

EXPLANATORY MEMORANDUM TO

THE LYME BAY DESIGNATED AREA (FISHING RESTRICTIONS) ORDER 2008

2008 No.1584

1. This explanatory memorandum has been prepared by the Department for Environment Food and Rural Affairs and is laid before Parliament by Command of Her Majesty.

This memorandum contains information for the Joint Committee on Statutory Instruments.

2. **Description**

2.1 The objective of this order is to establish a closed area in Lyme Bay of the South West coast of England that will prohibit the use of certain damaging fishing practices that have a negative impact on important biodiversity in Lyme Bay. The closure is being established to protect high value biodiversity in Lyme Bay and in particular to protect nationally and internationally important rocky reefs and rare, threatened and valued species such as sunset cup coral, pink sea fan and several rare sponges.

3. **Matters of special interest to the Joint Committee on Statutory Instruments**

3.1 None

4. **Legislative Background**

3.1 Powers to establish the closure stem from sections 5, 5A and 15(3) of the Sea Fish (Conservation) Act 1967 as amended.

3.2 The closed area will prohibit the use of dredges for shellfish and demersal trawls in an area of approximately 60 square nautical miles of Lyme Bay as specified in the order. Other methods of fishing and recreational activities will not be prohibited.

5. **Territorial Extent and Application**

5.1 This instrument applies to England.

5.2 The instrument will apply measures to English, Welsh, Northern Irish, Scottish and Crown Dependency vessels when operating within the closed area.

6. **European Convention on Human Rights**

6.1 As the instrument is subject to negative resolution procedure and does not amend legislation, no statement is required.

7. **Policy Background**

7.1 Public consultation on measures to protect marine biodiversity in Lyme Bay from the impact of fishing with dredges and other towed gear ran from 7 September to 21 December 2007. The consultation was launched following advice from Natural England that voluntary measures to protect the biodiversity in Lyme Bay were failing to deliver protection from damaging fishing practices for the majority of the high value biodiversity in the bay. A good response to consultation was received with 108 substantive responses and over 7000 responses based upon conservation organisations' campaigns. A summary of responses to consultation was published on the Defra website on 7 March and is available from the contact details at section 9.

7.2 An Impact Assessment was completed following consultation and signed off by the Defra's Chief Economist on 14 of May. This provided a thorough breakdown of the costs and benefits of the closure based upon consultation responses and additional information and data gathered following the close of consultation.

7.3 The Minister considered the Impact Assessment and made his decision to prohibit dredging for shellfish and demersal trawls in the area of Lyme Bay specified in the order on 19 May 2008.

7.4 A 3 year project to monitor the rates of recovery of key species within the closed area and the economic impacts of the closure is being established by Defra. Interim reports will be provided to Defra throughout the term of the project with a final report anticipated in December 2010.

8. **Impact**

8.1 An Impact Assessment is attached to this memorandum.

9. **Contact**

Tim Andrews at the Department for Environment Food and Rural Affairs Tel: 0117 372 8320

Summary: Intervention & Options

Department /Agency: Defra	Title: Impact Assessment of measures to protect marine biodiversity in Lyme Bay	
Stage: Final Proposal	Version: 1	Date: 9 May 2008
Related Publications: University of Plymouth, EROCIPS Report¹⁴, Homarus Report⁴, Seafish proposal to the MFA¹³		

Available to view or download at:

<http://www.>

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Lyme Bay is an area of the sea and seabed off the South West Coast of England. The Bay contains some of the UK's most important reef habitat. The Lyme Bay Reefs are considered to be both nationally and internationally important in conservation terms. The Reefs are also considered important for fishing, including fishing with towed gear. Government's nature conservation advisors, Natural England, have advised that the continuation of the use of towed gear in the area of the Lyme Bay Reefs is not sustainable if the reef system is to be protected. Without intervention, the Government considers that commercial pressures would lead some fishers to continue to pursue the stocks in the

To implement fisheries management measures that best protect the biodiversity of Lyme Bay. 60 square nautical miles of the Lyme Bay Reefs area would be protected from the damage caused by towed demersal fishing gears. This would maintain the conservation value of the reef habitat and the benefits derived from it, and would allow recovery of associated biological communities. Scallop dredgers and bottom trawlers would be excluded from the recommended area. Fishing using static gear and other activities (diving for scallops, scuba diving and sea angling for example) would be able to

Options considered included closing areas of around 12, 25, 60 and 85 square nautical miles of the Reefs to towed gears. Consideration was also given to allowing some otter trawling and pelagic mid-water trawling within the closed area. The recommended option is a variation of the 60 square nautical mile option from the consultation paper (see fig 1.1). All towed gears would be excluded from the recommended area with the exception of pelagic mid-water trawls. This option was chosen as it would enable the protection of the reef system and it was considered that on the

The Government is intending to establish a project to monitor the recovery of key species and habitats within the recommended area and the social and economic impacts of the recommended closure. This would initially be a three year project to commence in Summer 2008 with a final report in 2011.

Jonathan Shaw

19th May 2008

Summary: Analysis & Evidence

Policy Option: C2

Description: Closure of 60 square nautical miles of the Lyme Bay Reefs to towed demersal fishing gear

COSTS	ANNUAL COSTS		Description and scale of key monetised costs by ‘main affected groups’ Costs to fishing fleet currently active in the area from decreased potential landings in the first year of the closure of £229,991 within a range of £183,993 - 275,989; Non-scalloping adjusts fully after year 1; Scalloping does not adjust and when discounted at 3.5% over 20 years is £2,399,836. Annual enforcement costs faced by the MFA and the SFCs over 20 years totalling £817,720.
	One-off (Transition)	Yrs	
	£ 66,847	1	
Average Annual Cost (excluding one-off)			
£ 218,735			

Other **key non-monetised costs** by ‘main affected groups’ Possible increases in fuel and time costs of searching for and fishing in new areas; costs of impacts from displacement of fishing effort on other habitats and fisheries (increased gear conflict and pressure on existing fisheries), potential costs to the wider local economy.

BENEFITS	ANNUAL BENEFITS		Description and scale of key monetised benefits by ‘main affected groups’ No monetised figures are available for the benefits of the recommended closure, although significant benefits would be derived as stated below.
	One-off	Yrs	
	£		
Average Annual Benefit (excluding one-off)			
£			

Other **key non-monetised benefits** by ‘main affected groups’ Protection of one of the UK's most important reefs systems and the resulting wider ecosystem benefits for fishers and the UK public. Increased opportunities for commercial scallop diving and elimination of gear conflict for static fishing within the zone. Increased benefits of recreational activities and tourism within the zone.

Cost calculations assume closure would impact vessels recorded operating within the zone between 1997 and 2007. All 2007 towed gear landings for these vessels from the ICES rectangles 30E6 and 30E7 have been included and an assumption that 50% of these landings came from inside the recommended closed zone, although the recommended area only covers a small part of these rectangles. Landings in 2007 were comparatively high, so this estimate of costs is likely to represent an overestimate. Loss of crew wages and profits are assumed to account for 50% of total value of landings (calculated with a range of +/- 10%). Due to uncertainty on the speed & ease of adjustment of fishers to the closure costs have only been estimated for the 1st year for non-scallopers and over 20 years for scallopers. There is no estimate for knock on effects to the fish processing industry & wider economy.

Price Base Year	Time Period Years	Net Benefit Range (NPV) £	NET BENEFIT (NPV Best estimate)
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Lyme Bay				
2008 onwards				
MFA / SFCs				
What is the total annual cost of enforcement for these organisations?			£55,590	
Yes				
N/A				
What is the value of the proposed offsetting measure per year?			£ N/A	
What is the value of changes in greenhouse gas emissions?			£ minimal	
No				
Annual cost (£-£) per organisation (excluding one off)	Micro N/A	Small N/A	Medium N/A	Large N/A
	No	No		
0	0	0	0	0

Key: Annual costs and benefits: (Net) Present

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1. Introduction

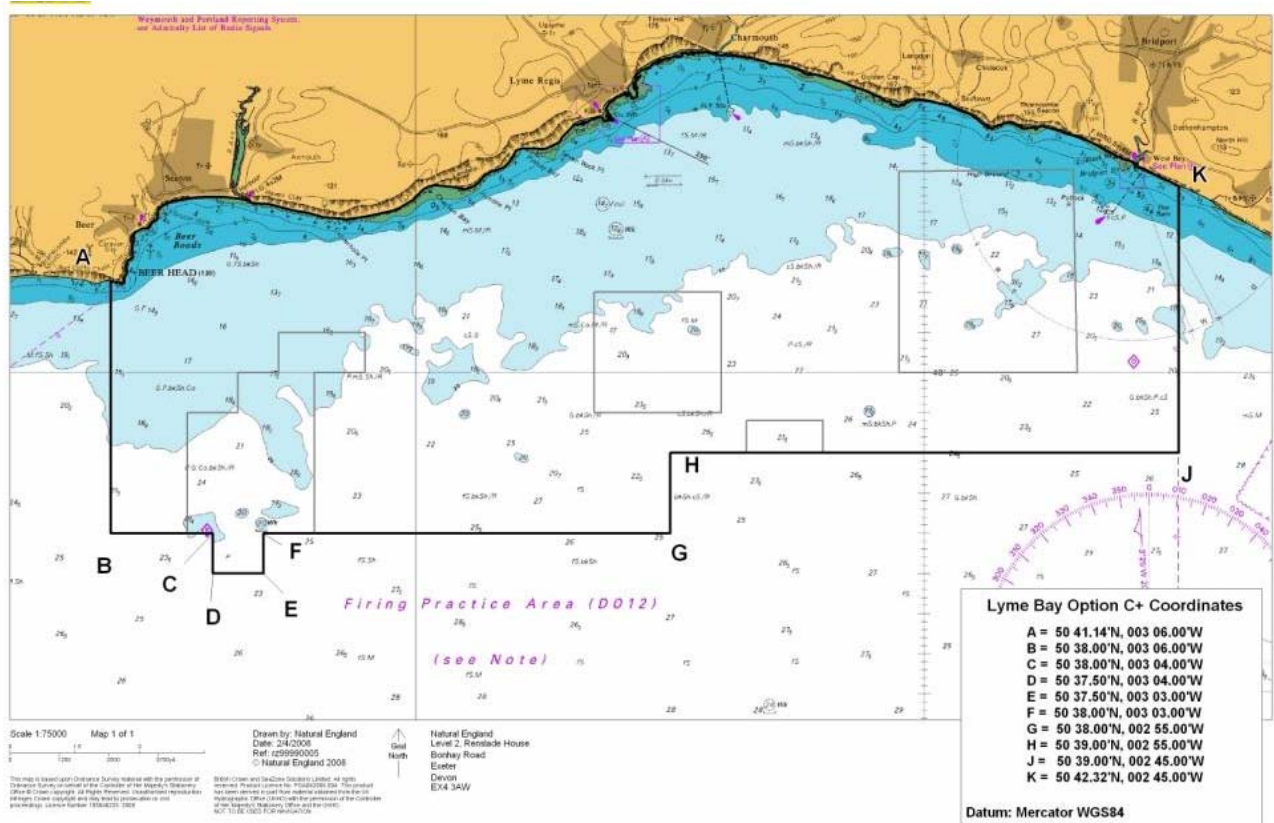
1.1 Lyme Bay is an area of the sea and seabed off the South West Coast of England. The Bay hosts some of the UK's most important reef habitat. The Lyme Bay Reefs are considered to be both nationally and internationally important in conservation terms. The Reefs are also considered important for fishing, including fishing with towed gear. Government's nature conservation advisors, Natural England, have advised that the continuation of the use of towed demersal gear in the area of the Lyme Bay Reefs is not sustainable if the reef system is to be protected.

1.2 This final Impact Assessment (IA) has been prepared to make an assessment of the benefits and costs of the recommended option. This Impact Assessment will also indicate why this option is being recommended rather than others considered. This Impact Assessment follows the public consultation which took place between 7 September and 21 December 2007. A summary of responses to this consultation was published on 7 March 2008 and is available at <http://www.defra.gov.uk/corporate/consult/lymebay-biodiversity/responses-summary.pdf>.

Recommended Option

1.3 The recommended option is a 60 square nautical mile closure of the area of the Lyme Bay Reefs to towed fishing gears with the exception of mid-water pelagic trawls. The recommended area is a variation of Option C from the consultation paper, which has been expanded to include an area of Beer Home Ground that is within the current voluntary closed areas (see fig 1.1). Table 1 summarises the key biodiversity benefits of the recommended option.

Figure 1.1 Proposed Area, showing current voluntary closed areas



Produced by Natural England

1.4 The recommended area has the greatest potential to quickly fulfill the Government’s stated aims of protecting marine biodiversity in Lyme Bay. It would allow some other activities to continue and even increase to some extent, including static gear fisheries, diving for scallops, scuba diving and sea angling. The closed area would protect the majority of the known high quality reef systems in the bay including approximately 78% of the reefs considered by Natural England to meet the criteria under the Habitats Directive for possible inclusion in a Special Area of Conservation (SAC). In effect this means that the recommended area would protect the majority of the known reef systems within the area of search identified in the recent Special Area of Conservation (SAC) identification work undertaken by Haskoning¹. This work forms part of Natural England’s ongoing programme to identify inshore SACs.

1.5 Government considers that the continued use of certain towed gear, and in particular scallop dredging, in the areas recommended for closure is not sustainable. The evidence for drawing this conclusion is summarised below in section 5 ‘Evidence Base’ and consists of a summary of the evidence describing the impact of towed gear on sensitive marine habitats and a summary of the ecological importance of Lyme Bay.

Table 1: Key Costs and Benefits

	% of known Annex I habitat protected	Restriction	Scale of Biodiversity Benefits
Option A	19	All towed gear excluded	Low: Small area of reef system protected. The area of these closures is likely to be too small to deliver viable populations of known rare and threatened species over the course of their life cycle without further measures being introduced (though some populations of rare species protected)
Option B	42	All demersal and dredged gear excluded Pelagic gear permitted	Moderate: A proportion, less than half, of known high quality reef system protected. The closure would not likely deliver a site that is large enough to support habitats and species at viable population levels and is unlikely to provide good connectivity with other protected areas. Protected area would therefore provide limited benefit for regional and national MPA network.
Recommended Option (C2)	78	All demersal and dredged gear excluded Pelagic gear permitted	High: Significant proportion of known high quality reef system protected including 78% of known internationally important reef. The recommended closure would deliver a site that is large enough to support habitats and species at viable population levels as well being located to ensure good connectivity with other protected areas. Protected area would therefore benefit regional and national MPA network through good connectivity. Important range of nationally rare and threatened species protected.

2 Rationale for Government intervention

2.1 Government intervention is required to ensure an improved outcome for society and the environment. Without intervention commercial pressures would lead some fishers to continue to pursue activities without adequate regard for the wider costs (on the environment and other users of the marine environment) of their actions. Fishers and the general UK public derive benefits from the reefs in Lyme Bay and the ecosystem goods and services that they provide. If fishing with towed demersal and scallop fishing gears continues then the benefit from ecosystem services would diminish. Thus, intervention is necessary to ensure protection of a valued resource.

2.2 The Government's vision for fisheries is set out in *Fisheries 2027, a long-term vision for sustainable fisheries*. In this publication the Government indicated that its overall priority for fisheries management is to get the best possible long-term economic benefits for society through effective management and moderate levels of exploitation, within the following two constraints:

- Fishing is managed according to an ecosystem approach, including use of the precautionary approach to make sure that healthy ecosystems are maintained and rare, vulnerable or valued species and habitats protected. This means more environmental protection than before, especially in the context of climate change and the need to increase the resilience of the marine environment.
- Access to fisheries continues to be available to small scale fishing vessels, even if in some cases that is not the most economically efficient way of harvesting the resource. This is because the wider economic, social and environmental benefits of small scale fishing can outweigh the comparative inefficiency in harvesting the resource and make a significant economic and social contribution to the lives of individuals and coastal communities, for example, by providing jobs, attracting tourists, providing high quality fresh fish and maintaining the character and culture of small ports throughout England.

(Fisheries 2027, a long-term vision for sustainable fisheries, p.6)

2.3 The Government considers intervention is necessary at Lyme Bay to ensure fisheries are managed within the above two constraints to ensure the best measures are adopted to protect the biodiversity of Lyme Bay. Whilst Government is committed to supporting small scale fishing vessels and the coastal communities they support, using certain towed mobile gear in the Lyme Bay Reefs area is considered not to be sustainable as its environmental impact is unacceptable.

3 Policy objectives and intended effects

3.1 The Government's vision for managing and conserving the marine environment includes:

‘the establishment of healthy marine ecosystems that protect rare, vulnerable or valued species and habitats’

(Fisheries 2027, A Long Term Vision for Sustainable Fisheries)

The policy objectives for Lyme Bay are to ensure the rare, vulnerable and valued species and habitats are protected through the effective management of fisheries. Where fisheries are not sustainable due to the damage they cause, Government considers action should be taken.

3.2 The recommended closure would protect 60 square nautical miles of the Reefs from the damage caused by the use of towed demersal and scallop fishing gears. This would maintain the conservation value of the reef habitat and the benefits derived from it. It would provide opportunities for recovery of associated biological communities, which would further increase the high biodiversity value of the area. In addition the area would protect the majority of Habitats Directive Annex I quality habitat recently identified within the area by Natural England and would provide a good basis for the management of the area if the Government were to decide to designate areas of the Reefs as an SAC following recommendations from Natural England in the summer.

4 The options

4.1 As part of public consultation three options were considered. Each would exclude scallop dredging and demersal trawling from certain areas of the reef, whilst allowing other activities (such as static gear fishing, scuba diving, diving for scallops and sea angling) to continue:

Option A was the ‘do nothing’ option and was based upon the voluntary agreement currently in place. This covers four closed areas totaling approximately 13 square nautical miles that were negotiated through cooperation between the relevant Sea Fisheries Committees, the fishing industry and Defra. However this option would protect only a limited amount of the valuable Lyme Bay reef system as the areas put forward were based solely on known pink sea fan populations at the time. Further survey work has shown that pink sea fans and other important reef communities occur in areas which are not protected by the existing closures. In its consultation response, Natural England has advised that this option does not protect enough of the high value biodiversity in the Bay. Government accepts this advice and this option is not being recommended.

