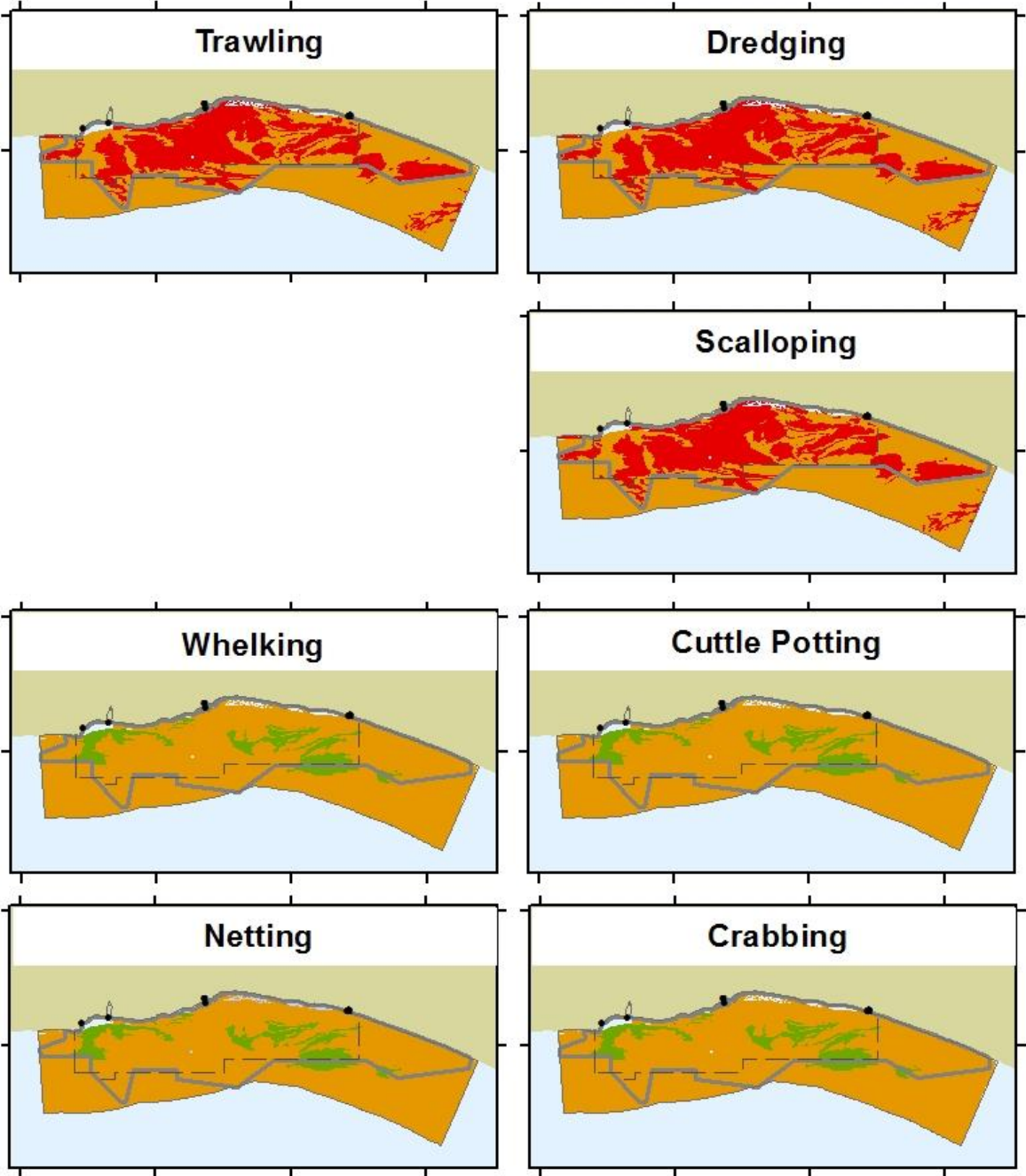
Note that some maps show overlapping gear types owing to the different fishing activity data sources. All gears were kept to help relate back to source data and for some slight differences, e.g. within the potting category.

## Baseline risk (uniform fishing activity across AOI)

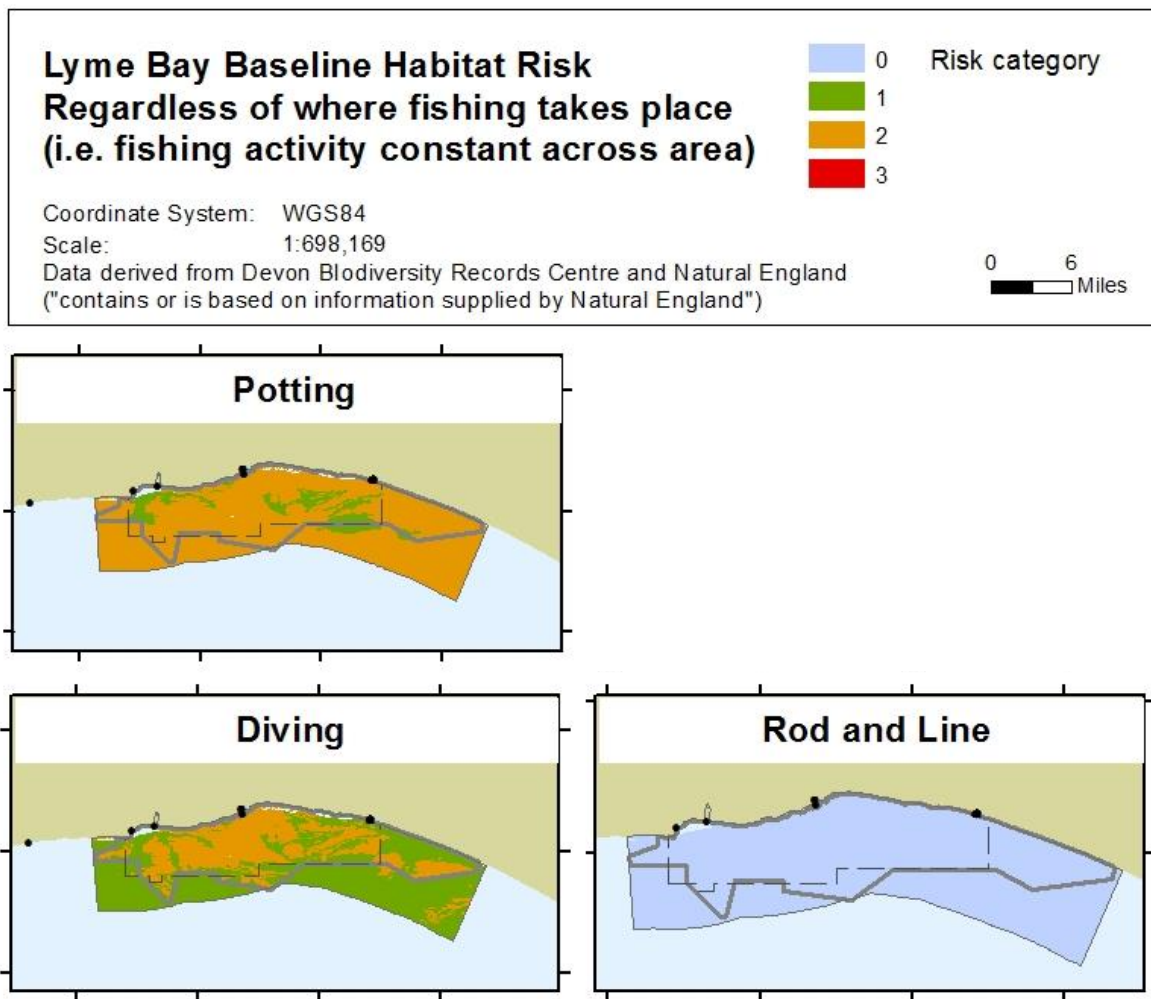
### Baseline for habitat maps

The baseline risk assessment has been carried out only for broad-scale habitats as these have full coverage data. The baseline does not consider where particular fishing gears take place, nor what management is in place, and as such forms a baseline to inform management. By assessing the whole AOI for the potential risk, this allows future management scenarios / practices to be drawn up. In addition, this allows assessment of the habitats against future fishing activities that may change from the current. By looking at the baseline risk, this mitigates against the use of sightings based fishing activity data in the following assessment, which is biased by patrol effort.

