

APPENDIX 3h – OTHER USERS AND MATERIAL ASSETS (INFRASTRUCTURE, OTHER NATURAL RESOURCES)

A3h.1 INTRODUCTION

The coasts and seas of the UK are intensively used for numerous activities of local, regional and national importance including coastally located power generators and process industries, port operations, shipping, oil and gas production, fishing, aggregate extraction, military practice, as a location for submarine cables and pipelines and for sailing, racing and other recreation. At a local scale, activities as diverse as saltmarsh, dune or machair grazing, seaweed harvesting or bait collection may be important.

These activities necessarily interact at the coast and offshore and spatial conflicts can potentially arise. A key consideration of this SEA is the potential for plan elements to interact with other users and material assets, the nature and location of which are described below.

A3h.2 PORTS AND SHIPPING

A3h.2.1 Commercial ports

UK ports are located around the coast, with their origin based on historic considerations including, principally, advantageous geography (major and other ports are indicated in Figure A3h.1 below). In 2007, some 582 million tonnes (Mt) of freight traffic was handled by UK ports, a slight decrease (ca. 2Mt) from that handled in 2006. The traffic handled in ports in England, Scotland and Wales was very similar in 2006 and 2007, differing by less than 0.5%. However, ports in Northern Ireland handled 2.5% less traffic in 2007, compared to in 2006. Over the last ten years, since 1997, inward traffic to UK ports has increased by 21% and outward traffic has decreased by 15%. In 2005 the turnover of the sector was in the region of £8,108m, employing 54,000 people (Pugh 2008).

Grimsby and Immingham is the UK's busiest port, handling 12% of the UK's traffic (equal to 66 million tonnes) in 2007. Other major ports in Regional Sea 2 include London, Felixstowe and Dover, handling approximately 53, 26 and 25Mt respectively (DfT 2008b). In Regional Sea 1, the largest ports are Tees and Hartlepool (50Mt) and the Forth (37Mt), while in Regional Sea 8 the largest ports are Flotta and Sullom Voe, which handle a significant amount of crude oil, some 10 and 17Mt respectively in 2007. Southampton on the south coast is the largest port within Regional Sea 3, handling nearly 44Mt and within Regional Sea 4, Bristol handled the most traffic at just over 11Mt.

Regional Sea 6 includes the major ports in Northern Ireland: Belfast, which handled just over 13Mt) and Larne at nearly 6Mt. It also includes the major ports on the west coast of Britain, the largest of these being Milford Haven (36Mt), Liverpool (32Mt) and the Clyde (12Mt).

There are few large ports in Regional Sea 7, with Glensanda and Clydeport being the two largest. Glensanda only has export traffic almost entirely consisting of granite, amounting to 7.1Mt in 2007, up from 5.2Mt in 2004.

The main origins and destinations for UK traffic in terms of tonnage in 2007 were ports in the Netherlands (58Mt), France (48Mt), Norway (36Mt) and the USA (29Mt). Some 304 million tonnes, 54% of all traffic, was with short-sea countries (Europe and Mediterranean), 124Mt (22%) was with other countries and 138Mt (24%) was domestic traffic. By tonnage, the

largest cargo handled at UK ports is liquid bulk and this totalled 249Mt in 2007, equating to 44% of the total traffic. The main components of this cargo are crude oil (140Mt) and oil products (86Mt). One hundred and twenty-five million tonnes of dry bulk cargo was handled (some 22% of the total traffic), with the main component being the movement of coal.

The UK Renewables service has recently produced recommendations (UK Renewables 2008) which include the requirement to develop at least 8 ports around the UK by 2014 for wind farm construction in order to meet the UK's 2020 offshore wind objectives. Failure to do so may discourage development or lead to economic losses through competition from continental sources. The principal sites identified as potential offshore wind production ports included Nigg, Tyneside, Seaton, Humber and Isle of Grain, as these locations are sizeable enough and in appropriate locations for continental and indicative potential Round 3 offshore wind areas. A greater number of ports around the UK have the potential to assist project construction, but lack suitable facilities for services such as turbine assembly and manufacture of towers, blades, key nacelle components and foundations. In addition to those ports listed above, possible construction sites include Arnis, Hunterston, Belfast, Barrow, Mostyn, Milford Haven, Portland, Southampton, Newhaven, Ramsgate, Shearness, Thames Gateway, Harwich, Lowestoft, Great Yarmouth, Hartlepool, Blyth, Methil, Dundee, Montrose, Peterhead and Deeplaven.