Option B was proposed by Natural England (then English Nature) in August 2006. It involved a closed area to vessels using towed gear of 25 square nautical miles (made up of three distinct areas) but was proposed without prejudice to English Nature’s original advice (provided in May 2006 which now forms option C below) that an area of 60 square nautical miles should be closed to all vessels using towed gear. Option B was proposed on the basis that these three areas would protect solely the majority of surveyed pink sea fans but not the broader reef interest. This option therefore leaves large areas of high value biodiversity unprotected in the Bay and Natural England has advised that it therefore should not be recommended. Government accepts this advice and this option is not being recommended.

Option C is based upon the advice provided to Government by Natural England (then English Nature) in May 2006 and reiterated in their response to consultation. It recommends a closure to vessels using towed gear of an area of around 60 square nautical miles. This option would deliver protection for the high value biodiversity in Lyme Bay as it covers the known reef area with the most diverse marine biodiversity. This option would deliver national biodiversity protection requirements under the NERC Act and with 78% of the Annex I habitat that has been identified to date protected might also deliver the potential requirements of the Habitats Directive. This option however excludes part of Beer Home Ground that is included within the existing voluntary closures. For this reason it is not being recommended.

Following consideration of the consultation responses a number of additional options were considered, including:

Option C2, which would exclude towed demersal and scallop fishing gears from the same area as Option C, with the addition of a small additional area (0.3 square nautical miles) of Beer Home Ground, which is included within the existing voluntary closed areas (see fig 1.1). This would have additional biodiversity benefits compared to Option C and maintain greater consistency with the voluntary closures introduced after Natural England’s initial recommendation. The closure would be implemented through a Statutory Instrument with enforcement undertaken by fisheries enforcement bodies (most likely the Marine and Fisheries Agency and local Sea Fisheries Committees).

Option D, which was proposed by Natural England in their consultation response. This option would exclude towed demersal and scallop fishing gears from an area of approximately 85 square nautical miles, enclosing all of the habitat within the Lyme Bay Reefs identified by Natural England as Annex 1 quality, including those to the east of the Option C. This option is not being taken forward as the Government does not consider that stakeholders have had sufficient opportunity to consider and respond to the proposed closure of the additional area to the east of Option C2. There will be further opportunity to consider fisheries controls in this area if it is recommended by Natural England as part of a Special Area of Conservation for the protection of the Reefs.

4.2 The Government also considered whether there should be any exceptions to a prohibition on the use of towed gears within the recommended areas:

Light Otter Trawling

Consideration was given to allowing otter trawling by less powerful vessels in all areas except those currently protected under the voluntary agreement (Option A). This was considered in response to suggestions that:

- light otter trawling has been undertaken on the reefs for a number of years,
- light otter trawling would not affect the more sensitive areas of the reef as such trawls would necessarily avoid the more difficult areas of upstanding reef where biodiversity is greatest
- trawling would take place in areas already irreversibly damaged by heavier gears

Light otter trawls do generally cause considerably less damage than other demersal towed gears, but they can still have an impact (see para 5.2). In relation to the Lyme Bay Reefs:

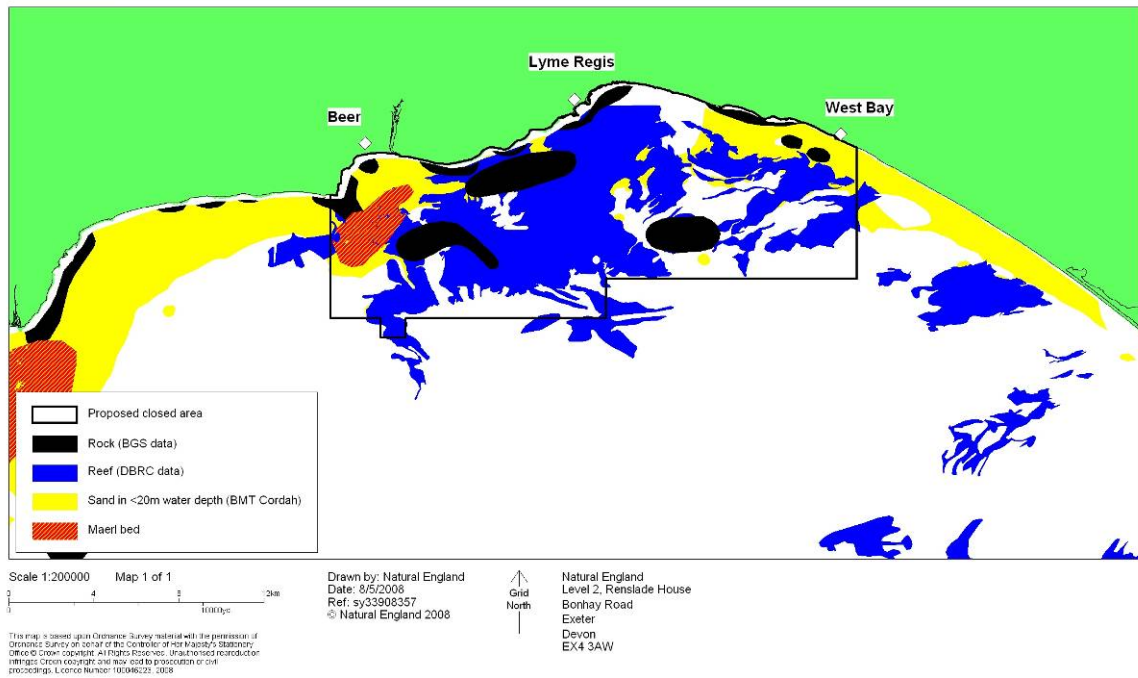
- MFA advise that otter trawling is undertaken by relatively small low-powered vessels, but that the rough ground requires the use of “rockhopper” gear, rather than clean ground gear such as that used in the west of the Bay²,
- the recommended area is made up of reef, occasionally interspersed with relatively small and complex areas of mixed ground and does not contain large discrete areas of clean ground that are not sensitive to trawling (see fig 4.1),
- though significant damage has been caused by towed gears, the reef communities are capable of recovery if damaging activities are removed (see para 5.16).

Natural England’s advice is that although otter trawling is comparatively less damaging than other towed demersal fishing gears, the use of even light rough-ground otter trawl gear would continue to have a significant effect on the attached species on the reefs (particularly upright branching corals and sponges) where these gears were used, and could cause additional irreversible damage to the reef structure through the impact of trawl doors in particular. They advise that these effects would prevent or significantly delay the recovery of important biological features of the Reefs. Government accepts this advice and an exception for otter trawling is not being recommended.

Pelagic Trawls

Consideration was also given to allowing mid-water pelagic trawls for species such as sprats and anchovies. Although allowing some towed gears within a closed area would make enforcement somewhat less straightforward the local SFCs advise that with port inspections and the power to request vessels to haul their gear, effective enforcement is possible². Mid-water pelagic trawls would not cause damage to the reefs or the benthic communities associated with them. Mid-water pelagic trawls would therefore be excluded from a general prohibition on towed gears within the closed area.

Fig 4.1: Habitats in the Proposed Area



Produced by Natural England – Base Layers from Royal Haskoning¹

5 Evidence Base

5.1 In proposing the recommended Option to protect the biodiversity of Lyme Bay, the Government has had to establish three things. First, that towed gear can damage sensitive reef habitat, secondly that the reef systems found in Lyme Bay are of a high biodiversity value and thirdly that there is scope for recovery of damaged areas. Defra and its conservation agencies have therefore considered a number of scientific studies both into the impacts of towed fishing gear on the seabed and into the biodiversity value of Lyme Bay. The impact of the recommended area on the fishing industry that operates in the Lyme Bay area must also be analysed and sufficient data collected to allow a comparison of the costs and benefits of closure. Evidence on the impacts, costs, and benefits of the recommended closed area is set out in section 7.

Impacts of Towed Gears

5.2 The impact of specific towed fishing gear types is summarised below:

- **Scallop dredging:** 24 different individual studies of the impacts of scallop dredging on seabed communities have been undertaken on four different types of broadly defined habitats: sand, muddy-sand, gravel and biogenic (i.e. that formed by living organisms). In almost all cases, scallop dredging caused an immediate decrease in the mean abundance of animals that ranged from -22% to -98%. The greatest initial mean decrease (-98%) was observed for seafans and sponges in biogenic habitats. These species are key features of the Lyme Bay reefs³.
- **Beam trawling:** Mortality of seabed biota as a result of the passage of a beam trawl is highest in those habitats with a stable substratum such as gravel, cobble or boulders. The production of larger animals such as crabs and sponges is reduced by beam trawling, and although the production of smaller polychaetes increases at low intensity, it decreases beyond a threshold of beam trawl intensity. Beam trawling has the greatest impact on hard ground and the recovery times are measured in years⁴.
- **Otter trawling:** The greatest impact is associated with the otter doors, which spread the wings of the net. Larger, more powerful vessels are able to deploy heavier gear, and thus can access rougher

ground. The direct effects of otter trawling are similar to that created by beam trawling, and vary according to habitat. Larger gears are problematic if they give access to stable substrata that harbour high diversity assemblages of organisms. Smaller, lighter otter trawls are more likely to fish cleaner ground, and the impacts on this clean ground are likely to be lower⁴.

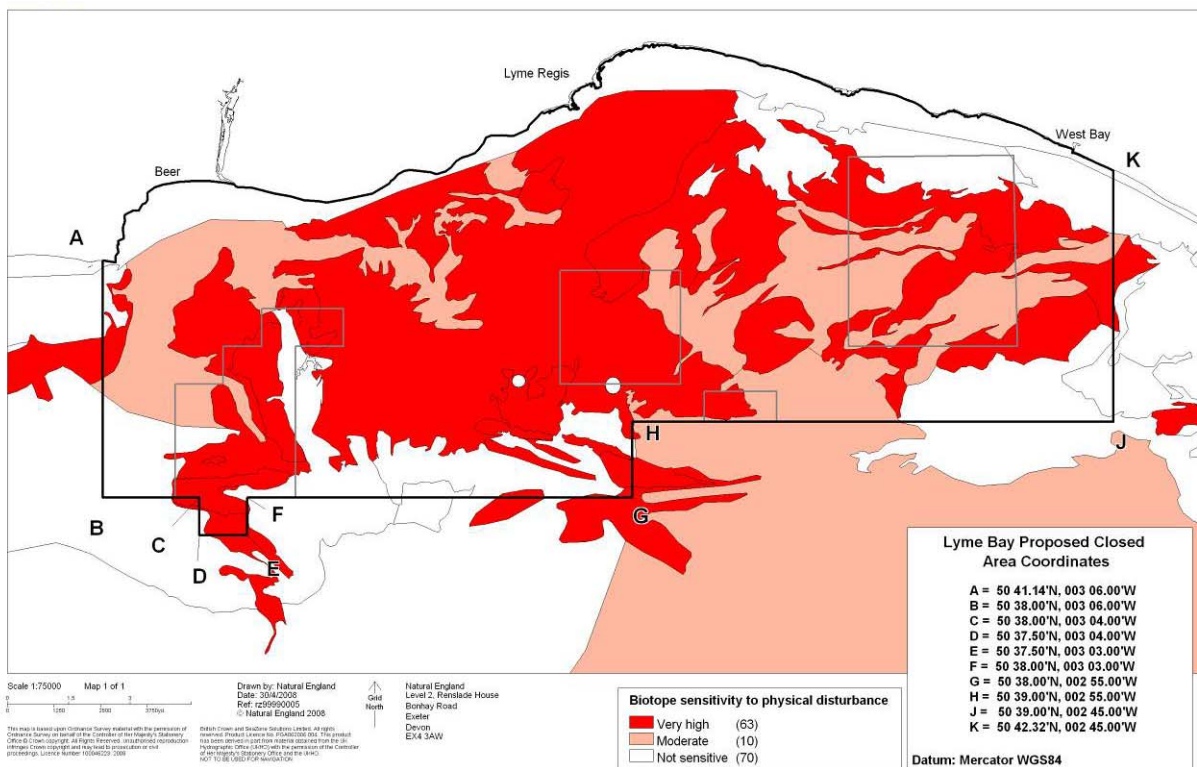
5.3 In terms of overall sustainability, rated against a range of measures including ecological, economical and social measures, pot-based fisheries have been considered most sustainable, whereas otter trawl, beam trawl and dredge fisheries were ranked lowest⁵.

5.4 Much of the reef interest of Lyme Bay provides a habitat for a highly diverse community of erect sponges, gorgonian corals, ross coral and other hydroids and bryozoans^{1,6,7}. It has been found that many of these key reef-dwelling species have a high sensitivity to physical disturbance such as that caused by bottom trawled fishing gear³.

5.5 The degree of sensitivity of the reef habitat of Lyme Bay has also been assessed in recent work by the University of Plymouth⁸ (see fig 5.1). This work reveals that much of the reef area has a high sensitivity to the sort of physical damage caused by dragging mobile towed fishing gear across the seabed. The study relies on expert judgements of sensitivity, and on a relatively small selection of species. However, it supports the view of *Kaiser et al*³ that the reef areas of Lyme Bay are extremely sensitive to towed demersal fishing gears.

The Marine Biodiversity of Lyme Bay

Fig 5.1: Sensitivity of Lyme Bay Reefs to Physical Disturbances⁸



Produced by Natural England – Base Layers by University of Plymouth

5.6 Lyme Bay is an area with a high diversity of marine habitats. These include estuarine areas such as the Exe, areas of seagrass such as found in Torbay and off Teignmouth, areas of maerl off Beer Head and off Budleigh Salterton, and diverse reef areas off Start Point, in central Lyme Bay and off Portland Bill. Collectively, these areas support significant marine biodiversity that underpins important local economic activity.

5.7 The reefs of central Lyme Bay are one of the most extensively studied marine environments in England¹. An important element of the UK reef resource that would meet the selection criteria to qualify as of European Importance under the Habitats Directive is found in the Bay.

5.8 Initial surveys by the Nature Conservancy Council in 1979⁹ were followed by more detailed work undertaken by Devon Wildlife Trust in the early 1990's¹⁰. As a result of these studies, the area was identified in 1994 as one of 27 Important Areas for Marine Wildlife around England (also known as Sensitive Marine Areas) by English Nature¹¹. The description of the site refers to the high diversity of erect and branching sponges, the presence of large colonies of ross coral *Pentapora fascialis*, and bedrock dominated by the pink sea fan *Eunicella verrucosa*.

5.9 Further survey work continued throughout the 1990's leading to a greater understanding of the high biodiversity importance of the area. Much of the survey work in this time was concentrated around 8 sites: East Tennants, West Tennants, The Exeters, Eastern Head, West Bay Ledges, Beer Home Ground Reefs, Lane's Ground and Sawtooth Ledges (fig 5.2).

5.10 These surveys showed a wide variety of seabed substratum types, with differing geology: the hard bedrock of Sawtooth Ledges, West Tennants and West Bay Ledges, the mudstone reefs in Beer Home Ground, the boulders and cobbles of Lanes Ground and Eastern Heads and the relatively flat and muddy plain of the Exeters, an area that was reported to have been composed of biogenic reef before being much-damaged when scallop dredging was first carried-out in the area in the 1980s¹². Further survey work and pressure for protection then focused on three areas: Beer Home Ground Reefs, Lane's Ground and Sawtooth Ledges as these areas appeared to be most vulnerable to damage and to harbour the highest remaining biodiversity.

5.11 More detailed surveys have demonstrated the extent of the marine biodiversity of the area, by identifying examples of nationally rare and scarce species such as:

Sunset cup coral <i>Leptopsammia pruvoti</i>	Nationally rare species - one of only 5 known locations in the UK
Sponges <i>Thymosia guernei</i> and <i>Dysidea pallescens</i> ,	Nationally rare
Pink sea fan <i>Eunicella verrucosa</i> ,	Nationally scarce
Anemones <i>Isozoanthus sulcatus</i> , <i>Aiptasia mutabilis</i> ,	Nationally scarce
Sea squirt <i>Phallusia mammillata</i>	Nationally scarce
Weymouth carpet coral, <i>Hoplania durotrix</i>	Nationally rare

5.12 Acoustic surveys by Devon Wildlife Trust in 2005, along with existing data, grab samples and drop down video surveys, were combined to create the first map illustrating the distribution of habitats and their marine communities across the whole of Lyme Bay¹³. This data demonstrates the extent of the reef habitat, and more importantly demonstrates the presence of extremely species rich, but fragile, marine communities across substantial areas.

Figure 5.2 The named reef areas of central Lyme Bay



Courtesy of Devon Wildlife Trust

5.13 Further survey work¹⁴ concentrated on demonstrating the biodiversity interest of the reefs that lie outside the closures agreed in August 2006. Drop down video work on 125 sites demonstrated that 100 of these contained reef habitat, 52 of these supported pink sea fans and 27 were considered to have a particularly high epifaunal biodiversity.

5.14 The national importance of the Lyme Bay reefs area was further demonstrated in work undertaken by the Marine Biological Association¹⁵. Analysing existing data, using various measures of species and biotope diversity, Lyme Bay was assessed as being one of the top four locations for marine biodiversity in England.

5.15 Defra has also been advised by Natural England that further reef and sub-tidal sandbank areas have been identified that meet SAC qualifying criteria, as discussed above. The data on the reef areas of Lyme Bay was compared to other sites to establish the importance of the area¹. The study found that reefs of central Lyme Bay comprised a number of different types of reef habitat nationally renowned for their dense floral and faunal assemblages.

Potential for Recovery

5.16 The University of Bangor has undertaken a baseline assessment of the abundance of benthic species within different areas of the Lyme Bay Reefs¹⁶. Their report indicated that biological recovery of biogenic and reef habitat following the cessation of scallop dredging can occur over a period of several years and potentially more than five.

5.17 Study of the reefs area as a potential SAC¹ found that the structure of the reefs was diverse, including a range of geology, and while it was considered that recent scallop dredging activity had partially degraded the reef structure, the areas where no scalloping has taken place had excellent reef structure. The assessment states:

“the potential for restoration for the reef habitat within this area appears to lie solely in the ability to address the fishing activity that impacts on the seabed. If statutory measures can be introduced to halt the activity across the site, or at least within significant areas, then the restoration of the damaged parts of the reef within these areas is considered achievable.”