Therefore **Figures D10 and D11** shows the potential risk habitats show to each fishing gear type, irrespective of the extent of the actual fishing activity locations. The relevant risk score



**Figure D10:** Baseline risk of habitats based on uniform fishing activity (hypothetical)



**Figure D11:** Baseline risk of habitats based on uniform fishing activity (hypothetical)

for each habitat (**Table D7**) is allocated to each habitat on the map. Note that some fishing gears shown overlap in activity type due to the different source data and need to map all types provided. Further detail on the methodology is available in **Appendix F**.

As expected, and already mitigated through legislation and management measures, the baseline risk assessment shows highest (RED) risk in the Designated Area and cSAC to towed bottom gear (first four maps: trawling, dredging/scalloping).

The remainder of the gears present mostly full coverage AMBER risk between potting and diving activities, should these take place. These mostly cover non-reef areas, i.e. areas not designated for conservation but of value as a feeding resource to different species.

### Baseline for uniform (non-spatially varying) features

However there are a number of features that cannot be represented spatially across the Lyme Bay AOI due to lack of data and their highly mobile nature, and instead are considered

to have full coverage. These should be taken into account when assessing the risk maps as for example an orange risk in habitats for netting is added to by a significant greater risk from mobile species, whereas this is not the case for say diving. However it is important to note that the aggregated risk scores are not equal to the scale of risk, but act more as an indicator to the scale of potential interactions.

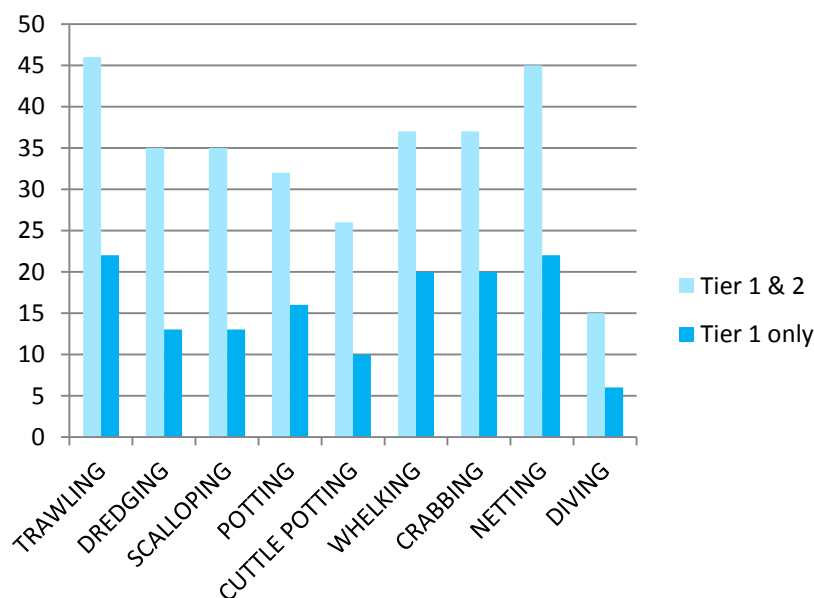
**Figure D12** shows the number of potential interactions for mobile species both for Tier 1 (dark blue) and combined Tier 1&2 species (light blue). These have a similar pattern except Tier 1 species only show greater significance for potting relative to other fishing gears (after trawling and netting). Given that Tier 1 is the focus of this assessment, these results would indicate that trawling, netting and potting pose the largest potential risk to species.

Whilst the impacts from different fishing activities to mobile species have already been provided in the risk matrix, this is further summarised in the conclusions section.

### Risk based on spatial interaction of features and fishing gear types

As the baseline risk shown above is only the potential and the actual risk depends on where fishing activities take place, this section assesses the spatial overlay between features and fishing gears. Wherever these coincide, the matrix scores are assigned to the feature in the maps. Further technical detail on the methodology is available in **Appendix F**.

Clearly, the location and nature of fishing activity is also governed by management practice. This is addressed in the main report. The purpose of this habitat risk assessment is to show what the risk may be, based on the spatial evidence of feature and fishing activity locations, before these management practices are assessed.



**Figure D12:** Aggregated risk scores for features that have a uniform presence across the Lyme Bay AOI, i.e. mobile species

**Figure D12** includes all fish, mammals, turtles and birds\*: dark blue indicates Tier 1 species where there was strong spatial and temporal evidence; light blue indicates Tier 1&2 species where evidence was weaker.

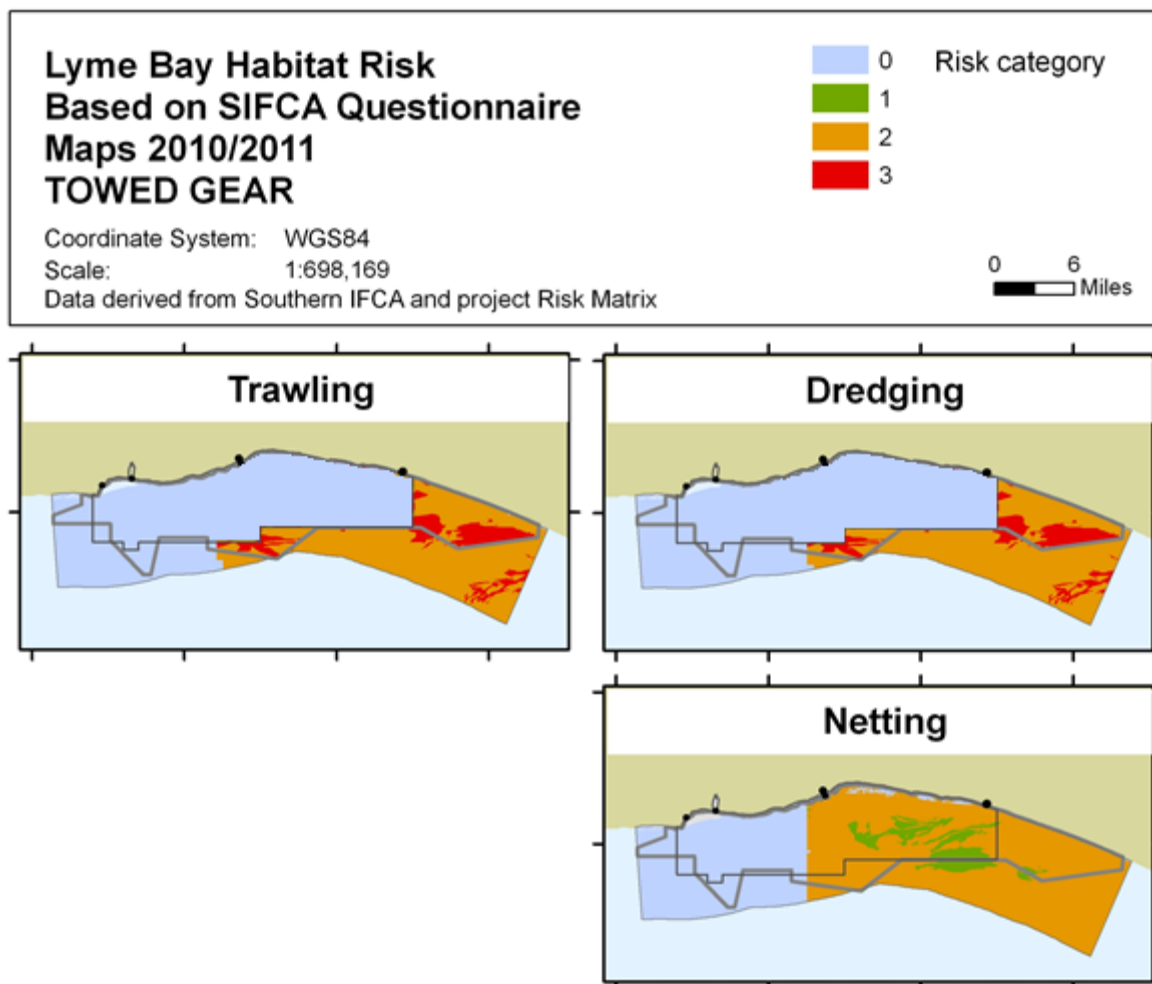
Due to the different types of fishing gears provided in the source data and the use of more than one source in the assessment, there is some overlap between gear types.