A3h.2.2 Commercial Shipping and Ferry Operations

The shipping industry continues to be the dominant carrier of goods to and from the UK, shipping 426million tonnes in 2005 (to put in context, 2.2Mt were transported by air), with a turnover of £8,820m in 2004 (Pugh 2008). The industry employs 28,100 people offshore, and a total of 98,000, which includes land-based support staff (Pugh 2008).

The North Sea (Regional Seas 1 & 2) contains some of the world's busiest shipping routes, with significant traffic generated by vessels trading between ports at either side of the North Sea and the Baltic (Figure A3h.1). North Sea oil and gas fields generate moderate vessel traffic in the form of support vessels, principally operating from Peterhead, Aberdeen, Montrose and Dundee in the north and Great Yarmouth and Lowestoft in the south (UKHO 1997), which in turn results in busy port approaches at these locations. Oil related operations to the west of Shetland bring regular traffic into Regional Sea 8.

Similarly, there is traffic associated with the gas fields of the eastern Irish Sea with supply trips operating out of ports including Liverpool, Barrow and Heysham. Within Regional Seas 6 and 7, major routes pass on either side of the Outer Hebrides and in the south, the North Channel has moderate traffic bound for the Firth of Clyde and Irish Sea. There is moderate traffic in a north-south direction through the Irish Sea between lanes which link England and Scotland with the Isle of Man, Northern Ireland and the Irish Republic. The Bristol Channel and Liverpool Bay areas are a moderate source of traffic in Regional Sea 4 and 6 as these areas contain several large ports.

Some of the highest traffic densities are located in routes from the Humber, south to the Thames Estuary (Regional Sea 1), Strait of Dover and English Channel (Regional Sea 3). The density of shipping in the Strait of Dover and eastern English Channel is also exemplified by IMO routing in this area in the form of an extensive traffic separation scheme.

In order to aid the identification of areas where shipping could conflict with offshore renewable generation, ship Automatic Identification System (AIS) data has been used to plot vessel traffic around the UK on a 5x5km grid for data spanning four weeks, one from each

month of January, March, June and September 2008. Due to variations in vessel speed and the frequency of AIS data collection (every few seconds), the 'routes' which can be visualised in the resulting map layers (Figures A3h.2 to A3h.5) must be interpreted as indicative only. A number of limitations to the AIS data have been highlighted as part of stakeholder engagement which include:

- AIS data do not represent the distribution of recreational vessels
- AIS data do not represent the distribution of fishing vessels
- AIS data may contain errors; a certain degree of caution must be exercised when interpreting the data. However, the data quality is improving over time
- AIS data are only collected within the range of VHF radio (i.e. line of sight between antennae), which is approximately 80km off the coast. Relays could be placed offshore to extend this range when/where necessary

The AIS map layers presented below also include IMO routing measures which are present at key locations in UK waters. These measures are in place to aid navigation of certain ships or ships with certain cargoes and include traffic separation schemes (e.g. Dover Strait), areas to be avoided (e.g. around Orkney and Shetland), deep water routes which are areas surveyed for obstacles (e.g. west of the Outer Hebrides). IMO routing measures are concentrated around the English Channel, Scilly Isles, southern North Sea, the North Channel and Western and Northern Isles. In addition to the limitations of AIS data, other information gaps come in the form of the whereabouts and use of the sea by non-UK vessels, particularly fishing vessels.