5.18 The report concluded that the Lyme Bay reefs were an excellent example of Annex I reef habitat with excellent and degraded reef structure present. The report concluded that with the right measures in place the excellent reef structure could be conserved and that for degraded reefs, regeneration was possible¹.

6 Sectors and groups affected

6.1 The main sectors and groups affected by the recommended closed area are:

- **Fishers:** There are scallop vessels, trawlers and static gear vessels registered in the Lyme Bay area. However, many of these towed gear vessels are prevented from fishing inside the closed area because of existing byelaws and national regulations that restrict fishing opportunities inshore to smaller vessels. The largest impact of the recommended closure therefore would be likely to be on under 10m vessels using towed gear typically operating within the 6nm area, though there is potential for all of the above registered vessels to be directly or indirectly impacted to some degree. Vessels from outside the area (for example from Cornwall or Sussex) would not be as significantly impacted by the recommended closures as they derive, as a proportion of their total landings over time, only a limited benefit from the impacted fisheries.

The closure would have some impact on all fisheries in the area with some potential for economic benefits for non towed gear fisheries as well as costs for towed fisheries. Predicting how fishers would adapt following any closure, and the resulting impacts of displacement of effort (vessels fishing in different areas), is difficult given the number of possible scenarios and interactions that may arise. However a negative economic impact on the local towed gear sector is probable and may be significant for some fishers. This is considered in Section 7 below.

- **Users:** Users are those people who make use of Lyme Bay, both local residents and visitors, whether this is for angling, scuba diving, boat charter or other activities resulting in visits to the area. The closure would benefit most of these activities since they depend in part on healthy reef systems. There is also the likelihood that the reef systems would recover over time, which could increase the benefits from such activities.

- **Local economies and society:** The recommended area would be likely to result in some social and economic costs to the local community as a consequence of impacts on the fishing industry, but these are difficult to predict and have not been quantitatively assessed. The major benefit of the recommended area would be the value of the reef system in the context of the wider environment and the possibility of expansion of benefits resulting from angling, scuba diving and the charter boat industry. The former is difficult to quantify or monetise and is not monetised in this IA. However, in relation to the latter clearly the reefs are within range of small angling vessels fishing out of West bay, Lyme Regis and other ports in Lyme Bay, and are a popular angling location. Angling and scuba diving currently generate economic benefits in the order £330k per annum¹ for the recommended area, and it is likely with the protection of the reef system secured these benefits would increase, though it is not possible to accurately predict or value these changes. An assessment of the benefits of the recommended area is included below in Section 7.

- **Public sector bodies:** Public sector bodies would not be significantly impacted by the recommended closure.

- **Enforcement bodies:** The recommended closure would be most likely be enforced by the local Sea Fisheries Committees and the Marine and Fisheries Agency. The economic costs of enforcement of the recommended closed area are considered below in Section 7.

7 Analysis of costs and benefits

Costs

7.1 The exclusion of towed demersal and scallop fishing gears from the recommended area would impose a number of costs, including:

- Direct costs to the fishing industry
- Indirect costs from gear conflict outside the area and pressures on other fisheries
- Potential environmental costs from increased fishing activity outside the area
- Administrative and enforcement costs to Government

Vessels would be able to continue to sail through the recommended area, use static gear, dive for scallops and use rod-and-line to fish. Other activities such as scuba diving and sightseeing would also be permitted.

Analysis of Fisheries Impacts

7.2 A range of information is available to inform the assessment of the impacts of the recommended closure on fishing activities. This includes:

- details of UK licensed commercial fishing vessels that have access rights to operate in the area
- landings data for individual vessels over 10 metres for 1997-2007,
- grouped landings data for under 10 metre vessels for 1997-2007, and at individual vessel level for 2007
- vessel position monitoring and sightings data from the Marine and Fisheries Agency Monitoring Control Surveillance System (MCSS)
- vessel sightings data from SFC patrol vessels
- assessments of fishing grounds for scallops and other stocks from CEFAS and the local Sea Fisheries Committees
- expert advice from local fishing industry regulators such as the MFA's District Inspectors and officers of the local Sea Fisheries Committees
- expert advice from conservation and fisheries advisers in Natural England
- consultation responses from fishermen who would be affected
- reports and analyses of the fisheries in Lyme Bay from various organisations, including Homarus¹⁷, Seafish¹⁸ and the University of Plymouth¹⁹.

From this information it is possible to build a good picture of fishing activities within Lyme Bay and the likely effects of a closure.

Fishing Activities in Lyme Bay

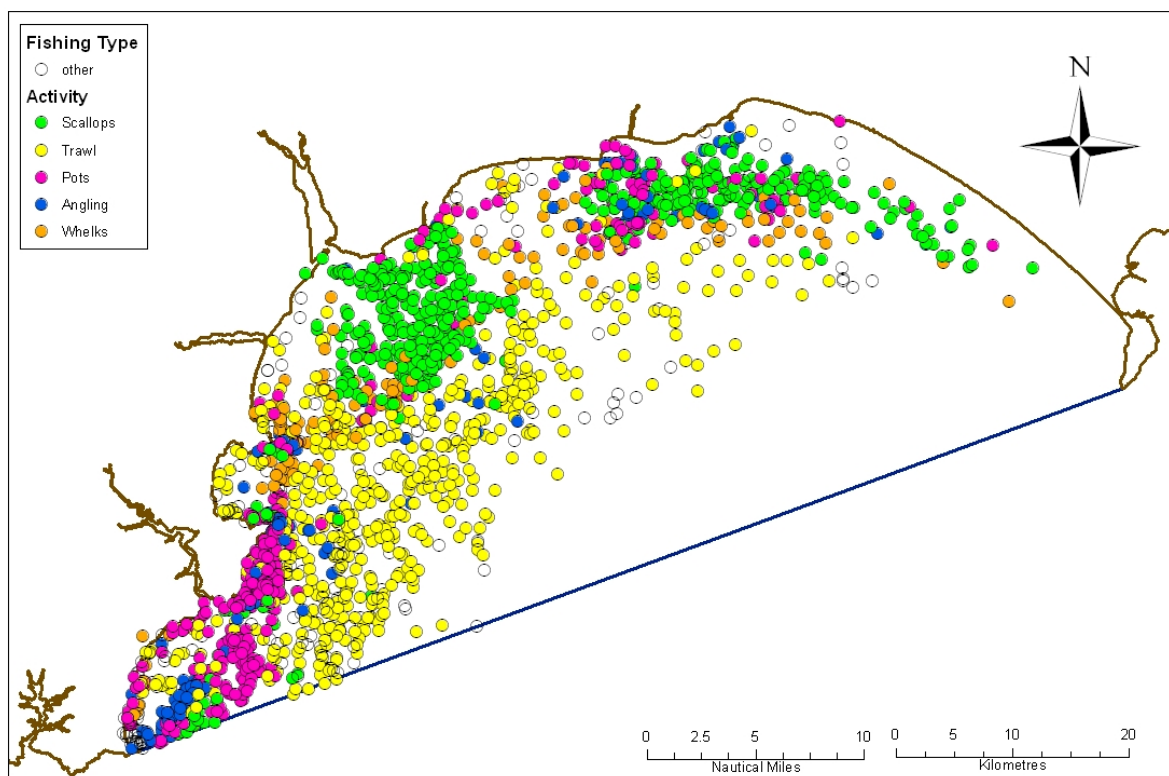
7.3 Lyme Bay is an active and important fishery. Locally based vessels that fish in the area include around 25 over 10m trawlers and scallopers, similar numbers of under 10m trawlers and scallopers, and around 90 vessels involved in netting, potting or "artisanal" fishing activities^{20,21}.

7.4 The fisheries within the Bay area are highly mixed and seasonal, with significant annual variations in activities being driven by a number of factors, including weather conditions, the varying availability of stocks and the financial returns available on different species. Most vessels use a number of gear types, during different seasons, in different locations and in different fisheries²¹.

7.5 The University of Plymouth has carried out research¹⁹ into the distribution of fishing activities in Lyme Bay, which is illustrated in figure 7.1. Their analysis is based on vessel sightings by the Devon Sea Fisheries Committee patrol vessel *Drumbeat* of Brixham from 2005 and 2006. Their report recognises that sightings are likely to contain a degree of bias towards activities in the western part of the Bay where *Drumbeat* is based, but the diagram nevertheless gives a good broad indication of fishing activity in the area.

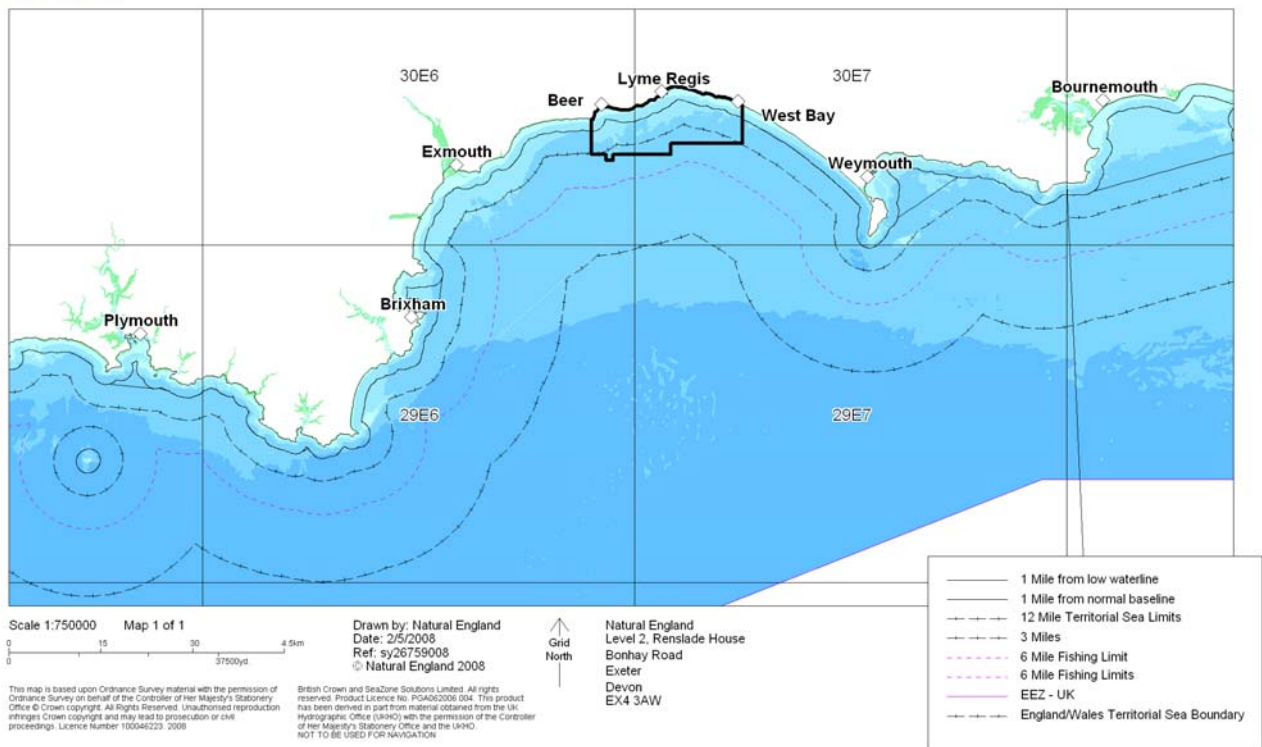
7.6 Scallops are an important stock within the fishery, accounting for around 30% of the value of landings from the ICES rectangles 30E6 and 30E7 covering the northern part of the Bay (see fig 7.2) over the last decade²³. Scallop grounds within the Bay include the Lyme Bay Reefs, coastal reefs to the east and south towards Portland, the “Exeters” to the south of Exmouth, a small area off Torbay and the Start Point

Figure 7.1 – Distribution of main fishing activities in Lyme Bay based on sightings by the DSFC patrol vessel *Drumbeat* of Brixham from 2005-6. (Univ. Plymouth)



area^{18,19, 22}. Scallop fisheries are generally cyclical in nature with peak landings coming from intensive fishing involving a relatively mobile fleet, as well as local vessels that maintain more regular scalloping activity. Scalloping, trawling and potting accounted for 75% of the fishing activity observed in the Plymouth study¹⁹.

Figure 7.2 Position of the Proposed Area in Relation to ICES Rectangles 30E6 & 30E7



7.7 Most of the trawling in the area is undertaken by otter trawls²³. There appears to be a significant difference in otter trawling operations in the two halves of the Bay. In the western half, clean-ground trawling on muddy and sandy substrates is undertaken for species such as lemon sole, red mullet, whiting and cuttlefish. In the eastern half “rockhopper” gear is used to allow access to rougher ground and target species such as bass, skates and rays, red mullet, whiting and pollack²⁴.

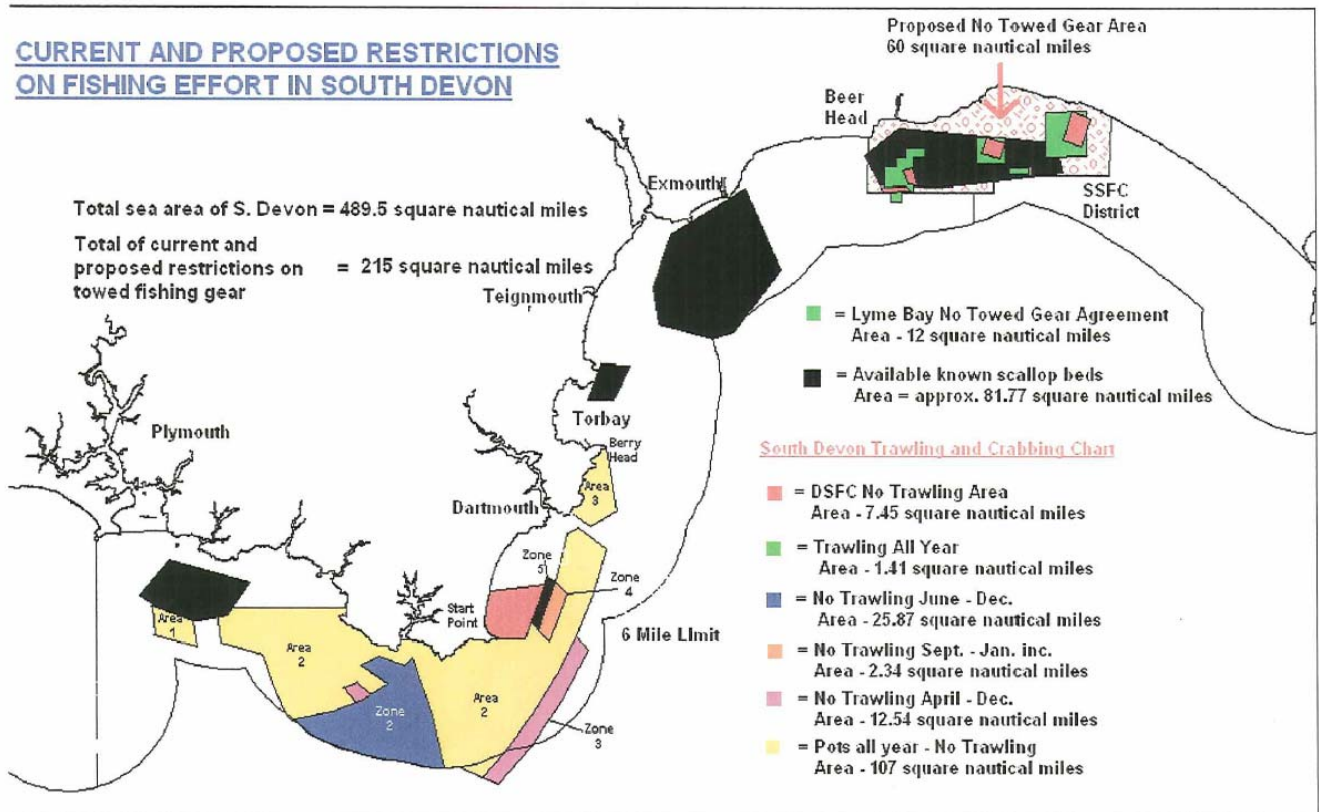
7.8 Most potting takes place within the Inshore Potting Agreement (IPA) area around Start Point (see fig 7.3), and there are also important grounds around Portland Bill and Weymouth. Whelk potting has been a significant activity around the Lyme Bay Reefs for at least the last two years²³.

Vessel Range

7.9 Most of the fishing vessels in the area appear to be strongly attached to their local ports. This is particularly true of vessels based in the smaller ports in the northern part of the bay (Beer, Lyme Regis and West Bay), which seldom travel further than 20km from port¹⁹. In Lyme Regis there are three under 12m scalloper/traulners and one otter trawler, which currently carry out almost all of their fishing activities within the vicinity of the Lyme Bay Reefs²⁴.

7.10 Vessels based in ports in the western part of the Bay such as Brixham, Teignmouth and Exmouth spend much of their time fishing in the western part of the Bay and the Start Point area. Although these vessels generally fish local grounds, most of the scallopers and trawlers in these ports (including those under 10m) are powerful vessels, which are prepared to travel considerable distances for high catches. It is difficult to assess how much of their time these vessels spend within the Lyme Bay area. For many of them the Lyme Bay Reefs provide one of a large number of local grounds, which provides an important part of earnings in some years^{21,22,24}.

Figure 7.3 Scallop Beds and Fisheries Restrictions in South Devon (Devon SFC)



7.11 In addition to the local fleet, parts of the area are periodically fished by visiting vessels from further afield. The ability for large vessels to access the reefs is however restricted by existing byelaws and national regulations that restrict fishing opportunities inshore to smaller vessels. 96% of the sightings in the Plymouth study were of vessels from ports within Lyme Bay¹⁹.

7.12 Analysis of the MFA’s vessel position and sighting data²⁵ shows that between 1997 and 2007 almost a quarter of all of vessels recorded within the two relevant ICES rectangles were recorded within the recommended area (see table 7.1). This is based on all data reported from vessels over 15m in the area through their satellite monitoring system, sightings by MFA aircraft surveillance flights over the area and sightings by the navy patrols of activity in that area.