*\* Birds do cover the whole AOI but as two species were selected for particular conservation importance these have also been assessed separately.*

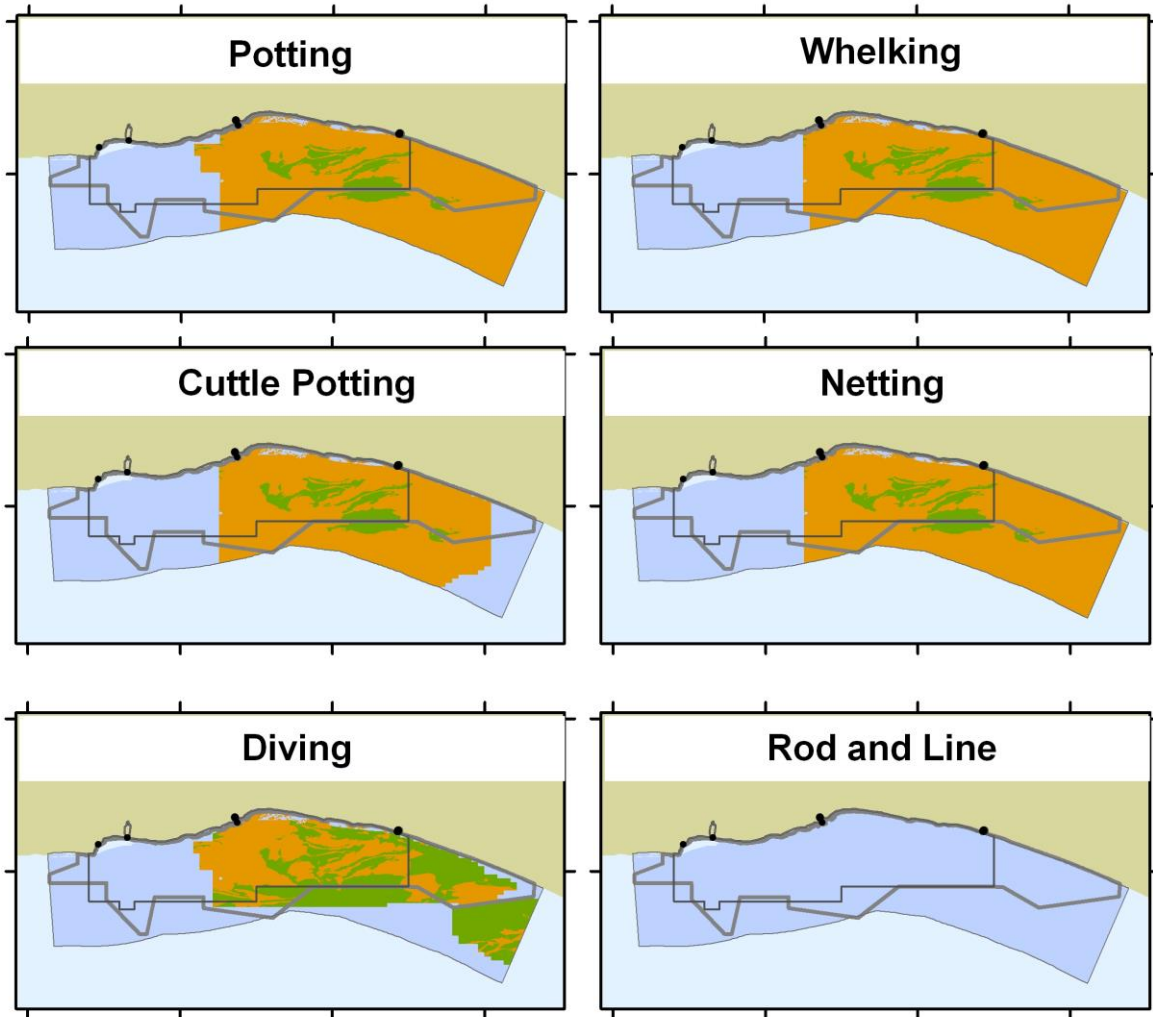
### Risk based on SIFCA questionnaire maps

Based on the Southern IFCA questionnaire fishing activity maps, as presented separately above, the spatial evidence indicates a risk to broad scale habitats as shown in **Figures D13** and **D14** below. This has been mapped on the basis that fishing activity is present if one or more fishermen responded to the questionnaire for the given gear type for any area.

The minority RED risk areas are the marginal reefs in the southeast of the project Area of Interest (outside of the Designated Area) that are exposed to trawling and dredging. The gear activities in these non-closed areas otherwise result in AMBER risk. The potting and netting activities all present an AMBER risk across the AOI where fishing data is available (i.e. biased towards the east), except for the areas of coarse sediment which are GREEN (low risk). Diving presents a slightly different pattern with all reef areas at AMBER and the remaining areas at GREEN. However this represents commercial diving and it is likely to be far less at risk than shown in reality, depending on what divers are targeting within the reef habitats.