Figure A3h.1 – Shipping density on the UKCS

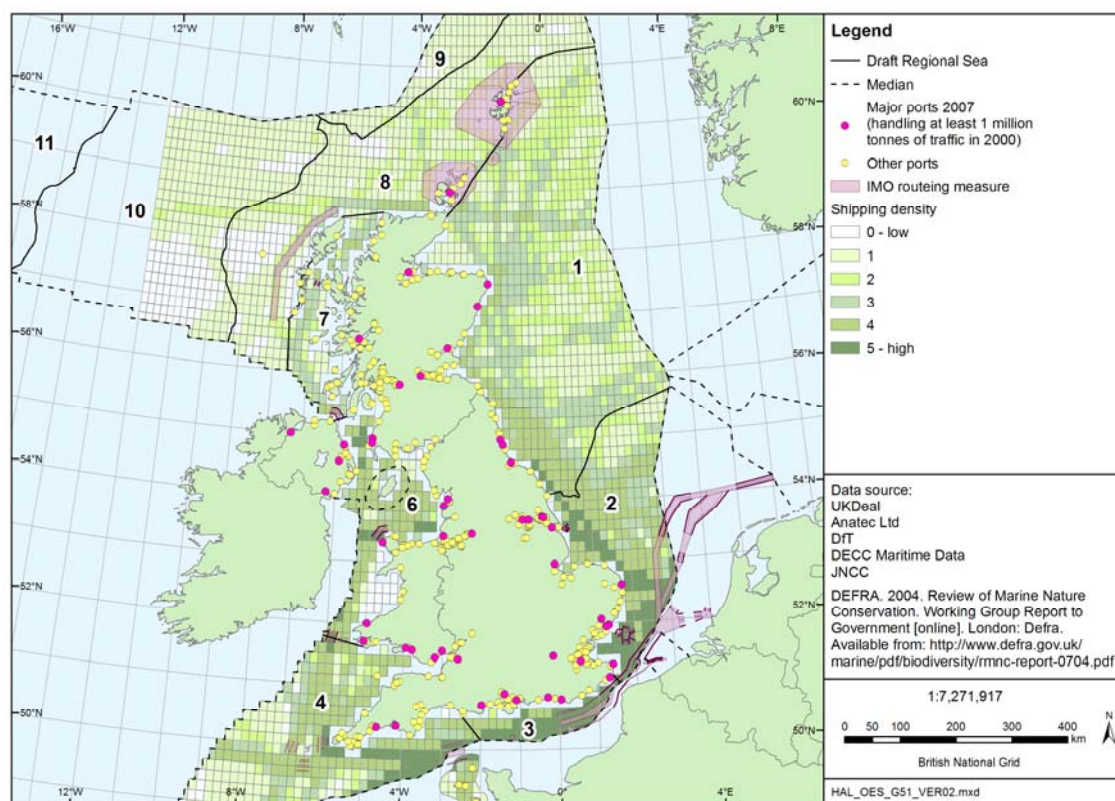


Figure A3h.2 – IMO Routeing and ship AIS tracking, January 1-7 2008