Table 7.1: Summary of vessels recorded in the Lyme Bay area

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average	Total*
Vessels recorded in recommended closed area	29	34	26	26	21	25	16	25	41	40	48	30	126
Vessels recorded in ICES rectangles 30E6/7	131	125	102	115	92	107	91	102	152	128	164	119	545
Percentage	22 %	27 %	25 %	23 %	23 %	23 %	18 %	25 %	27 %	31 %	29 %	25 %	23 %

*this is the total number of vessels seen, some of which were recorded in more than one year

Valuation of affected landings

7.13 The direct impact on vessels using towed gear would be to reduce their current landings from demersal trawling and dredging in the recommended area to zero. A key question for the costs estimation is therefore what their current landings are from demersal trawling and dredging in this area.

Basic calculation of affected landings

7.14 Calculation of affected landings has been based primarily on analysis of MFA landings data. The Marine and Fisheries Agency recorded 126 vessels recorded in the recommended area at any time between 1997 and 2007²⁵. Landings by these vessels in 2007 can be identified for the two ICES rectangles within which the recommended area is located (see fig 7.2). Table 7.2 shows the quantity and value of these landings for fishing gears that would be excluded from the recommended area.

Table 7.2: Demersal trawling and dredge landings from the 2 ICES rectangles in 2007 by vessels recorded in the recommended area during 1997-2007*

	Dredge (18 vessels)	Otter Trawl (18 vessels)	Beam Trawl (2 vessels)	Total (29 vessels**)
Scallops	£650,049 (412 tonnes)	£42 (0 tonnes)	£141 (0 tonnes)	£650,232 (412 tonnes)
Other Molluscs	£319 (0 tonnes)	£44,201 (13 tonnes)	£1,130 (1 tonne)	£45,650 (14 tonnes)
Crustaceans	£365 (1 tonne)	£11,773 (2 tonnes)	£74 (0 tonnes)	£12,212 (3 tonnes)
Demersal fish	£1,845 (1 tonnes)	£183,031 (110 tonnes)	£25,449 (9 tonnes)	£210,325 (120 tonnes)
Pelagic fish		£1,546 (2 tonnes)		£1,546 (2 tonnes)
Total	£652,578 (414 tonnes)	£240,592 (127 tonnes)	£26,794 (10 tonnes)	£919,965 (551 tonnes)

*Information from MFA landings data²³

** Some vessels use more than one type of

gear

7.15 For the purposes of this IA, it is important to understand what this represents:

- it is from recorded vessels only – over the ten year period the vessels recorded by MFA will be a reasonably accurate reflection of the fishing vessels that are active in the area. However, it is possible that some under 15m vessels may have fished in the area without being recorded, as such the data extracted will not fully represent the activity of all vessels that fish in the area;
- it is a snapshot of one year's landings in a highly variable fishery – scallop landings in particular will vary considerably due to the cyclical nature of the scallop fishery;
- figures represent total value i.e. the total value of landed fish before any deductions of costs;

- it does not represent catches *only* in the recommended area - it is the quantity and value of landings by vessels *recorded* in the recommended area, from the two ICES rectangles, which include other significant fishing grounds, including some to the east of Portland.

7.16 These issues are considered further below to assess how closely these landings figures are likely to reflect affected catches in the closed area and to further refine the estimate of the value of affected landings, with appropriate sensitivity analysis.

Annual Variability

7.17 2007 is the first year for which information is available which makes it possible to identify the landings for all of the vessels recorded fishing in the recommended area. This is because 85 (67%) of the vessels active in the area between 1997 and 2007 were 10m and under. Prior to the introduction of the Registration of Buyers and Sellers (RBS) in 2006 there was no requirement to individually record landings and in this case landings would have been recorded as grouped data. This grouped data cannot be separated out for only those vessels that were recorded in the recommended area. Any analysis of landings by vessels fishing in the recommended area before 2007 is an underestimate as some landings of the under 10m fleet are not included. This data is still useful however in providing an indication of the variability of landings in the area and whether 2007 landings are likely to be typical.

7.18 Table 7.3 presents towed gear landings data for the two ICES rectangles for vessels recorded in the recommended area between 1997 and 2007, from the Marine and Fisheries Agency. For 1997-2006, this includes data for all over 10m vessels, and for any 10m and under vessels that individually recorded their landings. For 2007, this includes landings data for all vessels.

Table 7.3: Summary of towed demersal and scallop fishing gear landings data from individually identified vessels recorded in the recommended area.

	Dredge (All Species)	Beam Trawl (All Species)	Otter Trawl (All Species)	Scallops (All Towed Gear)
1997	£124,508	£291	£129,193	£123,953
1998	£263,219	£0	£143,789	£260,243
1999	£373,989	£3,442	£195,083	£378,532
2000	£392,987	£7,964	£368,862	£389,326
2001	£293,386	£11,075	£196,781	£276,833
2002	£228,990	£15,504	£114,031	£227,504
2003	£193,480	£935	£184,789	£192,265
2004	£368,850	£702	£106,047	£368,420
2005	£961,616	£48,084	£61,373	£958,789
2006	£1,111,031	£34,817	£163,321	£1,107,100
2007*	£652,578	£26,794	£240,592	£650,233
Average (1997 – 2007)	£451,330	£13,601	£173,078	£448,473

* 2007 is the first full year of data collected from the RBS including a full set of landings data for over 10m and under 10m vessels. This data is not available presented at this level for u10m vessels prior to 2007.

7.19 This shows that the estimated value of scallop landings in 2007 was almost 40% lower than attributable landings for 2005-6, but more than twice the average value for the previous 8 years. Landings from trawlers were 50% higher than the average for the previous decade, although some of this variation may be attributable to the differences in recording. Overall landings for 2007 were 51% higher than the average for the previous ten years.

7.20 Comparisons of 2007 data to previous years need to be considered alongside the change in data series at this date where 2007 is a more complete data set including all 10m and under 10m vessel landings in this area. As such, landings for 1997 – 2006, and their average, are likely to present an underestimate. As 2007 represents only one year of data and whilst comparisons show it may have been a higher yielding year for the fishery, and thus an overestimate of the average, it does not represent the greatest value of landings over the 10 year period and so can not be considered an upper bound.

7.21 To highlight this sensitivity, 2007 landings data, totalling £919,964 could be considered a high estimate, whilst the average of 1997-2006 is a low estimate of £609,814. Given the data gaps prior to 2007 we have used the 2007 data alone for the calculation of costs in this IA.

Catches outside the recommended area

7.22 The recommended area covers 11.2% of the marine area (below mean high water mark) of the two ICES rectangles within which it falls and from which landings data have been taken (see figure 7.2). The larger area contains a number of important fishing grounds in addition to the Lyme Bay Reefs (see figure 7.1). Many of the vessels recorded in the closed area (particularly those based in the western part of the Bay) will derive significant proportions of their catches from outside it. It is possible that some of the vessels recorded in the closed area will have spent very little time in the recommended area and will have taken the vast majority of their catches from elsewhere within the ICES rectangles.

7.22 Vessels recorded in the recommended area account for 73% of scallop landings from the 2 ICES rectangles in 2007 and 67% of scallop landings between 1997 and 2007 (see Annex 9). It is apparent however that the Reefs contain something more like 30-40% of the scallop grounds in the 2 ICES rectangles. Figure 7.3 for instance shows the Lyme Bay Reefs scallop grounds in relation to other open scallop beds around South Devon. This map is a conservative estimate of the scallop grounds available to local fishermen as it does not show the grounds in the Southern Sea Fisheries District, including those to the east of the Reefs and around Portland Bill, nor some which may be found around Start Point, including those which, while subject to partial or seasonal gear restrictions, may nonetheless be available to scallop dredgers at certain times of the year. It appears likely that scallop dredgers accessing the Lyme Bay Reefs, particularly those from the west of the Bay, would also be scalloping in the Exeters and possibly other grounds. Assuming that these grounds are equally productive, the scallop landings from vessels recorded in the recommended area may overestimate catches of scallops within the recommended area by 50% or more.

7.23 Otter trawl landings from vessels recorded in the recommended area represent 75% of total otter trawl landings in the 2 ICES rectangles for 2007 and 57% of landings between 1997 and 2007. Figure 7.1 suggests that relatively little trawling activity occurs within the recommended area and therefore that most trawl catches are likely to come from outside it. It therefore seems likely that landings from trawlers recorded within the recommended area over-represent likely catches in the area by a greater margin than that for scallopers.

7.24 In order to adjust for the proportion of catches made outside the recommended area an assumption has been made that for both scallop landings and beam and otter trawl landings catches in the recommended area are 50% of the total landings. It is likely that this is greater than the proportion caught within the recommended area but provides a conservative estimate at the higher end for both scalloping and trawling in the absence of certainty of the exact proportions landed inside and outside the recommended area within the 2 ICES rectangles. Given this assumption, the estimated value of affected landings using 2007 data is £459,982.

Effect of closures on profits and earnings

7.25 The previous section looked at the effect of closure on the total value of landings. A more accurate measure of the economic impact is to look at 'value added' i.e. the impact on profits and employee

compensation.¹ This is very challenging in the absence of detailed data, however some guidance can be found from the experience of Seafish economists and the data in the 2005 Economic Survey of the UK Fishing Fleet.

1. Based on Seafish information we have assumed vessel costs for the fleet as a whole are approximately 80% of turnover. These are total annual costs both fixed and variable but do not include vessel depreciation and interest.
2. Further assumptions are needed to consider the crew share of vessel landings. The Seafish 2005 Economic Survey of the UK Fishing Fleet estimates that for scallop dredgers in Area VII the crew share in 2005 was 32.2% of earnings (where earnings constitute over 99% of the total value of vessel landings). This is likely to vary widely by type of vessels and these figures are based on data from over 10m vessels only, however the same data for under 10m mobile gear vessels in England and Wales in 2005 indicates a crew share of 35.4%. We have therefore assumed that crew costs are an estimated 30% of the value of landings, but applied sensitivity analysis to this to obtain a range reflecting uncertainty over a reasonable estimate.
3. Based on assumptions 1 and 2 above for this analysis we have applied a central figure of 50% (i.e. 20% net profits + 30% crew share) with a range around it of +/- 10%. Although these costs may vary significantly for individual vessels, when applied to the fleet as a whole we can be more confident that they are an accurate reflection of costs.

7.26 There are limitations with these assumptions and results should be viewed with these caveats in mind, these are discussed further below.

7.27 Table 7.4 below uses the value of landings for 2007 of all species and calculates the impact on lost profits plus crew earnings for the fleet. For comparative purposes average landings data for 1997 – 2006 have also been included, although given the data gaps for under 10m vessels in these years these figures should be viewed accordingly.

Table 7.4 Net loss of profits and crew wages from reduction in landings*

	Gear	Landings	Assumed % from recommended area	Estimated Catches in Recommended Area	Percentage of turnover assumed to be value added*		
					40%	50%	60%
2007 Landings**	Dredge	£652,578	50%	£326,289	£130,516	£163,145	£195,77
	Otter Trawl	£240,592	50%	£120,296	£48,118	£60,148	£72,17
	Beam Trawl	£26,794	50%	£13,397	£5,359	£6,699	£8,03
	Total	£919,964		£459,982	£183,993	£229,991	£275,98
Average Landings 1997-2006	Dredge	£431,206	50%	£215,603	£86,241	£107,801	£129,36
	Otter Trawl	£166,327	50%	£83,163	£33,265	£41,582	£49,89
	Beam Trawl	£12,281	50%	£6,141	£2,456	£3,070	£3,68
	Total	£609,814		£304,907	£121,963	£152,453	£182,94

*Assumption: that approx 50% of landings value is value added with a range of +/-10% applied for sensitivity

** 2007 is the first full year of data collected from the RBS, including a full set of landings data over 10m and under 10m vessels. This data is not available presented at this level for 10m and under vessels prior to 2007.

7.28 The value of current landings by towed demersal and scallop fishing gears within the recommended area is therefore estimated at £229,991 within a range of £183,993 - £275,989, based on 2007 landings data and the assumptions outlined above.

¹ No official series are available at this level of detail so throughout this is an approximation

Issues and limitations:

7.29 It is recognised that the above figures and their derivation are subject to certain limitations and give rise to some issues. These may be summarised as follows:

- Vessels recorded as active in the recommended area between 1997 and 2007 are assumed to be an accurate reflection of vessels likely to be affected. This assumes that vessel sightings were comprehensive in the years analysed rather than an underestimate and that historical activity can be projected into the future.
- Costs are assumed to be on average 80% of turnover for the fleet. This includes both fixed and variable costs to the fishermen. By their nature the fixed element of these costs must be borne regardless of how much is landed. Allowing for this suggests that the lower end of the range of cost estimates may be appropriate.
- Any impacts on costs to fishing vessels would be likely to have knock on effects to the fish processing industry in terms of turnover and employment, and the wider economy in terms of change in GDP. These have not been calculated here.

Likely Effects on the Fishing Fleet

7.30 The value of directly affected catches provides an indication of the possible level of costs to the fishing industry. There are inherent difficulties in predicting the precise impacts of a closure on local fishermen however, for a number of reasons:

- it is possible to target some of the stocks that are currently caught with towed gear by other means, for instance by diving for scallops or by using nets to catch rays or flatfish
- individual fishermen may react differently to the measures introduced, for instance by changing gear, or moving their operations to other areas,
- the mixed nature of the fishery, the annual variations in catch levels and the flexibility with which many vessels use a number of gear types can also make it difficult to assess how important an individual gear or area is to many local fishing vessels,
- there appears to be little information available on the distribution and movements of many of the stocks within the Bay, making it difficult to assess the extent to which some of the lost fishing opportunities in the recommended area could be made up for by increased effort in other local grounds, or the extent to which some of the fish currently caught within the recommended area move into areas outside it where they could be targeted,
- it is difficult to predict the knock-on effects of changes in fishing activity, which may lead to increased costs for other vessels, for instance through increases in gear conflicts, leading to gear losses or the potential loss of fishing grounds due to displaced effort
- there appears to be little information available on the profitability of vessels in the Bay, which makes it difficult to predict the impacts of increased competition in grounds outside the recommended area, or of any reduction in income on vessels' viability
- in addition, evidence collected from other established closed areas suggests that benefits may accrue to fisheries through protecting adults of targeted, sessile species that are able to spawn more effectively and improve recruitment to surrounding areas.

Adaptability

7.31 One of the most difficult factors to assess is the extent to which vessels would be able to maintain the value of their catches by shifting effort to other grounds or using different gear.

7.32 The shifting of effort to other grounds following a closure is known as 'displacement' of fishing effort. The scope for effort to move to alternative grounds may be limited if stocks in those areas are

already fully exploited (and are not sufficiently supplemented by greater stocks moving in and out of the closed area). Some vessels may also be limited by other factors such as the distances to alternative grounds and their exposure to adverse weather conditions.

7.33 Fisheries restrictions in other areas may also be a constraint on relocation of effort. The Devon Sea Fisheries Committee for instance calculates that 44% of south Devon waters within 6 nautical miles of the coast would be closed to demersal towed gears on at least a seasonal basis (215 of 489.5 square nautical miles)¹⁸. Further restrictions might also have to be introduced to protect European Marine Sites in the area if fishing activity displaced from the Lyme Bay Reefs seemed likely to cause them significant damage.

7.34 MFA advises that displacement can be very hard to predict (for reasons such as those given in paragraph 7.30). Their view however is that most of the demersal trawlers and dredgers from ports in the western part of Lyme Bay would be likely to continue to fish in other grounds within the Bay or around Start Point towards Plymouth²⁴. This is based on an understanding that most of these vessels are not reliant on catches from the Lyme Bay Reefs and that although many are capable of visiting other areas, they are generally highly attached to local ports¹⁹. Vessels in ports nearer the recommended area in the north of the Bay are generally less mobile and would be likely to remain in the vicinity. Effects on visiting vessels from ports such as Falmouth, Megavissey and Shoreham would be more marginal and these vessels would have the opportunity to shift effort to alternative grounds, from Sussex to Cardigan Bay and further afield^{26,27} as well as continuing to target other stocks within Lyme Bay²⁴.

7.35 Trawlers may have opportunities to maintain catches outside the recommended area as most fish are relatively mobile and are unlikely to stay within the boundaries of small closed areas²⁸. A CEMARE report²⁹ on the economic impact of closed areas in the North Sea noted that small otter trawlers in particular may suffer a small impact on revenue because of changes in catch composition when very significant parts of a fishery are closed. MFA advise that before 2005 the majority of the earnings of the trawlers from ports in the north of the Bay would have come from outside the recommended area. The increase of scalloping activity on the Reefs in 2005 led to the displacement of netters to areas that had previously been trawled, and provided greater opportunity to trawl within the Reefs²⁰. There may therefore be scope for significant proportions of trawling catches to be maintained in areas adjacent to the Reef, particularly if netting activity moves back into the recommended area following the exclusion of towed demersal and scallop fishing gears.

7.36 Opportunities for scallop dredgers to maintain levels of scallop landings would be limited by the discrete nature of the beds in which they occur (see for instance fig 7.1). Although the scallop stocks could be exploited by other methods such as diving (which has lower environmental impacts and can attain higher prices), this may not benefit existing scallop fishermen.

7.37 It is not clear how significant the level of displaced scallop dredging effort would be either locally or regionally, for a number of reasons:

- the number of fishing vessels recorded in the recommended area are on average only 23% of those in the 2 ICES rectangles (see table 7.1) and it is not clear what proportion of their time is spent in the area,
- it is not possible to identify what proportion of scallops come from the recommended area as opposed to the Exeters or other grounds within ICES rectangles 30E6 and 30E7 and therefore how significant a shift in effort from one ground to another would be,
- scallop landings in the recommended area have not historically been as high as they were in 2005-6 when high catches contributed to a substantial increase in the overall value of landings from the two ICES rectangles (see fig 7.4) and it is not clear how important peak landings from the recommended area are to the normal operations of the scallop fishing fleet,
- 2007 landings already show a significant decrease from these levels and it is difficult to predict what future landings from the recommended area would be,

7.38 Without spare capacity in scalloping stocks the closure of the grounds in Lyme Bay would be likely to lead to around a 1.5% reduction in historic landing levels by scallop dredgers in the English Channel and Irish Sea region (if it is assumed that 50% of scallops catches within ICES rectangles 30E6 and 30E7 come from the recommended closed area - see table 7.5 and para 7.21). This would have potential implications for the profitability of less efficient or adaptable vessels within the fleet.