**Figure D13:** Current risk of habitats based on recent fishing activity (SIFCA questionnaire map): Towed gear



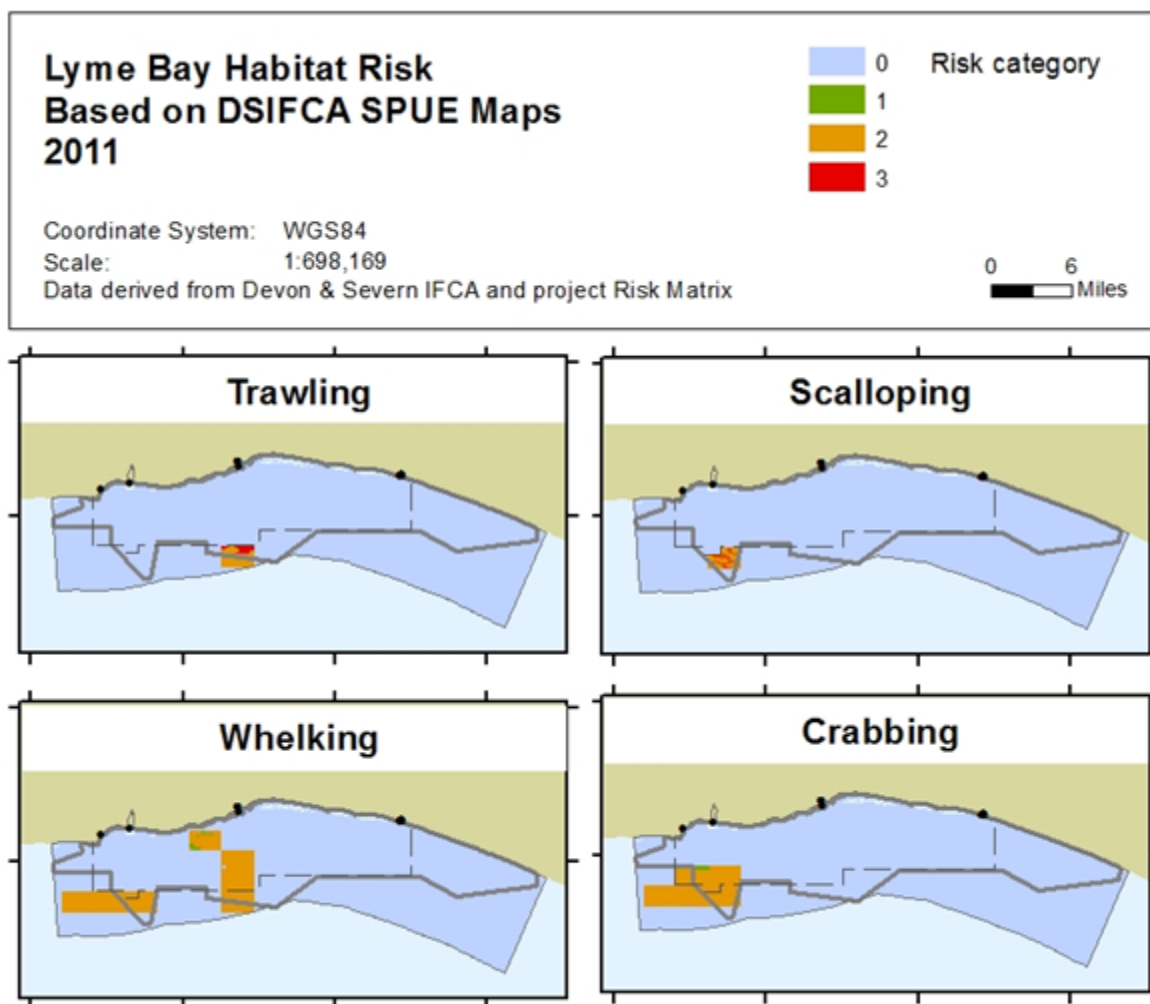
**Figure D14:** Current risk of habitats based on recent fishing activity (SIFCA questionnaire map): Non-towed fishing

### Risk based on DSIFCA SPUE maps

Based on the Devon and Severn IFCA SPUE (sightings per unit effort) fishing activity maps, as presented separately above, the spatial evidence indicates a risk to broad scale habitats as shown in **Figure D15** below. This has been mapped on the basis that fishing activity is present if the SPUE value is greater than zero.

Due to the reduced coverage of fishing activities by the SPUE data compared to the SIFCA questionnaire (which may be over-representative to avoid specific site identification), there is a marked difference in area assessed for DSIFCA. Whilst this does not necessarily provide the full actual area of risk, those areas that are shown have high confidence, due to a confirmed sighting of fishing taking place for a specific gear type.

However as shown, what little of the AOI is shown as at risk this is almost entirely AMBER risk, generally for non-towed gears.



**Figure D15:** Current risk of habitats based on recent fishing activity (DSIFCA SPUE map)

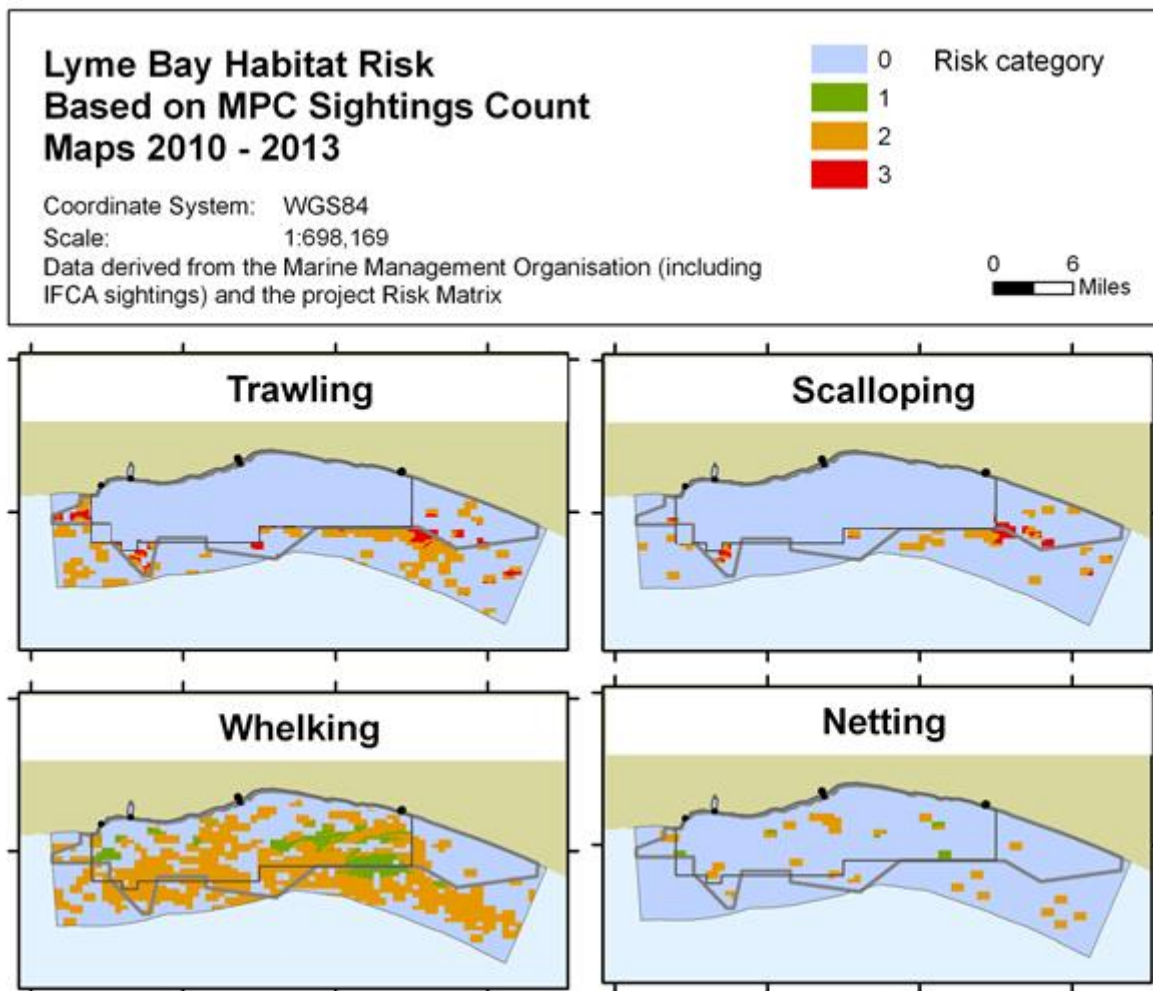


## Risk based on MPC sightings maps

### Habitat

Based on MPC's sighting based maps (presence/absence of fishing activity), as presented separately above, the spatial evidence indicates a risk to broad scale habitats as shown in **Figure D16** below. This has been mapped on the basis that fishing activity is present if the number of sightings for vessels actually fishing (i.e. not travelling to fishing grounds) is 1 or above. Fishing gear types have been generalised as per the IFCA fishing data for comparison.