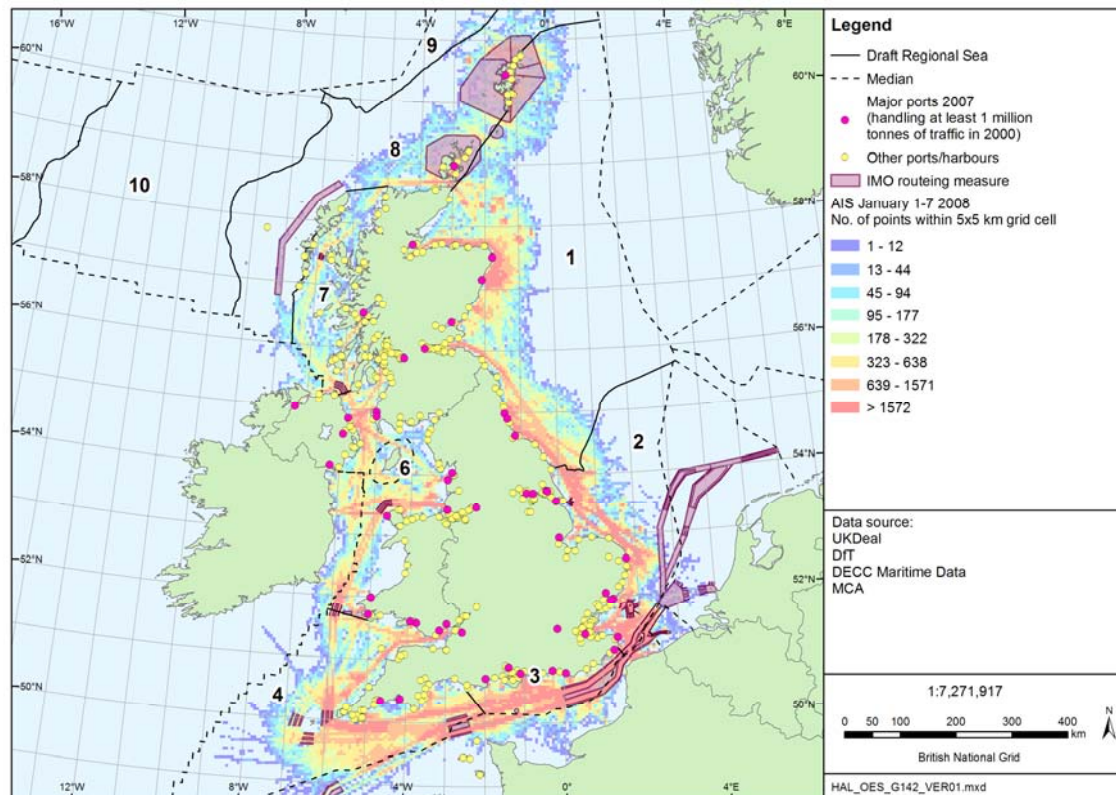


Figure A3h.3 – IMO Routeing and ship AIS tracking, March 1-7 2008