**Fig 7.4 - Scallop Landings in the 2 ICES Rectangles 97-07
- Vessels Sighted in the Proposed Area**

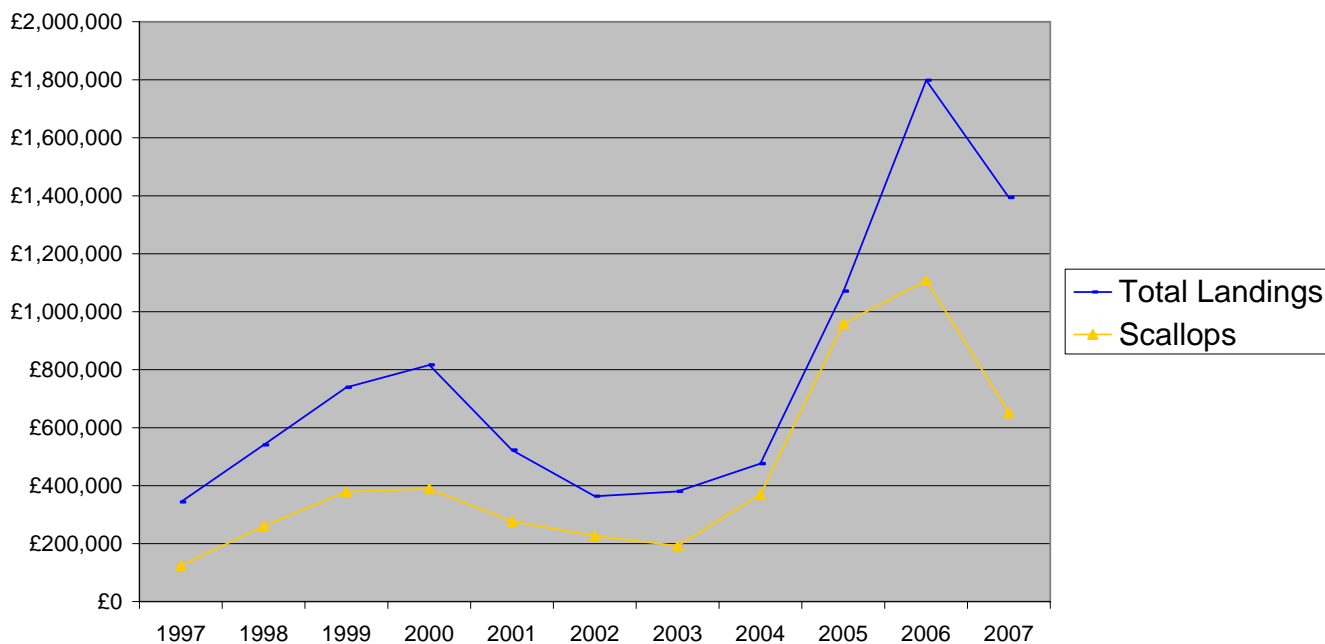


Table 7.5 Lyme Bay scallop landings in their regional context

2 Rectangles covering recommended area				Of which by vessels recorded in recommended area		% of total landings from 2 Rectangles		% of total landings in the western Channel (ICES Area VIIE)		% of total landings in the Channel and Irish Sea (ICES Areas VIIA-DEFG)	
Year	ICES division	tonnes live wt	Value	tonnes live wt	value	tonnes live wt	Value	tonnes live wt	value	tonnes live wt	value
1997	VIIE	142.6	£188,539	111.8	£123,953	78%	66%	2%	2%	1%	1%
1998	VIIE	300.4	£414,283	179.3	£260,331	60%	63%	3%	3%	2%	2%
1999	VIIE	504.6	£803,518	252.3	£378,532	50%	47%	4%	5%	3%	3%
2000	VIIE	582.3	£841,218	262.2	£389,326	45%	46%	4%	4%	3%	2%
2001	VIIE	473.9	£603,671	235.0	£276,833	50%	46%	5%	5%	3%	3%
2002	VIIE	420.7	£555,872	199.4	£227,504	47%	41%	5%	4%	3%	2%
2003	VIIE	301.1	£375,750	153.9	£192,265	51%	51%	3%	3%	2%	2%
2004	VIIE	394.9	£488,695	290.1	£368,420	73%	75%	6%	5%	4%	3%
2005	VIIE	750.4	£1,013,296	703.5	£958,789	94%	95%	11%	10%	8%	7%
2006	VIIE	662.4	£1,202,241	595.9	£1,108,061	90%	92%	10%	12%	6%	8%
2007	VIIE	576.1	£890,964	412.4	£650,511	72%	73%	7%	8%	4%	3%
Average		464.5	£670,732	308.7	£448,593	65%	63%	5%	5%	3%	3%

7.39 Although many of the vessels in the area are highly flexible and use a variety of gears, it is not clear to what extent this applies to the trawlers and scallopers who would be most affected by the closure. It is possible that some vessels presently using towed-gears in the recommended area could be reconfigured and employed in activities that would be permitted within the closure area, such as netting, potting, whelking, charter angling or diving^{26,27}. There would be costs involved in doing so however and ultimately their scope to make up for lost landings by using alternative gears is not known.

7.40 There is also considerable uncertainty about how quickly fishermen would be able to adjust to the introduction of measures excluding towed demersal and scallop fishing gears from the recommended area and therefore how quickly some of the costs of the measure could be ameliorated. It is likely that some parts of the fleet would be able to adjust more quickly than others, depending on a range of factors including current gear usage, the cost of adaptation and their level of dependency on the recommended area. There may for instance be little scope for trawlers to fish outside the recommended area in the short term because of the fixed gears present in adjacent areas.

7.41 Given the large uncertainties, two assumptions have been used to produce an estimate for the long-term costs of landings affected by the recommended closed area:

- That trawlers would be able to adjust their catches after the first year – this is based on the opportunities for trawlers to catch fish around the closed area and for trawled species to be caught through other methods – this may represent an underestimate of the costs of closure
- That costs for scallop dredgers would continue beyond the first year as it would take them longer to adjust to the closure of the recommended area – this is likely to be an overestimate of the costs as it does not take any account of the possibility that scallops might be caught through methods such as diving, or that scallop dredgers might be able to make up for lost catches by shifting to other grounds or methods.

To test the impact of this assumption we can calculate the cost to scallop fishermen if they do not adjust in the first year but if these costs persist for 5 years or 20 years. The figures presented are for dredgers, not scallop landings, although the total figures are similar (see table 7.3).

PV* for costs to fishermen dredging

Adjustment after 1 year	£163,145
Adjustment after 5 years	£762,390
Adjustment after 20 years	£2,399,836
*3.5% Discount Rate used	

Given the uncertainty over rate of adjustment the assumption that scallop fishermen would continue to face constant costs for a 20 year period following the closure is used. Given the discussion above these figures are likely to present a significant overestimate but give some idea of the impact on the scale of costs if they persist for future years and provide a worst case scenario in the absence of certainty over the speed and scale of adjustment for scallopers.

Therefore, total cost to scallop fishermen from the recommended closure is estimated to be £2,399,836 and total cost to non-scallop fishermen is estimated to be £66,847, which gives a combined cost of £2,466,683.

Indirect Costs

7.42 The exclusion of towed demersal and scallop fishing gears from the recommended area would give rise to a range of potential indirect costs in relation to fishing. These costs are difficult to predict and have not been quantified, but may include:

- Costs associated with displaced fishing effort, including increased gear conflict and pressure on alternative fishing grounds. Increased effort in alternative areas may affect stocks and lead to lower catches per unit of cost, potentially affecting the viability of some vessels. Where gear conflicts arise the loss to a static fisher can be relatively large with costs amounting to thousands of pounds if static gear is destroyed as a result of displaced towed fishing effort. Displacement may also result in environmental costs (see para 7.48)

- Increased fuel and operating costs for vessels which sail further to access alternative fishing grounds, with longer steaming times reducing the time available for fishing,
- Costs arising from gear change (converting to other gear would be costly and vary between vessels)

7.43 The exclusion of towed gears from the recommended area would also provide opportunities for other types of fishing vessel which may help to offset some of the costs to the industry as a whole. These benefits are considered in paragraphs 7.78 – 7.79..

Assessment of Costs to the Fishing Fleet

7.44 There is considerable information available on the likely impacts of the recommended closed area on fishing activities within Lyme Bay. Gathering further information would require primary research on issues such as the detailed distribution of fishing grounds and fishing effort within the Bay and the likely responses of fishermen to a closure. Although such research would add further detail to the understanding of the impacts of a closure, it would be unlikely to alter the overall picture significantly. Despite some inherent difficulties and limitations in the data available, it is possible to build a good picture of the likely impacts of a closure and assess the approximate monetary value of affected catches within acceptable ranges. There is therefore sufficient information on which to consider proportionate measures to protect the Lyme Bay Reefs, particularly in the context of the irreversible damage that continuing fishing with towed gears would cause to them.

7.45 The annual value of current landings by towed demersal and scallop fishing gears within the recommended area is estimated at £229,991 within a range of £183,993 - £275,989, based on sightings data from 1997-2007 and landings data for 2007. This gives an idea of the likely scale of costs, but is unlikely to represent the actual costs to the industry given the ability of fishermen to adapt to the closure. The impacts of the recommended closure would vary significantly for different sections of the fleet within Lyme Bay.

7.46 The most seriously affected vessels are likely to be the four scallopers and trawlers currently based in Lyme Regis who derive income from the scallop fishery throughout its cycle and whose activities are almost entirely restricted to fishing grounds in the vicinity of the Reefs⁵. They would continue to have access to the reefs and mixed ground to the east and west of the recommended area, but would not be able to use their current gear over the majority of their current fishing grounds, which may affect their viability. Unless these vessels relocated to another port, their fuel and travel costs would increase as they would have to cross the recommended area before starting to fish. The MFA advises that these vessels have limited operating ranges and are quite limited by weather factors²⁰. Immediate options for accessing alternative grounds may also be restricted by the presence of fixed gears.

7.47 The recommended area is also one of a number of a number of fishing grounds for vessels based in ports in the west of the Bay and provides an important contribution to earnings in some years. Although much of this fleet would be expected to adapt to the recommended closure, it may affect the viability of a number of vessels from these ports.

7.48 The likely effects of the recommended area on different parts of the fishing fleet operating in Lyme Bay are summarised in table 7.6.

Table 7.6: Summary of affected fishing vessels and likely effects of recommended closed area*

Vessels Affected	Activities	Range	Importance of Recommended Area	Likely Impacts**	Displacement
Visiting scallopers (from e.g. Falmouth, Megavissey, Sussex)	Scalping	Eastern Channel to South Wales - will move where catches are likely to be highest	One of a large number of grounds exploited when stocks are high	1.5% reduction in scallop dredge landings from existing beds in English Channel and Irish Sea	Increased competition and pressure on other UK scallop grounds, may affect some sensitive habitats***
Weymouth trawlers and scallopers >10m (2)	Occasional scalping, Otter trawling for roundfish e.g. whiting, bass, bream and red mullet	Generally within 5 miles of Weymouth	One of a large number of local grounds, generally providing a relatively small part of earnings.	Would be able to maintain catches in other local grounds	Increased competition and pressure on other local grounds
Devon trawlers and scallopers (Concentrated in Brixham, Teignmouth & Exmouth) >10m (22) "Powerful" <10m (24)	Scallop dredging, Otter trawling for flatfish and some roundfish e.g. cuttlefish, lemon sole, red mullet and whiting	Concentrated in western part of Lyme Bay round to Start Point grounds – will occasionally travel significant distances for particularly large catches	One of a large number of local grounds, providing an important part of earnings in some years.	Most vessels would be able to maintain catches in other local grounds – may affect scallop dredge landings and perhaps viability of one or two of the smaller vessels	Increased competition and pressure on other local grounds
Lyme Regis Trawlers and scallopers >10m (1) <10m (3)	Scallop dredging and otter trawling for roundfish e.g. whiting, bass, bream, red mullet, skates and rays	Concentrated in northern part of Bay	Most scallops and catches of most other species currently come from the recommended closed area,	Would be significantly affected by the closure – would need to move further offshore to otter trawl, – opportunities more restricted in adverse conditions – unlikely to be able to maintain catch levels with current gear	Trawling activities likely to move to some current fixed net areas. Any gear changes would lead to increased competition for resources.

Netters, Potters and small “artisanal” fishing vessels <10m (c 90)

Netting for e.g. skates, rays and monkfish, Potting for e.g. crabs, lobsters and whelks. Occasional trawls. Some line fishing, charter trips and diving.

Local

For some vessels 90% of their activities take place within the recommended closed area.

Most activities would be unaffected by a prohibition on towed demersal and scallop fishing gear

Increased opportunities within closed area. May lose some current grounds to displaced fishing effort.

CEFAS²²

* Fisheries information from MFA^{20,21} and

** MFA District Offices (expert opinion)

*** Habitats information from Natural England^{26,27}

Other available evidence on costs to the fishing fleet:

7.49 Two separate studies have been undertaken to estimate the likely costs of closing the Reefs to towed gears. Firstly, Homarus estimated the economic value of scalloping and non-damaging activities (static gear fishing, angling and diving) in the area. They reported the probable range of the economic value of scalloping to be between £198 – 260k per year, and £509k per year for non-damaging activities (based on turnover estimates only). This is useful in providing an illustration of the relative importance of activities in the area but is not considered to provide an accurate estimate of the costs of closing the Reefs to scalloping for the reasons set out below. Other demersal towed gears are not considered. As for the calculations in the paragraphs above it could be considered an underestimate of costs as it does not consider the wider impact on the economy (for example, supporting businesses in the area). The report also assumes that scallop activity is equally spread through the two ICES rectangles, resulting in the recommended closed area accounting for 11.3% of the landings of the rectangles. This is likely to be a considerable underestimate of the importance of the recommended area within the two ICES rectangles.

7.50 Secondly, Seafish completed a submission to the MFA that considered both the direct costs of closing the area and the wider social and economic impact. This study estimated costs and total profit from activity in the recommended area and used two scenarios to analyse the impact of a reduction of scallop landing value and total landing value. This analysis is useful in exploring the effects of different scenarios on economic output and wider society, but should only be considered as illustrative. The results depend on assumptions which may overestimate the true costs, in particular the assumption that all towed gear vessels recorded in the recommended area in 2005 and 2006 always derive a significant proportion of their landings from that area. Scenario 1 assumes that scallop landings reduce by 50% as a result of the recommended closure, which takes the upper estimate of the size of the reduction of landings. Sensitivity analysis would increase the confidence in these results. Scenario 2 assumes that total landings of all fishing activity using all mobile gear sighted is reduced by 25% as a result of the recommended closure. Although again without sensitivity analysis it is not clear if this accurately reflects the degree to which mobile gear vessels would be affected and the potential for vessels to adjust to the recommended closure. As with the calculation in this IA, Seafish is limited by the number of years of data which is available; data is presented for the two year period 2005-6, which were exceptional years for the scallop fishery in the Lyme Bay area and as such may overestimate the average impact on the fleet.

7.51 For further details see the analysis of the Homarus and Seafish data in annex 8

7.52 The MFA, in addition to statistical data, have also provided advice based upon expert knowledge regarding the impact on of the proposed closed area on the local fleet. The MFA have provided estimates based upon landings for all areas (not just the 30E6 and 30E7 rectangles) that relate to 22 over 10m vessels, of which 9 spent time scalloping, and 24 under 10m vessels of which 12 spent some time scalloping. Estimates by local MFA officers, based on their experience, value the catches within the proposed closed area of these vessels at £2.68m of which estimates suggests £1.68m are scallop catches. These figures have been derived by estimating the amount of time spent by vessels in the proposed closed area and calculating the proportion of gross catch that would be derived from the proposed closed area accordingly. This is by nature a rough estimation and has produced an estimate that is higher than total recorded landings for demersal trawlers and dredgers for ICES rectangles 30E6 and 30E7. Given the uncertainty of the estimation and the larger area which this is based on it can not be used as a firm estimate of cost figures for the impact of the closed area but provides an indication of the possible scale of the costs

Conclusions

7.53 In this section, the value of catches that would be affected by the recommended closure have been estimated to represent a net loss to fishermen and crew of £229,991 for the first year within a range of £183,993-£275,989. It has been assumed that trawlers would be able to adapt after the first year, but that scallopers would not be able to do so, giving a present value of lost catches of £66,847 for towed demersal trawlers, £2,399,836 for scallop fishermen and £2,466,683 in total.

7.54 The Homarus report indicates a potential loss in economic value of scalloping in the range of £198,000 – £260,000 annually. The Seafish work estimates loss in the total value of landings for all vessels in the recommended area to be in the region of 25% which equates to a loss in the value of landings of £2.5m (for 2006), this includes landings from all mobile gear vessels sited in the recommended area. The MFA estimates in paragraph 7.52 are based on the experience of local officers and value catches in the proposed closed area at £2.68m. These figures are considered an overestimate as the total value of recorded landings for dredges and mobile gears from the two ICES rectangles in which the recommended area is located was £1.7m in 2006 and £1.5m in 2007. Although there are limitations and caveats around all these figures, they give us an indication of the scale of the impact on costs that can be weighed up against the likely environmental, economic and social benefits of the recommended option.

Environmental Costs

7.55 The recommended closure is intended to secure the conservation value of the Lyme Bay Reefs and to assist in their recovery. It is likely however that the exclusion of towed gears within the recommended area would lead to some increases in fishing effort elsewhere (displacement) as fishermen seek to maintain the value of their catches. In addition to potentially putting pressure on stocks and creating greater competition for vessels already fishing in those areas, increased fishing pressure in other areas may lead to increased environmental harm.

7.56 It is not clear how much effort would be displaced from the recommended closed area. It is also difficult to predict where fishing effort would be likely to increase and how significant this would be in relation to existing activities. It is considered likely however that most displaced effort from the Lyme Bay Reefs area would be focussed on existing fishing grounds in the west of the Bay and around Start Point towards Plymouth (para 7.34).

7.57 Natural England advises that there are a number of sensitive habitats in and around the bay that would be vulnerable to damage by towed gears^{26,27}. These include European Marine Sites such as the Plymouth Sound and Estuaries Special area of Conservation (SAC) and the Exe Estuary Special Protection Area (SPA). These are not thought to be the main grounds to which effort would be expected to relocate and it is not clear that there would be a risk of increased fishing effort causing damage to designated features within these sites. If such a risk did arise additional measures would have to be taken to protect these sites from the impacts of damaging fishing activities.