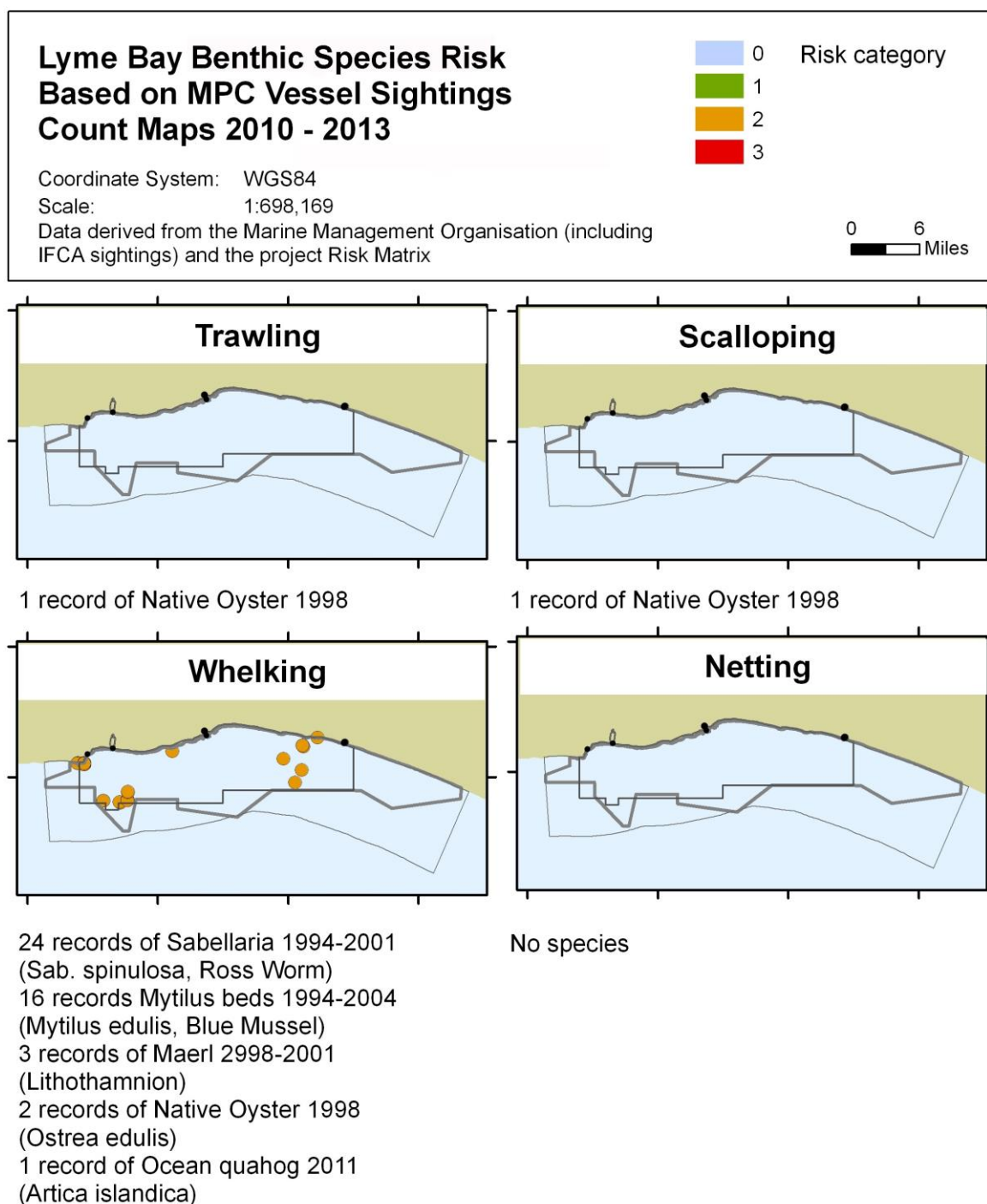
As with the DSIFCA based fishing activity, some trawling and scalloping occurs with RED risk outside of the Designated Area boundary, but with greater coverage. As this is primarily an overspill from the closed areas and as these risk areas are mostly now managed for the AOI as a whole, it is of greater note that whelking poses a widespread risk of AMBER across most of the AOI, with some emphasis towards the areas further offshore between 3 and 6nm. Netting has a very small footprint of generally AMBER risk spotted uniformly across the AOI.



**Figure D16:** Current risk of habitats based on recent fishing activity (MPC sightings map)

## Benthic Species

The risk of benthic species to fishing activity based on the MPC sightings map shows that, spatially, there are few occurrences of both fishing activity and species where the combination results in a risk, as shown in **Figure D17**. The only risks emerging are for Tier 2 species (i.e. those with weak evidence) for whelking, which presents an AMBER risk. This is concentrated on the interaction between whelking and *Sabellaria* (24 species records) and *Mytilus*



**Figure D17:** Current risk of benthic spp. based on recent fishing activity (MPC sightings map)

(mussel, 16 records) reef/bed forming species. These species recordings are only 'potential' reefs/beds as the data is restricted to abundance numbers of individual species as opposed to observation of an actual reef/bed. However many of these records are significantly abundant so have potential to indicate or form reefs/beds. Whilst the *Mytilus edulis* species is protected both as a *Mytilus* bed and singular species, Sabellaria species are only protected when forming reefs (as detailed in the conservation table spreadsheet, see **Appendix E**).

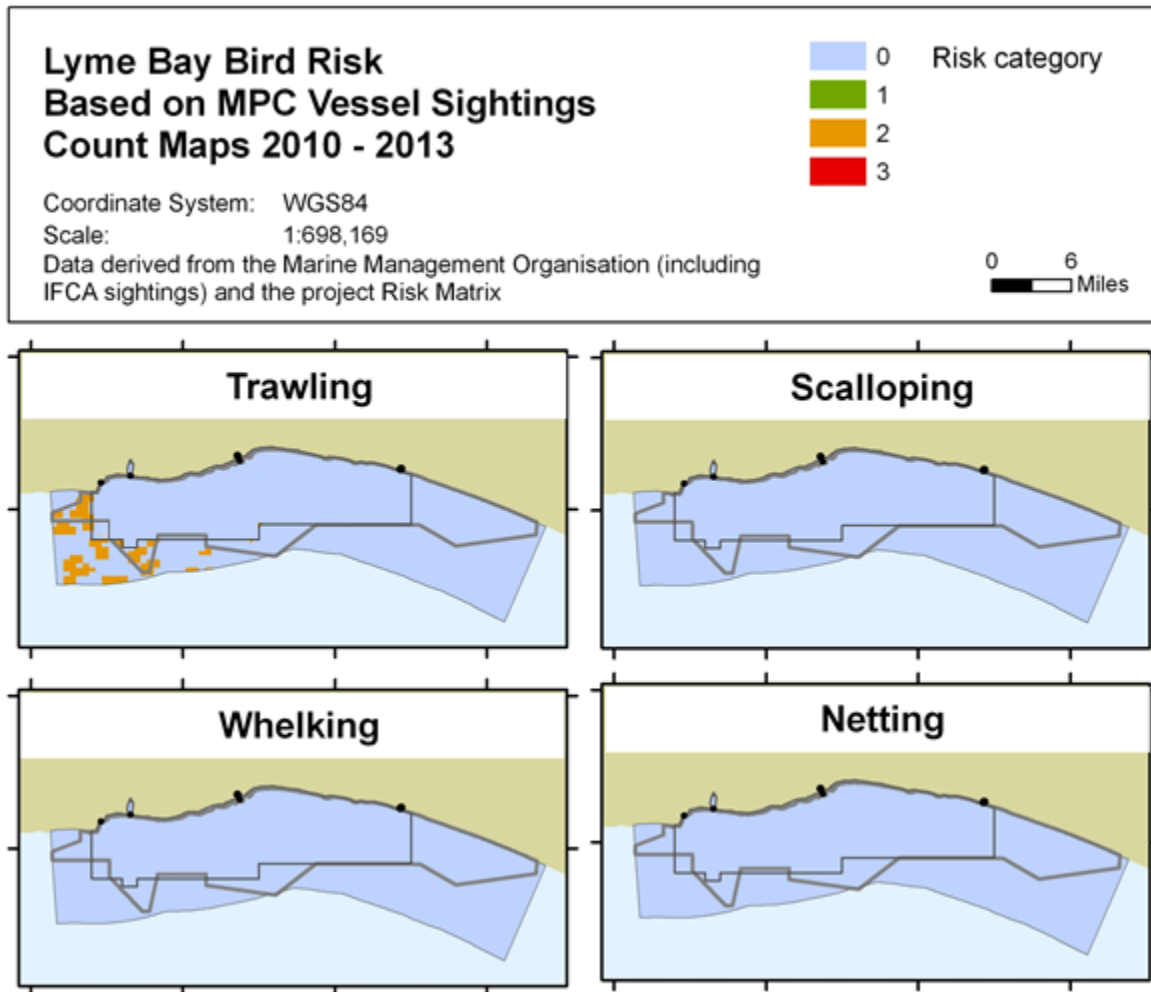
In addition, whelking was shown to interact with Tier 2 species *Maerl* (3 records), Native Oyster (2) and Ocean quahog (1); whilst there is only one species record of Ocean Quahog interacting, this is relatively recent (2011). These are all Tier 2 species.

In summary, there are no Tier 1 benthic species that interact with current fishing activity, according to the available evidence used. However there are some cases of Tier 2 interactions though these are not supported by strong evidence to necessarily warrant management and would benefit from greater survey effort to confirm current presence / abundance and whether actual reef/beds.

### **Birds**

Some of the bird species assessed, both from the plunge and pursuit diver group and surface feeding group (both forming Tier 1 species groups), were found to have foraging distances from their breeding grounds / territory that extended across the whole AOI. Therefore it should be considered that the whole AOI is at risk according to these bird groups, according to the risk categories presented in **Table D7**: these show both bird groups are at AMBER risk to potting, cuttle potting and whelking; whilst for trawling and netting surface feeding birds are at GREEN risk and pursuit and plunge diving birds at AMBER risk (all other feature-gear combinations are BLUE).

However some of the species were selected to be assessed as stand along species as well, as detailed in the previous section. **Figure D18** therefore shows the results for these selected bird species, again based on their foraging distances where within the AOI: Common Guillemot, Great Cormorant, and Little Tern. As these were found mostly across the western part of the AOI it follows that the majority of risk is to the west, only found when interacting with trawling. As with previous trawling interactions with other species, this is mainly on the periphery of the Designated Area and cSAC. This interaction is drawn from species within Tier 1 (Common Guillemot and Great Cormorant).



**Figure D18:** Current risk of birds based on recent fishing activity (MPC sightings map)

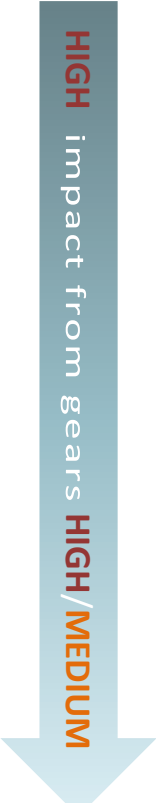
### Cumulative Impact

Multiple gear types at one location do not mean increased impact necessarily (Eno et al., 2013; Halpern et al, 2008), though this is more applicable when considering a single species type, e.g. benthic. Resulting from this, a cumulative impact of gear types has not been carried out as would be best informed through a site level assessment. However it would be possible to use combined gear risks at any one location to indicate the number and level of potential interactions requiring further assessment.

## Summary of Risk


The risks of different gear types to each habitat and species assessed are shown in **Table D9** in descending order of overall risk, i.e. the first is at risk the most and from the most gears (should they occur), the least at risk the last. Where the conservation status has important legal implications to users of the sea, these are marked by three asterisks \*\*\*. Conservation status and comment are summary and outline only. For full implication of the conservation status see **Table D2**. NERC habitats of principle importance, aside from subtidal reef, have not been noted due to their full coverage over the AOI. The table only includes Tier 1 species which have strong spatial and temporal evidence.

**Table D9:** Tier 1 Habitat and Species Conservation Status & Implications

	SPECIES/ GROUP	RISK SUMMARY	CONSERVATION STATUS	COMMENT ON CONSERVATION STATUS
	Subtidal bedrock & stony reef	Reefs are likely to be at RED risk to towed mobile gear in the southeast area outside of the cSAC/Designated Area; and AMBER risk from potting and netting across the whole AOI. Sightings data indicate whelking is of greatest intensity, especially further offshore.	i) Habitat Regulations 2010 / EC Habitats directive [Species that are indicative of an Annex I Habitat (protected through SACs)]***	Habitat Regulations so legally requires conservation, addressed by SAC network in England and feature of the Lyme Bay and Torbay cSAC. Hab Regs 2010 precludes any intentional injury or death to species or disturbance to habitat whether site designated or not.
Pink Sea-fan	Scattered within the cSAC on different reef/substrate areas with AMBER risk due to potting	i) English NERC List [Species of Principle Importance] *** ii) IUCN Red List [VULNERABLE] iii) OSPAR (2008) [Threatened and Declining] iv) UK Conservation Status (Rare & Scarce) list [Nationally Scarce] v) Wildlife & Countryside Act 1981 [Schedule 5(9) Animals that are protected] ***	Both NERC and W&CA 1981 so legally preclude any intentional injury or death to species or disturbance to habitat.	