7.58 The wider area also includes a number of sensitive habitats including further European Marine Sites designated to protect reefs and other habitats of international conservation importance. Measures are already in place in the Isles of Scilly SAC to prevent an adverse effect on sensitive features from scallop dredging, and the Government will be introducing a closure of the Fal and Helford SAC to towed demersal gears. It is not clear that displaced fishing effort from Lyme Bay would create any risk of damage to designated features in sites such as the South Wight Maritime SAC, but if such a risk did arise, similar measures would need to be introduced to protect the features in those sites.

7.59 In addition to existing sites, Natural England is considering a number of areas for recommendation in the summer as potential SACs. Areas that have been surveyed in the south-west include Poole Bay to Lyme Bay, Salcombe to Yealm and Eddystone, and Land's End and Cape Cornwall. Some of these areas may already be fished to differing extents by towed demersal gear fishing vessels. It is possible that increased fishing pressure as a result of displacement in Lyme Bay could lead to some damage of habitats in some of these areas, particularly those close to the recommended closed area.

7.60 Some other environmental costs may arise as a result of the effects of changes in fishing activities, but these are difficult to predict. Increased journey times to new fishing grounds could for instance lead to greater CO₂ emissions from some fishing vessels (though it is also possible that this could be offset by shorter journey times for fixed gear vessels moving into the closed area and fewer journeys by visiting dredging and trawling vessels travelling to the area to fish).

Administrative and enforcement costs

7.61 The recommended closed area would not directly result in an increased administrative burden for the fishing industry.

7.62 The preferred approach for delivering the recommended option is through the creation of a Statutory Instrument (SI) under Sections 5, 5A and 15(3) of the Sea Fish (Conservation) Act 1967(a) to close the identified areas of Lyme Bay to towed gear. This order would provide powers to British sea-fishery officers to enforce the closure. Lead responsibility for enforcement of the SI would likely fall to the Marine and Fisheries Agency though in practice would most likely be undertaken in collaboration with the local Sea Fisheries Committees (Devon and Southern Sea Fisheries Committees). The existing routine patrols undertaken by the SFCs in the area could form the basis for enforcement of the closure. Most vessels fishing in the area are under 15 metres and are not equipped with VMS, making the routine SFC surface patrols operating in the area the most appropriate enforcement measure. All of the recommended closed area lies within 6nm.

7.63 Whilst it is difficult to predict how many infringements of the SI would be likely to take place, expert opinion from the MFA and local SFCs suggests there is a relatively high risk of infringement given the relatively high yields from the recommended closed area. In the event of serious non compliance, additional SFC patrol days may therefore need to be undertaken as well as the possibility of initiating additional Royal Navy patrols. Costs have been therefore provided for 5 additional days above and beyond the existing routine SFC patrols, and 2 additional Royal Navy patrols.

7.64 It is recognised that the recommended closure may result in displacement of some towed gear fishing activity. In particular displaced effort may impact existing closures in the area. The Inshore Potting Agreement around Start Point for example may be impacted by towed gear vessels excluded from the recommended closed area. Where existing closed areas are subject to statutory restrictions therefore additional enforcement activity may result from the recommended closure. Whilst the level of additional enforcement is not predictable an additional 3 SFC patrol days have been included to reflect this possibility.

7.65 MFA advises that the closure being recommended is made up of a relatively large and distinct area. As such the MFA advises that such a closure may lend itself to enforcement through aerial surveillance. Whilst this would not be used for routine surveillance it is recommended as an option if the level of infringement grew to a point where vessel based enforcement was not on its own effective. The table for enforcement cost below includes 4 hours of surveillance per annum.

7.66 A further identified cost is the cost of the SFC or the MFA carrying out a prosecution following an infringement. The estimated costs identified below are for 2 infringements per annum where the SFC or the MFA considers it is necessary to enforce through investigation and prosecution. These figures are based upon expert knowledge³⁰ of similar closures and the measures adopted to enforce them.

Table 7.7 – Annual Additional Costs of Enforcement of Recommended Option

Activity	Cost Per unit (£)	Unit	Number of Units Per Annum	Total Per Annum
Additional SFC patrols	£1,400	Day	8	£11,200
Additional RN patrols	£8000	Day	2	£16000
Aerial Surveillance	£2,000	Hour	4	£8,000
Prosecution / Investigation	£10,375	prosecution	2	£20,750
Total				£55,590
Total NPV				£817,720

Benefits**Contribution to the UK Marine Protected Area Network – Overview**

7.67 Lyme Bay lies within an area of England with a high diversity of marine habitats including estuarine areas such as the Exe, areas of seagrass found in Torbay and Teignmouth, areas of maerl off Beer Head and other reef systems off Start Point. The high diversity of marine habitats in this area is recognised through several existing protected areas put in place to protect marine biodiversity. Examples of these include the Exe Estuary SPA, the Chesil and Fleet SAC, Plymouth Sound Estuaries SAC and the existing voluntary measures in Lyme Bay itself agreed in August 2006. It should be recognised therefore that the recommended closed area is not unique or unusual in this area but in fact fits well with broader marine conservation measures that would help deliver sustainable use of the Lyme Bay area.

7.68 In a wider UK context, Lyme Bay and adjacent areas would also form an important element in delivering an ecologically coherent network of MPAs by 2012. A key benefit of the recommended closed area therefore is the contribution it would make to these strategic goals. Whilst Option A currently provides some benefits the areas closed would not deliver these strategic goals as the areas involved leave a considerable amount of the high biodiversity areas unprotected. The connectivity benefits discussed below for the recommended closed area would likewise not be delivered by the voluntary closures under Option A as the area of these closures is too small to deliver viable populations of rare and threatened species over the course of their life cycle. Option B with a proposed closed area of 25 square miles is also unlikely to deliver the first of the two key elements identified below. Whilst covering a larger area than Option A, it still falls short of the recommended continuous 20km length along the coastline. Figure 7.59 below shows the existing designated areas in Lyme Bay and the Lyme Bay potential area of search.

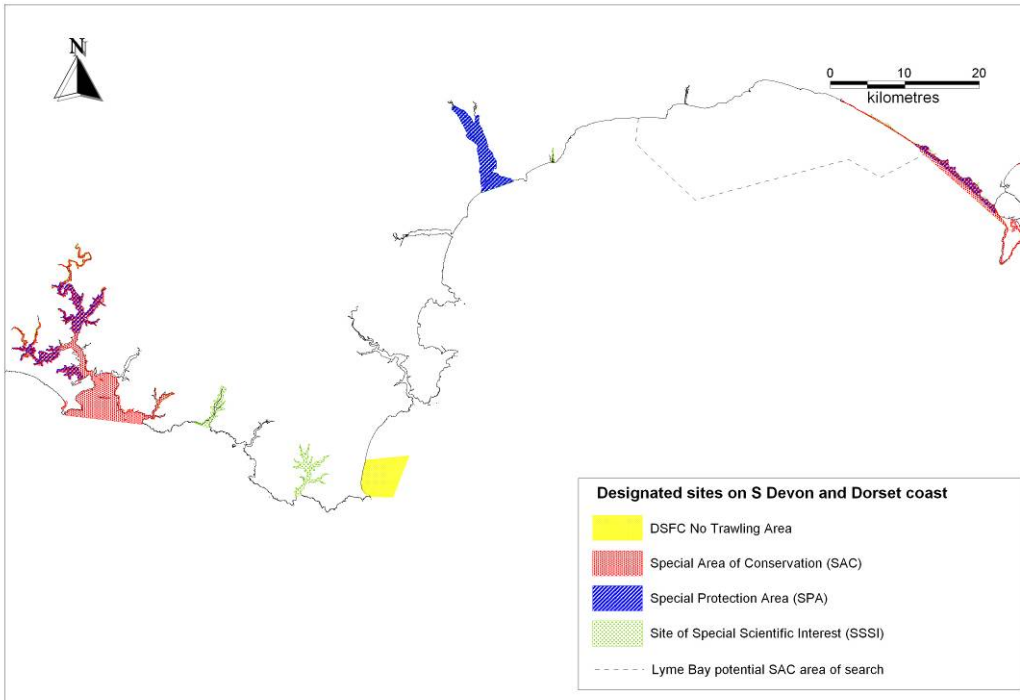


Figure 7.59: Map of designated areas on South Devon and Dorset coast

7.69 Although there is no clear consensus for UK waters on the size and spacing of MPAs needed to constitute an ecologically coherent network Natural England advises that two key elements must be considered:

- Sites are large enough to contain viable populations of a range of mobile and sedentary species during most of their life cycle
- Sites are close enough together to provide reasonable likelihood of larval transfer between protected sites (connectivity between sites)

A key benefit of the recommended option would be that the recommended closure would make a significant contribution to delivering a protected area that in turn delivers the above two key elements. Natural England advise in their response to consultation that in the nearshore area where there are known currents, such as Lyme Bay, protected sites should be no more than 50km apart. Other research³¹ suggests that to be effective MPAs should in addition be a minimum of 20km length along the coastline. The recommended option, in conforming to this spatial model, would create good conditions for transfer of larval and/or adults of a range of marine biodiversity from sessile invertebrates to mobile crustaceans and fish, within and between the sites identified in Figure 7.60 below.

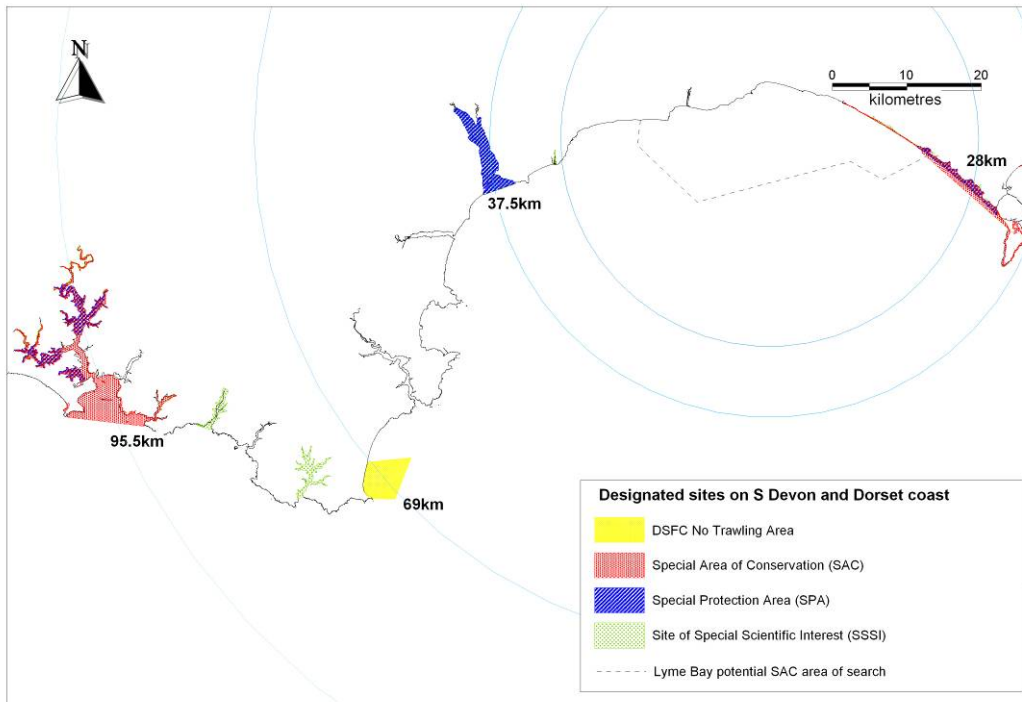


Figure 7.60: Map showing distances between designated areas along S Devon and Dorset coast

7.70 In the local and national context the recommended option would deliver a protected area that would contribute to the development of an ecologically coherent MPA network in accordance with the best available information available on network design. The recommended option would deliver a site that is large enough to support habitats and species at viable population levels as well being located to ensure good connectivity with other protected areas.

Habitat Provision

7.71 The recommended closed area would ensure a significant proportion of the high value biodiversity rocky reefs of Lyme Bay are protected from damaging towed gear fishing practices. Whilst towed gear (demersal and dredging) fisheries are not the only threat to the important reefs in the Bay, Natural England have advised that they are the most immediate and significant threat³². The rocky reefs found in Lyme Bay have been assessed as being one of the top four locations for marine biodiversity in England¹⁵. The marine communities supported by the reef system have been found to be extremely species rich, but fragile. Protecting the rocky reef habitat from damaging fishing practices would maintain the rocky reef system and the richness of the biodiversity, as well as allowing for their natural regeneration.

7.72 In an international context the recommended closed area also host a significant proportion (78%) of the currently known rocky reef habitat in Lyme Bay that may qualify for inclusion in the UK's Natura 2000 network, see Figure 7.66 below. Options A and B offer 19% and 42% respectively and this would not make the significant contribution to the network described below. This network consists of protected areas (Special Areas of Conservation under the Habitats Directive and Special Protection Areas under the Birds Directive) that host species and habitats considered of European importance. These areas are considered to be a critical element in achieving international and global commitments to protect and conserve biodiversity, including the UK commitment to halt the loss of biodiversity by 2010. Natural England is currently considering whether to recommend areas of Lyme Bay for consideration as a European site. A benefit of the recommended closed area would be therefore that the recommended closure would protect the great majority of reef systems potentially of European significance and form a solid basis for establishing the management measures that might be necessary if parts of the Bay are designated as a European Site.

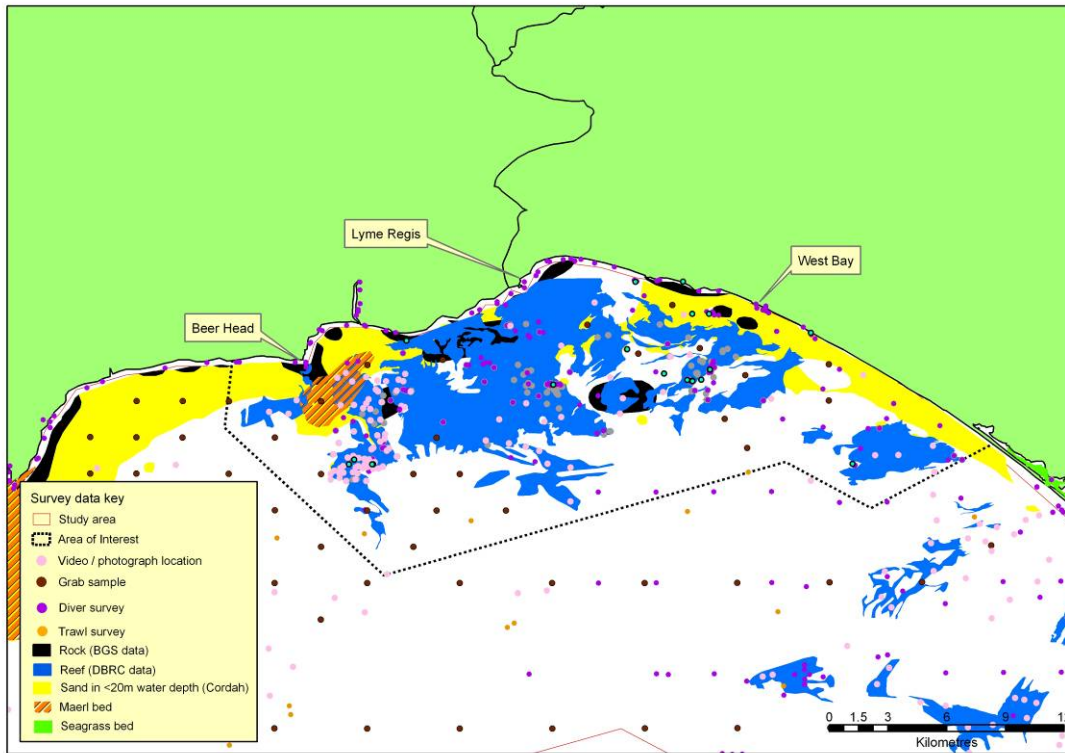


Figure 7.66: Map showing Lyme Bay Area of Search within which reef interest has been assessed against SAC selection criteria (From Royal Haskoning in prep¹)

Species Provision

7.73 In addition to the rocky reefs being of high conservation value in themselves this habitat supports an important range of nationally rare and threatened species. Examples of nationally rare and scarce species such as Sunset cup coral *Leptopsammia pruvoti* Sponges *Thymosia guernei* and *Dysidea pallascens*, Pink sea fan *Eunicella verrucosa*, Anemones *Isozoanthus sulcatus*, *Aiptasia mutabilis*, Sea squirt *Phallusia mammillata* and Weymouth carpet coral, *Hoplangia durotrix*, have been identified in the Reef systems of Lyme Bay.

7.74 The recommended option would result in effective protection of these species which would in turn contribute to the establishment of an ecologically coherent network of MPAs. Furthermore effective protection of these species would contribute to the UK Government’s target to halt the loss of biodiversity by 2010 as well as reflecting a broadly accepted ethical and societal preference to value rare and threatened biodiversity. This preference was clearly indicated in the responses to consultation on the measures necessary to protect the biodiversity (74% of responses to public consultation supported Option C).

Ecosystem Services Assessment

7.75 The UK’s marine biodiversity provides a significant range of high economic value goods and services³³. Whilst values for the goods and services in Lyme Bay have not been subject to extensive primary research the relative contribution to UK goods and services made by the recommended closed area would be likely to be large due to the exceptionally high value of the biodiversity present in the Bay.

7.76 The environmental benefits, or the changes in the environmental benefits provided by the recommended option, are assessed in this IA using the Ecosystems Services Approach (or ‘ecosystems approach’). The ecosystems approach operates by identifying all the relevant services that the ecosystem provides. This has been analysed for this assessment in four overarching categories³⁴: Provisioning,

Regulating and Cultural and Supporting. In the case of the recommended option it is considered that the following services are relevant:

Food Provisioning (Fish for human consumption)

7.77 The closed area being recommended is an important area for several fisheries. Whilst recognising the exclusion of some mobile towed gear from the recommended closed area would incur costs it is important to recognise that the closed area would provide potential benefits for other fisheries. Two broad categories of food provisioning benefits have been identified. First, benefits may be derived from within the closed area in terms of increased opportunities for permitted fishing practices and secondly potential benefits may exist outside of the closed area due to larval export, spillover from the closed area and increased finfish stock levels.