<p>HIGH/MEDIUM impact from gears</p> <p>MEDIUM/LOW</p>		and netting activities.		
	Plaice	RED risk for all bottom towed gears and netting, AMBER for all other gears, except GREEN for diving	<ul style="list-style-type: none"> <li>i) English NERC List [Species of Principle Importance] ***</li> <li>ii) IUCN Red List [Least Concern]</li> </ul>	NERC precludes any intentional injury or death to species or disturbance to habitat
	Atlantic Cod	RED risk for trawling and netting, AMBER for all other gears, except GREEN for diving	<ul style="list-style-type: none"> <li>i) OSPAR (2008) [Threatened and Declining]</li> <li>ii) IUCN [Vulnerable]</li> </ul>	
	Basking Shark	RED risk for trawling and netting, AMBER for all other gears, except GREEN for diving	<ul style="list-style-type: none"> <li>i) Bern Convention [Strictly protected Fauna]</li> <li>ii) Bonn Convention [Strict Protection &amp; Multilateral agreements]</li> <li>iii) EC-CITES [Species that may become threatened with extinction unless trade is subject to strict regulation]</li> <li>iv) English NERC List [Species of Principle Importance] ***</li> <li>v) IUCN Red List [Vulnerable]</li> <li>vi) OSPAR (2008) [Threatened and Declining]</li> <li>vii) Wildlife &amp; Countryside Act 1981 [Animals that are protected] ***</li> </ul>	Both NERC and W&CA 1981 so legally precludes any intentional injury or death to species or disturbance to habitat
	Whiting	RED risk for trawling, AMBER for all other gears, except GREEN for diving	<ul style="list-style-type: none"> <li>i) English NERC List [Species of Principle Importance] ***</li> </ul>	NERC precludes any intentional injury or death to species or disturbance to habitat
	Bottlenose Dolphin	RED risk for trawling and netting, AMBER for other bottom towed gear, GREEN for all other gears	<ul style="list-style-type: none"> <li>i) Bern Convention [Strictly Protected Fauna]</li> <li>ii) Bonn Convention [Multilateral Agreements &amp; The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas]</li> <li>iii) Cons. of Hab&amp;Spp Regs 2010 [European protected species of animals] / Habitats Directive [Annex IV Species European protected species - strict protection]***</li> </ul>	Both NERC and W&CA 1981 so legally precludes any intentional injury or death to species or disturbance to habitat Hab Regs 2010 precludes any

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">MEDIUM/LOW</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">impact from gears</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">LOW</p>			<ul style="list-style-type: none"> <li>iv) EC-CITES [Species that may become threatened with extinction unless trade is subject to strict regulation]</li> <li>v) IUCN Red List [Least Concern]</li> <li>vi) English NERC List [Species of Principle Importance] ***</li> <li>vii) Wildlife &amp; Countryside Act 1981 [Animals that are protected] ***</li> </ul>	intentional injury or death to species or disturbance to habitat whether site designated or not.
	Dolphins & porpoises	RED risk for netting, AMBER for all bottom towed gear, GREEN for all other gears	<ul style="list-style-type: none"> <li>i) Bern Convention [Strictly Protected Fauna]</li> <li>ii) Bonn Convention [Multilateral Agreements &amp; The Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas]</li> <li>iii) Cons. of Hab&amp;Spp Regs 2010 [European protected species of animals] / Habitats Directive [Annex IV Species European protected species - strict protection &amp; for Harbour Porpoise only Annex II Species (Protected through SACs)]***</li> <li>iv) EC-CITES, OSPAR (2008) [Species that may become threatened with extinction unless trade is subject to strict regulation]</li> <li>v) English NERC List [Species of Principle Importance] ***</li> <li>vi) IUCN Red List [Least Concern]</li> <li>vii) Wildlife &amp; Countryside Act 1981 [Animals that are protected] ***</li> </ul>	Both NERC and W&CA 1981 so legally precludes any intentional injury or death to species or disturbance to habitat Hab Regs 2010 precludes any intentional injury or death to species or disturbance to habitat whether site designated or not.
	Seals	AMBER for trawling, potting (incl. cuttle potting, whelking, crabbing) and netting	<ul style="list-style-type: none"> <li>i) Bern Convention [Protected fauna (some exploitation allowed)]</li> <li>ii) Bonn Convention [not applicable to UK waters]</li> <li>iii) Cons. of Hab&amp;Spp Regs 2010 [European protected species of animals] / Habitats Directive [Annex II Species (Protected through SACs) &amp; Annex V Species Subject to managed exploitation measures]***</li> <li>iv) IUCN Red List [Least Concern]</li> </ul>	Hab Regs 2010 precludes any intentional injury or death to species or disturbance to habitat whether site designated or not.
	Pursuit & plunge birds	AMBER for trawling, potting (incl. cuttle potting whelking, crabbing) and netting	<ul style="list-style-type: none"> <li>i) Bern Convention [Strictly protected fauna &amp; Protected fauna (some exploitation allowed)]</li> <li>ii) Bonn Convention [Multilateral agreements &amp; African-Eurasian Waterbird Agreement]</li> <li>iii) Cons. of Hab&amp;Spp Regs 2010 [European protected species of animals] / Birds Directive [Subject to special conservation measures (protected through SPAs) &amp; Some hunting allowed as long as conservation efforts are not jeopardised (certain member states only)]***</li> <li>iv) English NERC List [Species of Principle Importance] ***</li> <li>v) IUCN Red List [Critically endangered &amp; Least Concern]</li> <li>vi) OSPAR (2008) [Threatened and Declining]</li> </ul>	NERC precludes any intentional injury or death to species or disturbance to habitat Hab Regs 2010 precludes any intentional injury or death to species or disturbance to habitat whether site designated or not.



			<ul style="list-style-type: none"> <li>vii) UK Cons. Status (Birds) {Red, Amber, Green}</li> <li>viii) Wildlife &amp; Countryside Act 1981 [Birds which are protected by special penalties at all times]</li> </ul>	
Surface feeding birds	AMBER for potting (incl. whelking and crabbing), GREEN for trawling and netting, BLUE for all other gears	<ul style="list-style-type: none"> <li>i) Bern Convention [Protected fauna (some exploitation allowed)]</li> <li>ii) Bonn Convention [African-Eurasian Waterbird Agreement]</li> <li>iii) Cons. of Hab&amp;Spp Regs 2010 [European protected species of animals] / Birds Directive [Some hunting allowed as long as conservation efforts are not jeopardised (EU)]***</li> <li>iv) English NERC List [Species of Principle Importance] ***</li> <li>v) IUCN Red List [Least Concern]</li> <li>vi) OSPAR (2008) [Threatened and Declining]</li> <li>vii) UK Cons. Status (Birds) [Red, Amber, Green]</li> </ul>	Hab Regs 2010 precludes any intentional injury or death to species or disturbance to habitat whether site designated or not.	



# Discussion and Conclusions

## Summary of Findings

The habitat risk assessment has drawn on and been dependant on the available spatial evidence for habitats and species; and fishing activity data. The purpose was to assess where these interact to flag up areas of risk in the Lyme Bay Area of Interest. This AOI was set for the project as an area extending out to 6nm and encompassing the Designated Area and the Lyme Bay part of the Lyme Bay and Torbay candidate Special Area of Conservation (cSAC, though formally termed a Site of Community Importance, SCI, at present).

## Habitats

Of all the habitats assessed, only Annex I reefs are designated for the site. All habitats were included however to provide a full coverage assessment and inform any future assessment of species' feeding grounds.

A baseline risk assessment was carried out for habitats where it was assumed for each fishing activity that it takes place across the entire AOI. This helps inform future management without prejudice to just those areas that are fished today or any biases in the methods used to collect locational fishing data. The highest risk (RED) was found in the Designated Area where the reefs mostly occur, for towed bottom gear (trawling, dredging/scalping); however this is mitigated by ban of such activities by current legislation for the area. For the remainder of gears almost full coverage medium (AMBER) risk is indicated between potting and diving activities, should these take place.

Considering where fishing activity takes place currently, however, does help identify those areas we can be more confident in saying there is a real risk occurring now. Based on the 2010/11 Southern IFCA questionnaire fishing activity maps, which have data for the east and middle of the AOI, there are only a minority of areas where trawling and dredging are found to be at high (RED) risk, on the reefs to the southeast of the AOI that are not protected by the Designated Area or cSAC. However the MMO and IFCA sightings based fishing activity data (2010-13) also reveal RED risk areas for these same gears along the outside periphery of the Designated Area, especially inside the cSAC. As this is primarily an overspill from the Designated Area and as these risk areas are now managed through IFCA byelaws (see main report), this is not an issue. However it does require some monitoring to assess scale of pressure from fishing activities (i.e. amount of time fishing takes place). The remainder of the cSAC is otherwise shown to be at AMBER risk wherever fishing data exists (the majority of the area), owing to the same risk assigned to the various substrates found here including muddy sand, gravel and sand, coarse sediment and mixed sediments.

The potting and netting activities from the SIFCA questionnaire data all present an AMBER risk across the AOI for various substrate types (where fishing data is available). With

exception to this are areas of coarse sediment which are GREEN (low risk). The sightings data show some emphasis within this pattern towards the offshore area between 3 and 6nm. Diving presents a slightly different pattern with all reef areas at AMBER and some at GREEN, though the more offshore environment has no risk (BLUE). However this represents commercial diving and it is likely to be far less at risk than shown in reality, depending on what divers are targeting within the reef habitats.

### Benthic / Epibenthic Species

The only locations found to contain the selected benthic / epibenthic species, given the data available, were within the cSAC. Therefore there is no evidence for selected species being at risk from towed bottom gear which is restricted here through the Designated Area restrictions and IFCA byelaws for the wider cSAC.

Tier 1 of the selected species, i.e. those with stronger evidence sources including Pink Sea-fan *Eunicella verrucosa* and the sea slug *Tritonia nilsodhneri*, were found scattered around the cSAC on different reef/substrate areas. As the Southern IFCA questionnaire data show the whole cSAC to be used by potting and netting activities, this indicates all locations are at AMBER risk. However the sightings based data indicate no risk to these species, which may (or may not) be owing to the reduced coverage in data from patrol effort and increase from generalising in questionnaire data.

The Pink Sea-fan is part of the Annex I community for which the cSAC is designated; and is separately listed under OSPAR (2008), IUCN Red List, English NERC List, Wildlife & Countryside Act 1981 and lastly the UK Conservation Status (Rare & Scarce) list.

Tier 2 of the selected species, i.e. those with reduced evidence sources including Sabellaria species, Maerl species, Native Oyster, Blue Mussel beds, Ocean Quahog and Sea-fan Anemone, again have AMBER risk across the cSAC, but for whelking activities only. The sightings data confines this to a cluster east and southeast for West Bay out to 4nm offshore; and a few records west of Lyme Regis, west of Beer and another cluster towards the edge of the south western boundary of the Designated Area. Whilst Maerl, Native Oyster and Ocean Quahog only occur at AMBER risk for up to 3 records / locations each, the potential reef/bed forming species *Sabellaria spinulosa* and *Mytilus edulis* each occur with 24 and 16 records respectively. The relevance of this depends on whether the species are forming reefs/beds here (which is not indicated in the data) as these are of most interest in terms of conservation. However the *Mytilus edulis* species is protected as a singular species. Therefore *Mytilus edulis* is of the highest concern of the Tier 2 benthic and epibenthic species.

*Mytilus edulis* is listed on the Habitats Directive, OSPAR (2008) and the English NERC List.

## Mobile species: Fish, marine mammals, turtles and birds

Species from each of the bird groups, pursuit & plunge and surface feeding birds, were found to use the whole of the project AOI for foraging and are discussed below. However three individual bird species that fall within these groups were found to have discrete spatial footprints over the western AOI. This included the Common Guillemot, Great Cormorant (both pursuit and plunge), and Little Tern (surface feeder). The Common Guillemot and Great Cormorant are pursuit and plunge birds and have AMBER risk to each of trawling, potting (including cuttle potting, whelking and crabbing) and netting, whilst the Little Tern is a surface feeding bird with the same except trawling and netting drop to a GREEN risk.

All other mobile species selected through conservation status were assumed to have a spatial footprint across the whole of the AOI, due to lack of data available on spatial preference. At a high level, the gear types most at risk from mobile species are trawling, potting and netting. However of most risk are Plaice, followed next by Atlantic Cod then Whiting. Lower down the rung are Bottlenose Dolphin and the Dolphins and Porpoise group. Lastly, at the lower end of risk, are Sand Goby, Whales, Seals, pursuit and plunge birds and surface feeding birds.

## Discussion

An extensive review of the source data was carried out and it is considered that the data used was the best available data at the time of consultation (2012/3). However the risk maps produced are wholly reliant on this data and whilst some are highly accurate, e.g. recent records of point locations for species, other data is less so, or with gaps. For example data with low confidence includes species data which is relatively old, though the more recent records have been used where possible; and fishing activity where this may have been recorded subjectively, e.g. questionnaire responses may protect specific fishing grounds, with areas delineated being generalised. Some of the critical data to show where features are at risk also has gaps in it, principally the sightings based fishing activity data. The results and interpretation need to be undertaken with a clear understanding of these caveats.

The key value of this exercise is that it establishes a baseline for the Lyme Bay Working group. In time, a number of schemes will help address these data gaps, whether planned for other purposes, e.g. the Fully Documented Fishery project; or designed specifically to further the work presented in this report, e.g. the University of Plymouth potting study, both of which are underway. The Fully Documented Fishery project for example will allow inshore vessels to record locations through Vessel Monitoring Systems (iVMS) for the first time, post trials. This offers the industry an opportunity to be able to present an accurate picture of its spatial footprint of activity, ensuring the risk assessed and managed is real, ensuring better protection in Lyme Bay to habitats and species. The potting study is also a

good example of the type of research that we urgently need to make spatial risk assessment tools work, especially if we want to develop meaningful spatial plans for our sensitive sites and to enable fishing to take place at sustainable levels.

The risk assessment based on the current data made available is necessarily broad-brush due to the constraints in the data and our understanding of the effects of fishing under different levels of activity. However it does expand upon the EMS revised approach to the commercial fisheries Risk Matrix to not only assess all features listed in the Habitats Directive (whether the site is designated for them or not) as well as other features with conservation status from other legislation / lists, e.g. this now includes mobile species which are known to use the Lyme Bay area. This has been informed through a considerable literature review that shows clear evidence for interactions between the species and fishing gears found in Lyme Bay.

The next step (as provided in the main report) is to utilise the results of the habitat risk assessment in an analysis of the current management practices operating in Lyme Bay (such as the Designated Area, Lyme Bay and Torbay Prohibited Fishing Areas<sup>15</sup> and IFCA Byelaws), as well as put forward options for future management. In a number of cases, these management practices are already in place to help mitigate these risks and so it is important that both this Appendix and the main report are read together. The final management assessment will be informed by the fisheries sustainability assessment, a separate Appendix completed following sign off of the habitat risk assessment.

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<sup>15</sup>[http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme\\_bay/prohibited\\_sensitive\\_a.pdf](http://www.marinemanagement.org.uk/protecting/conservation/documents/lyme_bay/prohibited_sensitive_a.pdf)

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