Enhanced Fishing Opportunities within the Recommended Closed Area

Static Gear (Pots) and Netting

7.78 Figure 7.1 above describes the fishing activities in Lyme Bay in 2005/6. Clearly the majority of potting takes place in the area of the Inshore Potting Agreement in the west of Lyme Bay and also around Portland Bill. However a significant amount of potting takes place within the recommended closed area indicating that opportunities for static gear fisheries exist in this area. Whilst there is no primary research available to indicate what the increased level of opportunity for static gear would be, with the exclusion of certain towed gear it is probable there would be some increase. There is not sufficient data on netting activities to assess clearly the current level of netting in the recommended closed area. Areas where scallop dredging takes place do not usually allow for a significant level of netting and it is possible the exclusion of demersal towed gear and dredges from the recommended closed area would result in additional opportunities for netters. However there is no primary research to support this possibility.

Dived Scallops

7.79 There is no detailed primary research available for the value to the economy derived in Lyme Bay from dived scallops and associated businesses. The Homarus Report estimated a value of £20K for scallop collected by divers on a commercial basis though the Report acknowledges this is an unsupported estimate. Whilst this Impact Assessment is unable to provide a monetary value for this activity it is likely that any monetary added value provided by dived scallops would increase with the recommended option. This is because the closed area would provide additional opportunities for divers collecting scallops.

Larval Export, Spillover and Finfish Stock Benefits

7.80 There is evidence to suggest (discussed below) that MPAs can benefit fish stocks. Certainly for some shellfish species research suggests because adult mobility is limited population enhancement within the MPA can take place once damaging fishing practices have ceased. This population enhancement within the MPA can result in fisheries benefits outside of the MPA. There is for example some evidence to suggest fisheries benefits may result for species such as lobsters (and arguably weaker evidence for scallops) in the form of 'spillover'. This is where fisheries benefit from enhanced stocks close to the 'edges' of an MPA due to the movement of stock (usually movement of adult or older juvenile specimens). There is good evidence to suggest that larval export from MPAs can take place for scallop species which can result in enhanced populations for these species in areas adjacent to (or possible at some distance from) the MPA. For finfish stocks evidence of population enhancement is not conclusive.

Scallops (Larval Export)

7.81 There are numerous studies to suggest closed area protection can increase the abundance and mean size of target species and this is particularly valid for sedentary and long lived species such as scallops.

Studies³⁵ indicate that closures can enhance the local reproductive output of a target species and that this in turn can lead to export of larvae to surrounding areas that are open to fishing.

7.82 Scallops are broadcast spawners, with long lived larvae (20 to 40 days) and there is a possibility therefore that based upon experiences at other closed areas³⁶ the recommended closure could result in the increase in the abundance of scallops in the closed area and an export of scallop larvae to adjacent areas open to fishing. It should be noted that any benefits would tend to be in the medium to long term and any larval export benefits would depend upon a number of factors (availability of settlement substrate and other environmental conditions for example), as well as effective enforcement of the closure. Another influencing factor would be the potential impact of permitted fisheries that could influence scallop abundance. Whilst diving for scallops is acknowledged to have a lesser impact on scallop habitats for example concerns have been raised regarding the degree to which this activity can adversely impact scallop populations through hand selection of larger more productive specimens.

7.83 Existing evidence nevertheless suggests that there is a possibility that the recommended closure could result in larval export to adjacent fishing areas which then benefit from increased settlement and recruitment resulting in a fisheries benefit. Whilst it is not possible without further primary research to quantify these possible benefits it is important to note they exist and that they may offset some of the direct costs of the closure.

7.84 This possibility is supported by some evidence to suggest that the prevailing environmental conditions in Lyme Bay result in larval export from scallop grounds at Start Point in a west to east direction. Any increase in scallop abundance in the recommended closed area and resulting larval export would result in the possibility of larval settlement east of the closure.

Scallops (Spillover)

7.85 Scallops are a sedentary species and the published evidence for spillover benefits for this species from closed areas is not extensive. There is some anecdotal evidence³⁶ relating to fishing effort on the borders of a closure around the Isle of Mann suggesting some spillover benefits have been apparent. For this assessment however it is not possible to suggest, without further primary research, that there would be any significant spillover benefits for scallop fisheries from the recommended closure.

Finfish Stock Levels

7.86 Finfish tend to be mobile and the evidence on the benefits of MPAs for these species, in terms of fisheries management, is inconclusive. Research at Start Point³⁷ suggests that a relatively large closed area (the Start Point Potting Agreement) resulted in increased mean weight for what the researchers described as 'Trophy Fish', that is fish of above average weight and of a species that mature early. This may suggest that closed areas can benefit finfish species populations. However the research concluded that such benefits would only likely materialise for relative large closed areas of 500km² or more. The evidence is inconclusive and it is not possible therefore to suggest the recommended option would benefit finfish stock levels as the closed area is considerably less than 500km².

Leisure and Recreation:

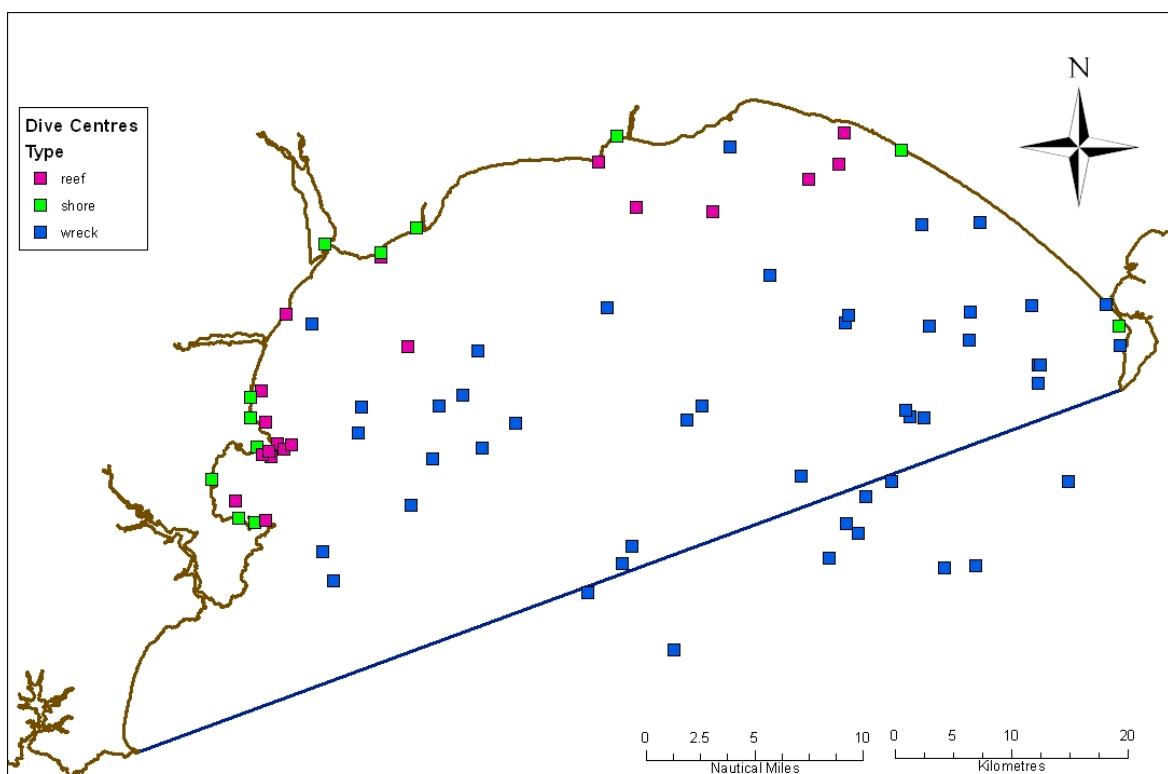
Dive Centres

7.87 Research by the University of Plymouth¹⁹ identified 9 active dive centres in the Lyme Bay area. The activity data that resulted from the questionnaires and interviews undertaken as part of this study are displayed in Figure 7.79. Whilst not exhaustive, the data presented in this study provides a spatial indication of dive centre activity and from this an indicative assessment of the importance of the closed area to dive centre activity can be made. It is not possible to gauge the frequency of dives made since the Plymouth data does not provide this information. Nevertheless the data suggests that Lyme Bay provides

opportunities for commercial dive activity and that in particular dives on reefs take place largely in two distinct areas, the first around Paignton and north of Torquay and the second around Lyme Regis in the area recommended for closure. Clearly the rocky reefs in the recommended closed area already support a level of dive centre activity.

7.88 The Plymouth study estimated a turn over value of £981K for the 9 dive centre businesses identified. This is a value for turnover and does not indicate the value added (profits and earnings) figure for this activity and the study acknowledges these figure were often based on broad estimates. The data indicates the relevant importance of diving for the area but does not allow any conclusions to be drawn regarding the impact of the change. It is likely that the recommended option would provide more opportunities for dives in the closed area due to the lifting of restrictions caused by towed gear fisheries operating in the area. However it is not possible without further research to conclude whether the recommended closed area would result in monetary benefits for dive centre businesses in the area.

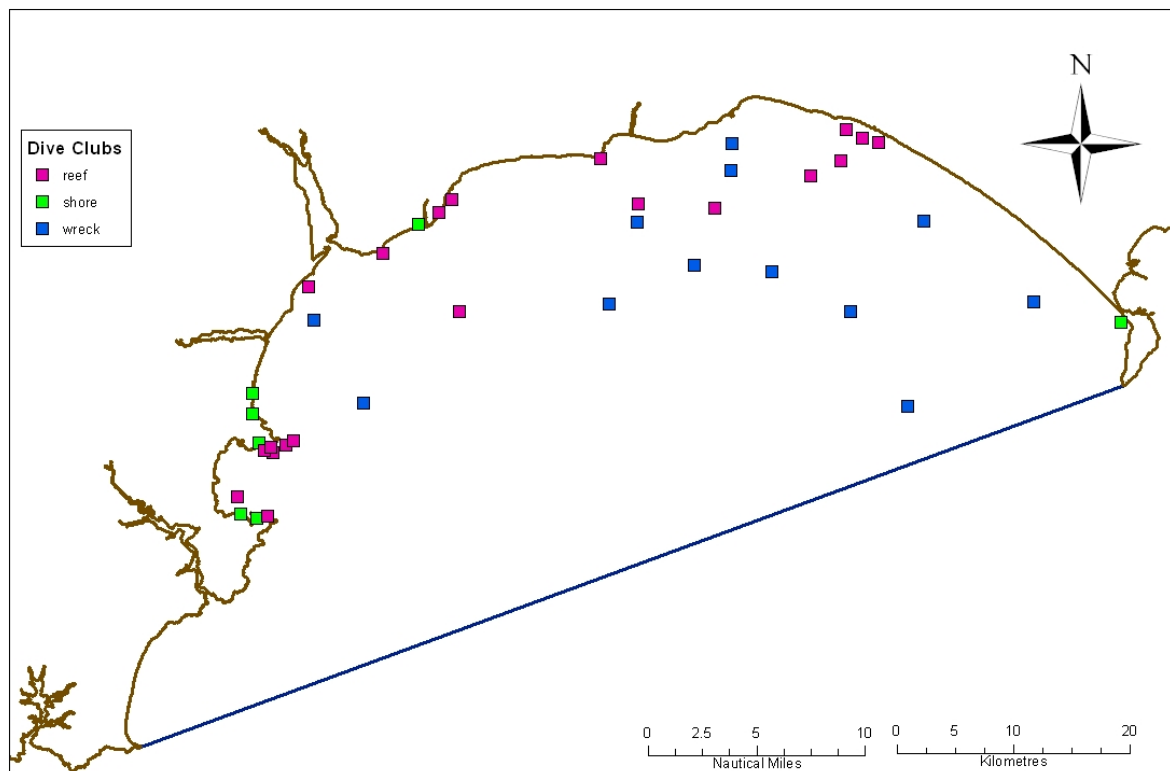
Figure 7.79 Distribution of Dive Sector Activity



Dive Clubs

7.89 The Plymouth study also conducted a survey into dive club activities in Lyme Bay. The survey methodology was limited by the voluntary nature of dive clubs and it was recognised that contacting members to conduct interviews was difficult. In the end an email survey was undertaken and 163 dive club members were contacted. The response rate was relatively low (20 respondents = 12.6%) and 7 of the respondents did not dive in Lyme bay and 3 used limited areas of the Bay. Respondents were asked to list the frequency of visits to dive sites. Figure 7.8 below shows the results of this survey.

Figure 7.8 Distribution of dive club activity by dive type



7.90 Respondents were also asked how often they dived in Lyme bay, how many divers on average per trip and the average cost of a dive trip. Respondents were sorted into three categories dependent on their location, local clubs, day tripper clubs and weekender clubs. For the 13 respondents diving in the Bay the total turnover value for their diving activity was £113,411. As with the turnover value for dive centres this figure gives an indication of the relative importance of diving in the area. It is not possible to draw conclusions regarding the impact of the recommended closed area in terms of possible monetary benefits as no multipliers have been used though it is likely the exclusion of towed demersal gear would provide greater opportunities for local dive clubs.

Sea Angling

7.91 Several studies have been considered in assessing the benefits of the recommended closed area to Sea Angling. Sea angling in this assessment means angling at sea undertaken by charter or privately owned vessels and does not include shore based angling. The activities of shore based anglers are expected to be largely unaffected by the recommended closed area. The studies considered are the Plymouth Study cited above, the Drew Report³⁸, the Homarus Report⁴ and the 2005 Invest in Fish South West report³⁹. Apart from the Homarus Report these studies are not primary research into the impacts of the recommended closed area on Lyme Bay. This assessment has therefore made use of the data provided by the Homarus Report which in turn took data from the Drew and Invest in Fish South West report to draw its conclusions.

7.92 Clear spatial data regarding where sea angling takes place is unavailable and it is difficult to assess the impacts of the recommended closed area on the value of sea angling in Lyme Bay therefore. However the Homarus Report did attempt to estimate the spend of anglers attributable to the closed area under Option C calculated on the proportion of their known area of operation falling within the area. This was for the 2006 period.

Harbour	Activity	Angler Days	Spend per hour (£) ⁴⁰	Total Spend (£)	Proportion of overlap by area of operation	Spend attributable to recommende
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						d closed area
Lyme Regis	Private vessels	1599	87.9	140,552	83%	117,127
	Charter	3744	67.75	253,656	8%	21,109
West Bay	Private Vessel	1950	87.9	171,405	45%	77,132
	Charter	3640	67.75	246,610	13%	31,216
Total				812,223		246,584

Table 7.8; Spending of Sea Anglers In Closed Area (Homarus Report 2007)

7.93. Whilst the figures in Table 7.9 provide an indication of total spending on sea angling in the recommended closed area they do not provide a value for monetary benefits of the recommended closed area as no multipliers to calculate such benefits are available. Nevertheless given the high economic value of this spending there may be economic benefits derived from the recommended closed area on the basis that the exclusion of towed demersal gear would result in increased opportunities for charter and private sea angling vessels.

Non Use:

7.94 Evidence indicates that public has preferences for rare/unusual habitats and species (Beaumont et al 2007)⁴¹. The area ranks as one of the top four reef areas in the UK and responses from the public to consultation indicated a strong preference for the recommended option. This suggests a high bequest and existence value is placed on the Lyme Bay reefs by the wider UK public.

7.95 Table 7.9 below summarises the benefits of the recommended option to be the value of the changes in services under each service relative to the level of services under option A, the ‘do nothing’ option. In the absence of robust quantitative data to inform benefits, the parameters that determine the benefits for each service are considered in turn to form a judgement of the scale of benefits of the recommended closed area, against which costs can be compared. The following parameters are considered:

- The relevance of the service to the recommended closed area.
- The decline of the services under Option A. This considers the decline for each service under Option A as a basis for comparing the increase in services under Option C.
- The increase of services under the recommended closed area compared with Option A.

These parameters are assigned a “level” for each service from a menu of:

- Nil
- Minimal
- Low
- Moderate
- High

A level is assigned to the overall benefits from the recommended option.

7.96 The confidence in the conclusions on benefits is also considered. This is a measure of the certainty in the assessment of the benefits based on the availability and robustness of data and the assessors’ confidence in the judgement exercised.

Resilience and Resistance:

7.97 Biologically diverse environments are acknowledged to be more resilient and tend to better sustain the provision of ecosystem goods and services⁴¹. With the recommended Option C the Lyme Bay reef system would be able to better absorb recurrent natural and human perturbations than is currently the case with the existing voluntary closures. This is because Option C is very likely to result in an increase in diversity, research indicates closed areas to fishing have been shown to help maintain or increase biodiversity, particularly in areas where bottom trawling has previously been permitted⁴². Whilst it is acknowledged the economic value of resilience and resistance of marine ecosystems is huge⁴³ a value for this category is lacking both for the Lyme Bay reefs and for the UK level. It should be noted however that an increased level of resilience and resistance for the rocky reefs in Lyme Bay would likely directly contribute to an increase in the value of all the ecosystem services considered relevant in this assessment.

Table 7.9 : Benefits of the Recommended Closed Area Based on Changes in Services (Habitats and Species and Ecosystem services)

Habitats and Species				
Services	Relevance to Lyme Bay Recommended Closed Area	Option A – Do Nothing Decline	Recommended Option (C2) Improvement	Confidence
Habitat Provision	High. One of the top four areas for marine biodiversity in the UK	High. If unrestricted, certain towed gear fisheries will damage reefs beyond the point where regeneration is possible.	High The recommended closure would protect the majority of the known rocky reef habitat from the most damaging fishing practices. The closure may not provide appropriate management of all threats to the reef system.	High. Lyme Bay is one of the most studied marine areas in the UK and expert opinion universally recognises the threat from certain fishing practices and the consequences of failing to impose restrictions.
Species Provision	High. A range of nationally rare and threatened species supported	High. It is probable if the reef system is allowed to deteriorate the range and level of rare and threatened species supported will decline.	High Rare and threatened species populations are likely to be maintained and may increase.	High. Lyme Bay is one of the most studied marine areas in the UK and expert opinion universally recognises the threat from certain fishing practices and the consequences of failing to impose restrictions.
Eco system services				
Fish for human consumption	<p>High. High level of fishing using mobile towed and static gear. Scallop fished in a cyclic nature. Diving for scallops also takes place.</p> <p>Net Value of affected landings £107,674 - £243,903.</p>	<p>Low. Scallops are exploited in a cyclic or rota basis and this would continue. No evidence to suggest this cycle is not sustainable though further deterioration of the reefs may impact scallop numbers.</p> <p>Risk of significant degradation of non scallop fisheries which in part depend upon a healthy and productive reef system.</p>	<p>Low. Improvement on site due to spillover not quantified but possible in particular in relation to pelagic species and support for adjacent areas through enhanced larval supply likely. However, this may be offset by corresponding decline as fishing is displaced.</p> <p>Increased opportunities for scallop diving and static gear possible.</p> <p>No data available</p>	Low. Very difficult to predict effects of displacement of fishing effort or benefits from closed area due to spillover or increased larval supply.
Leisure and Recreation Scuba diving and	High. High value of spending on diving and Sea Angling Activity	Low. Current level of diving and sea angling may be maintained but further loss of reef ⁴⁶ will likely result in decline in number of	Moderate. Protected reefs are likely to recover and may result in an increase in diving and angling in the area.	Low. No predictive evidence for how reefs would recover or additional benefits from increased diving or sea angling

Summary of Costs and Benefits

7.98 The net value of catches that would be affected by the recommended closure has been estimated at £168,923 in the first year within a range of £104,674 - £243,903, on the basis of the method and assumptions set out in paragraphs 7.14-7.29. This would not translate directly into losses to fishermen and crew as most would seek to maintain the value of their catches by fishing in different areas, or with different gear. The extent to which this would offset affected catches is impossible to predict. The closure would also result in increased fishing pressure elsewhere with potential costs to the fishing industry and environment in those areas through impacts on stocks and habitats. Enforcement costs in the first year are expected to amount to around £55,590.

7.99 The benefits of this policy arise from the protection of one of the UK's most important reef systems & the resulting wider ecosystem benefits for fishers and the UK public. These include the provision of habitat for rare and vulnerable species. These benefits have not been quantified in monetary terms due in part to uncertainty over the scale of impact that would result from the closure. The benefits also include non-use values such as existence and bequest values which can be difficult and costly to determine economic values for.

7.100 A number of economic benefits would be expected to arise from the closure, including protection of the habitats and associated species relied upon for activities such as fixed gear fisheries and recreational diving. The closure would also be expected to increased opportunities for activities such as commercial scallop diving and for static fishing through elimination of gear conflict within the area. It would also be expected to increase benefits from recreational activities (such as diving and angling) and tourism within the area.

7.101 Although it is not possible to compare monetised costs and benefits of the recommended closure it is possible to make a qualitative comparison (see table 7.1). Protection of the Lyme Bay Reefs from damage caused by demersal trawling and scalloping fishing gears is consistent with the Government's policies on conserving important marine habitats and managing fisheries within environmental constraints. In this case, the Government considers that the high environmental benefits of protecting the Lyme Bay Reefs considerably outweigh the costs to demersal trawlers and scallopers, which may only be felt in the short-term.

Table 7.9 Assessment of Key Costs and Benefits

	Costs	Benefits
Environment	Low. Risk that some displacement would adversely effect sensitive habitats.	High. Conservation and potential for recovery of one of the most important areas of marine biodiversity in England.
Fisheries	Medium. Net value of affected landings £107,674 - £243,903 in the first year, but adaptation by fishermen would be likely to reduce this.	Unknown. Gross value of landings from net, pot and dive fisheries would have scope to increase.
Leisure	None.	Unknown. Net value of diving and angling estimated at over £1m and would have scope to increase.
Overall	Medium	High

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

	No	Yes
	No	Yes
	No	No
	No	No
	No	No
	Yes	No
	No	Yes
	No	Yes
	No	Yes
	No	Yes
	No	Yes
	No	Yes
	No	No

A1 Competition assessment

A1.1 The competition assessment filter test asks whether the policy measures would affect market structure; impact on costs of some firms substantially more than others; create additional costs for new firms entering the market; or restrict the ability of firms to compete.

A1.2 The combined effect of the proposals is expected to have a mixed impact on local economies: some fisherman based in ports close to the recommended area and currently relying on scallop dredging for their income would be likely to suffer a significant decline in business, particularly in the short-term, if grounds were closed in line with these proposals. Other fishermen, based further away in the Lyme Bay area who rely mainly on scallops may also suffer a decline in business, particularly in the short-term.

A1.3 Fishers relying on using towed gear for non scallop species may see a decline in net profits but it is not currently possible to assess the scale of any losses. In reality vessels often rely on mixture of dredging and other towed gear and it is not possible to predict precisely what the impacts of the recommended closure would be therefore without knowing what proportion of income is derived by dredging.

A1.4 Fishers using static gear fisheries or recreational users of Lyme Bay may benefit from both the absence of towed dredges and an improvement to reef conditions but increased competition from former towed gear vessels may offset any benefits. The effects of displacement and the interaction of different fisheries is complex and impacts are difficult to predict.

A1.5 For new firms entering the business opportunities for fishing with towed gear would be reduced by the recommended closure. It may be that these reduced opportunities would be offset by increased opportunities for static gear fishing but it is not possible to predict the scale of such opportunities.

A2 Small firms impact test

A2.1 From Section 7 net losses to fishermen who fished in the recommended closed area of between £107,674 - £243,903 have been identified. It is therefore possible the recommended closures would result in some small businesses making an operating loss unless they could diversify in the short term. Vessels most affected would be those who derive a large proportion of their income from the scallop beds in the Lyme Bay area and are based in Lyme Regis or West Bay. There are thought to be four such vessels based in Lyme Regis. Other vessels from the region are thought to be more able to redirect effort to other existing grounds or find new fisheries, though it is recognised that the recommended closure would have some impact on these vessels.

A2.2 The static gear fishery in the closed area would derive benefits from the recommended closure to towed gear vessels as this would open up areas previously unavailable to these fishers. The Homarus Report⁴ identified first sale values of £177K per annum for this fishery. Although some existing grounds may be lost to displaced fishing effort, these benefits are likely to increase.

A2.3 Both scuba diving and sea angling small businesses may see increased benefits from the recommended closure however these cannot be quantified.

A2.3 Commercial scallop diving in the area recommended for closure is thought to provide some economic benefit. The Homarus report suggests a value of £20K though this is an estimate. Any benefits derived from diving in the recommended closed area would likely increase with the area closed to towed gear. It is not possible to predict the scale of these benefits however.

A3 Health impacts

A3.1 Regular physical activity is recognised as playing a role in preventing some illnesses and in ameliorating some existing illnesses. There are also benefits from improved psychological health. It is not possible to quantify the number of people who may benefit from such increased access.

A3.2 Some respondents as part of the consultation process indicated that the recommended option would possibly cause distress for some fishers and their families and dependents. The distress caused would be likely to have a negative impact on the health of those directly or indirectly affected by any closures and subsequent threats to dependent businesses.

A4 Race equality

A4.1 There are no specific impacts in relation to race equality to consider.

A5 Disability equality

A5.1 There are no specific impacts in relation to disability equality to consider.

A6 Gender equality

A6.1 There are no specific impacts in relation to gender equality to consider.

A7 Human rights

A7.1 There are no specific impacts in relation to human rights to consider.

Annex 8 – Analysis of Homarus and Seafish data

Lyme Bay – Homarus report

Objective

The Wildlife Trusts commissioned a report⁴ to estimate the likely economic value of different activities in a proposed conservation zone in Lyme Bay. The objective was to establish the likely economic benefits of scallop dredging, in comparison with the potential economic benefits from non-damaging activities, such as; static gear fishing (potting, netting); recreational fishing (angling); and diving.

Methodology

Data and consultation evidence was gathered from neutral public sources, such as; the Marine and Fisheries Agency (MFA); Sea Fisheries Committees (SFCs); local Harbour Masters and relevant literature.

Due to limited data availability a ‘value-added’⁴⁴ approach to measuring economic benefit was not possible. The report uses ‘total value’ as a measure of economic benefit, which simply takes the total first sale value or turnover from the activity.

The scallop industry follows a cycle of identification of scallops at commercial densities which are then fished down to sub-economic levels over months or years, before effort is diverted elsewhere. Therefore, the report uses a long term average of landing values (over 15 years) rather than a shorter term average, which would not take the cyclical nature into account. The report considered a long term picture to be more representative of what could be achievable in ‘steady state’ production from the proposed zone. Long term historical data was unavailable for recreational Sea Angling and Diving, so the report examined 2006 data.

Scallop fishing values were estimated using three methods:

1. Proportional areas: port landings data (under – 10m and over – 10m) from the MFA gives an indication of productivity in the vicinity of given ports. The proportion of productivity arising from small areas, such as the proposed conservation zone, can only be estimated from local knowledge. Landing values were discussed with local SFC officers to validate estimates. The approximate fishing areas were mapped using Geographical Information Systems (GIS). 15 year average values were recorded in the report.
2. ICES rectangles: A portion of the landings from the proposed conservation zone would be captured within the EU logbook system used to record catches of over – 10m vessels by statistical rectangle. The zone covers part of two ICES rectangles (11.3%). It has been assumed that fishing effort is distributed evenly within the rectangle. This allows the catch from the zone to be calculated from the total catch value of the two rectangles.
3. MFA overflight data: The MFA overflies the UK coast to monitor and enforce compliance with UK and EU fishery regulations. Vessel sightings are recorded and logged by position and type of fishing, one of which is scalloping, another netting/potting. The proportion of sightings in the zone compared to nationally can be applied to the national catch to arrive at an estimate of the relative importance of the zone.

Static gear fishing values were estimated using method (1) and (2). Angling and diving values were estimated using method (1). Landing values for commercial fishing, and spend per head, per day for angling⁴⁵ and diving⁴⁶, have been used as the measures of economic value. Interviews with two harbour masters were conducted to derive local information and perspective of the leisure use in the zone. Detailed information of Angling and Diving trips per year was gathered to estimate numbers of trips per year in the zone. Using the economic contribution of Anglers data from the Drew report, the trip numbers

were used to estimate the economic value of Angling in the zone. The Drew report data was also used as a proxy for economic contribution by Divers, who used the zone.

It is difficult to assess economic values attributable to a relatively small sea area such as the conservation zone proposed in Lyme Bay, and while the report took care to utilise the available public information, the methods and therefore the results are likely to contain a wide margin of error and must be considered approximate although useful in providing a guide to the relative importance of different activities in the proposed conservation zone.

The table below presents the estimates of relative economic benefits derived from the proposed conservation zone. The extreme values, plausible maxima and minima and the probable ranges for commercial fishing benefits are presented. Non-damaging uses of the proposed conservation zone are currently estimated to have an annual economic value of **£509k**. Using the same methodology to compare, scalloping has an economic value range of **£162 – 187k**. However, the economic value estimate for scalloping that is considered probable by Homarus is **£198 – 260k per year**.

Activity in zone	Estimation method (annual economic value)					
	Proportional area	Rectangle base			Probable	Overflight settings
		Max theoretic	Max plausible	Min plausible		
Scalloping	£162k - £187k	£751k	£415k	£67k	£198k - £260k	£145k
Static gear commercial	£177k	£1017k	£135k	£40k	£129k	
Other uses	Angling	£247k				
	Diving	£85k				
	Total	£509k				

Assumptions

1. The study assumes that scallop dredging is damaging to the sensitive biodiversity located on Lyme Bay reef systems, and if allowed to continue at its present rate, the damage would be such that it would prevent other activities which generate economic benefit from taking place in the proposed conservation zone. However, the potential cost to non-damaging activities if trawling continued has not been estimated.
2. Divers spend per day has been assumed to be identical to that of Sea Anglers, due to a lack of available evidence for the diving industry. The report considers this reasonable as both sports rely on the use of vessels, petrol and equipment at roughly equivalent rates, and spend on food, drink and accommodation would also be similar.
3. It has been assumed that within the ICES rectangles the fishing effort is evenly distributed. The zone forms 11.3% of the two ICES rectangles. The report assumes that Cost per Unit of Effort (CPUE) for scalloping is the same throughout the two rectangles and that therefore, the zone generates 11.3% of the total value of scallops from the two rectangles.
4. The report assumes that at least a proportion of scalloping effort can be re-directed to other sites if the proposed zone was closed.

Conclusion

The probable range for the economic value of scalloping in the proposed conservation zone in Lyme Bay is estimated at £198 – 260k, and the estimated economic value of other non-damaging activities in the area is £509k. These are current annual estimates, and it is assumed the non-damaging activities would continue if scalloping ceased. These estimates are considered to provide an illustrative assessment only of the economic importance of the activities within the zone

Lyme Bay – Seafish Submission to MFA

Objective

Seafish produced a submission to the MFA estimating the likely social and economic impact of the proposed closed area zone in Lyme Bay. The submission aimed to build some indications of the nature and scale of the likely impacts of closing this zone to scallop dredging.

Methodology

Seafish carried out the following methodology to estimate the economic impact of closing the zone to scalloping:

1. Estimate current activities in area of proposed area⁴⁷: number and type of vessel, number of on-board jobs, total days at sea.
2. Estimate costs and earnings from activities in area of proposed zone: estimates of financial performance of vessels based on vessel accounts collected by Seafish Economics.
3. Describe impacted activities⁴⁸: identify which activities of affected vessels would be impacted directly due to prohibiting scallop dredging, and those vessels impacted indirectly as a result of displacement of vessels from the zone.
4. Identify likely alternative activities⁴⁹: Identify what affected vessels are likely to do if scalloping is prohibited, e.g. would they fish elsewhere or use alternative gear.
5. Characterise new activities with zone⁵⁰: estimate the likely number of days spent at sea, identify new fishing patterns due to zone.
6. Estimate costs and earnings with zone:

Results

1. The table below provides a summary of the submissions findings regarding activity in the zone. Sightings of mobile gear vessels in the zone in 2005 and 2006 are reported, and the total number of vessels likely to be affected by the zone. It should be noted that the patrol is not active every day so the sighting estimates are likely to be an underestimate of activity.

Summary Table of results

Number of mobile gear vessels sighted in zone

2005 46

2006 80

Average vessels sighted 63

Total vessels affected (direct and indirect, based on registered vessels in the area) 285

Total fishermen potentially affected (direct and indirect) 490 – 575

Total number of days at sea/number of pots affected for sighted vessels (per year) 12,000 trawling days
22,000 potting days (70,000 pots)

The table below summarises the costs and earnings information from the zone activities. Total costs are estimated at 80% of total landings value (approximately £93k per vessel) this leaves approximately £2.5m total profits based on 80 vessels sighted in 2006.

Summary table of costs & earnings

	2005	2006
Scallops landing value	2.6m	£3m
Total landings value in zone	£7.85m (£146k per vessel)	£6,73m (98k per vessel)
Average landings value per vessel	£124k	
Total landings value (80 sighted vessels)	£9.9m	
Average total profits per vessel (2006)	£31k	
Total profit (2006, 80 vessels)	£2.5m	

Seafish identify three or four major scallop beds in the region of the proposed zone. It is expected that the removal of one would have a direct impact on the vessels exploiting the scallop beds in the area. As scallop beds are exploited on a cyclical basis, the removal of one puts increased pressure on those that remain available for trawling. More detailed analysis is currently unavailable.

The only activity that would be prohibited in the zone is dredging and trawling. Steaming through the zone and static gear fishing would continue.

Seafish estimate the zone contains 40% of the locally available scallop beds. They consider the closure of this zone to scalloping would result in increased steaming time for Lyme Bay based vessels, lower catch per unit of effort and lower value of landings for all vessels. They consider it likely that a significant proportion of scallop dredgers would cease to operate or gear conflicts occur as trawled gear is used in areas previously reserved for static gear.

Two impact scenarios were used to provide indications of potential loss of landings value due to the proposed zone. The table below shows the impact of these scenarios on fishing output and the wider impact on society. Multipliers⁵¹ (£4.6m per £1m change in landings of shellfish) are applied to the potential reduction in value of landings. This helps identify the impact of the zone on the wider economy in England, however, it is likely that much of the wider impacts would be constrained to the local region.

Two impact scenarios	Change in Output	Change in employment	Change in GDP
1. Landings reduction of £1.4m (half the value of scallops of affected vessels)	-£6.5m	-175 FTE jobs	-£2.3m
2. Landings reduction of £2.5m (quarter of the value of all landings of affected vessels)	-£11.5m	-315 FTE jobs	-£4.0m

Seafish research has shown that the social impacts of displacing fishing can be considerable. For example, the worry of the financial impact of the proposed closure, concern about increased gear conflict resulting from displacement of mobile gear vessels from the proposed zone, and the personal fear of bankruptcy.

Assumptions

1. Scenario 1 assumes; a 50% (£1.4m) reduction in the landings value of scallops, leading to a decrease in economic output of £6.5m (using multiplier), a decrease in employment of 175 employees, leading to a Gross Domestic Product (GDP) decrease of £2.3m.
2. Scenario 2 assumes; a decrease in total landings value of 25% (£2.5m in Lyme Bay area), leading to a economic output decrease of £11.5m and an employment reduction of 315 employees, leading to a decrease in GDP of £4m.
3. It has been assumed that 80 vessels (number of vessels sighted in 2006) would be affected.
4. Fuel costs assumed to increase by 10% per year.
5. 25% reduction in total landings
6. Assume average vessel costs of £93k, based on surveys
7. The impact on landings to GDP and economic output is determined by multiplying landings reductions with hybrid multipliers.

Conclusion

The Seafish submission to the MFA can only be considered as illustrative of potential costs due to the recommended area. Seafish use two scenarios to estimate the costs imposed on scallop dredgers and the wider economy (25% reduction of all landings and 50% reduction in scallop landings). These limitations of these scenarios should be considered when assessing the costs that they estimate. Testing the assumptions, e.g. the scenarios put forward, and applying some sensitivity analysis around these would give a clearer picture of the potential costs. As the estimated costs exceed total dredge and demersal trawl landings for the 2 ICES rectangles in which the recommended area is located it is clear that these costs represent an overestimate of the costs of the recommended closure.

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