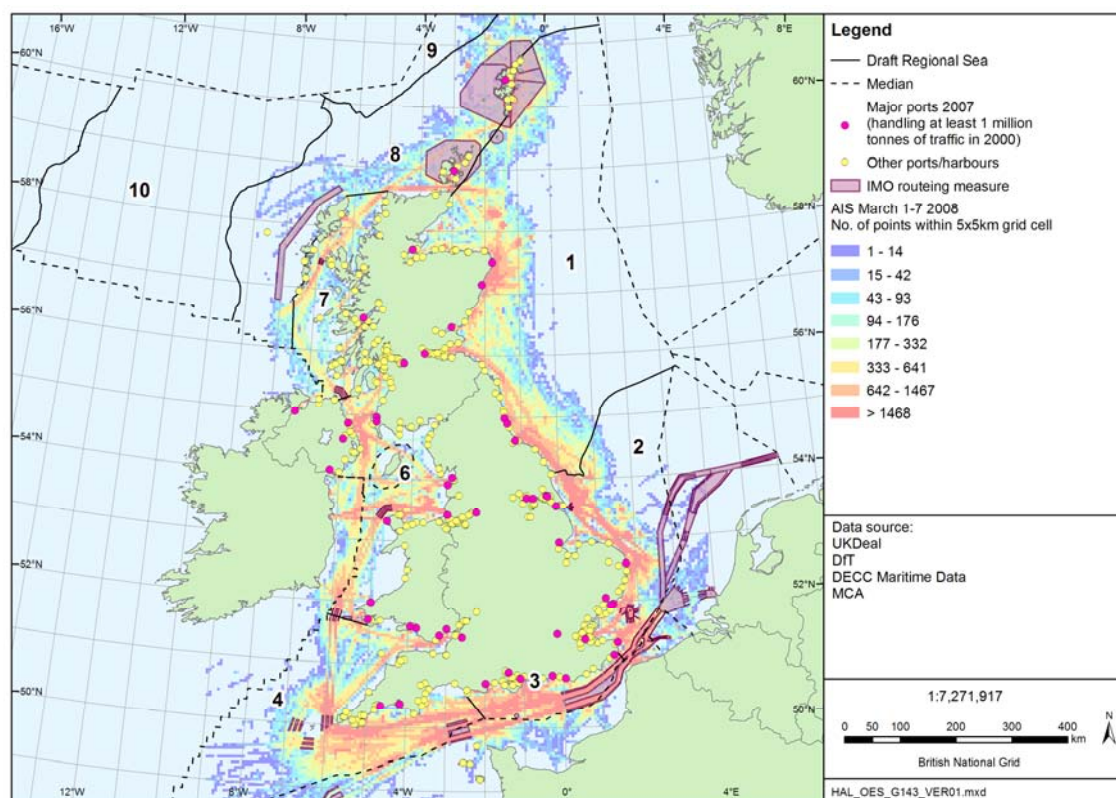


Figure A3h.4 – IMO Routeing and ship AIS tracking, June 1-7 2008

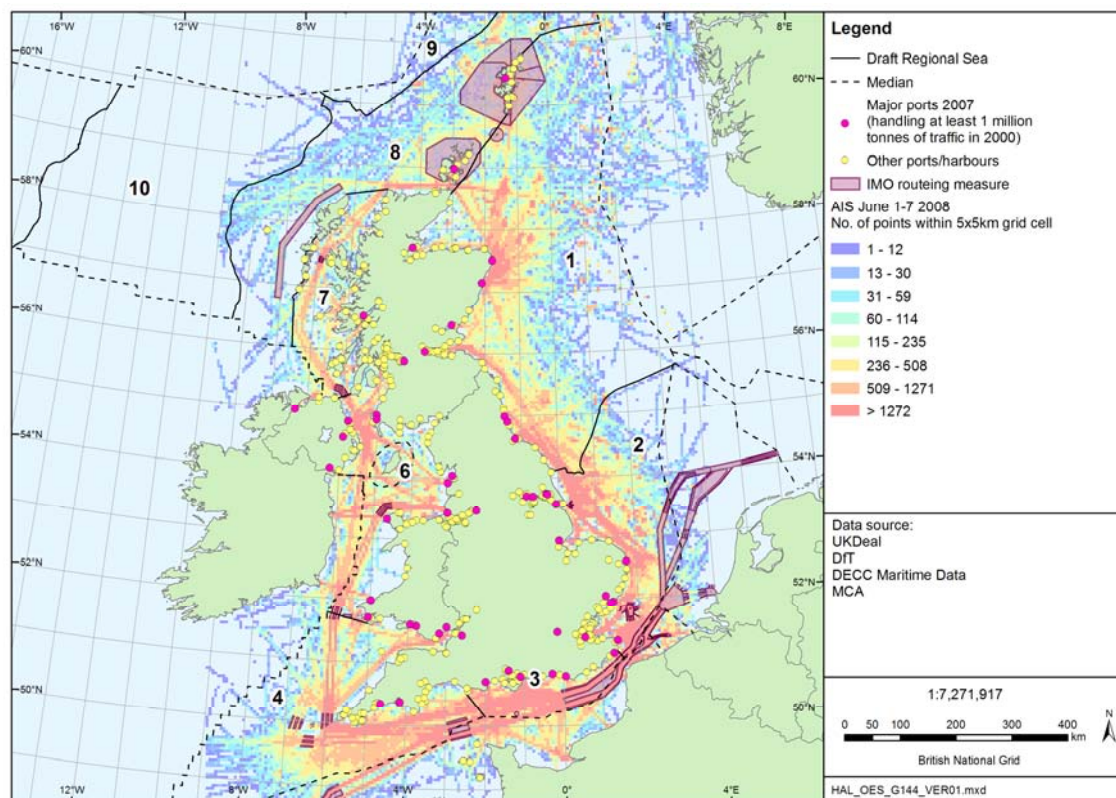
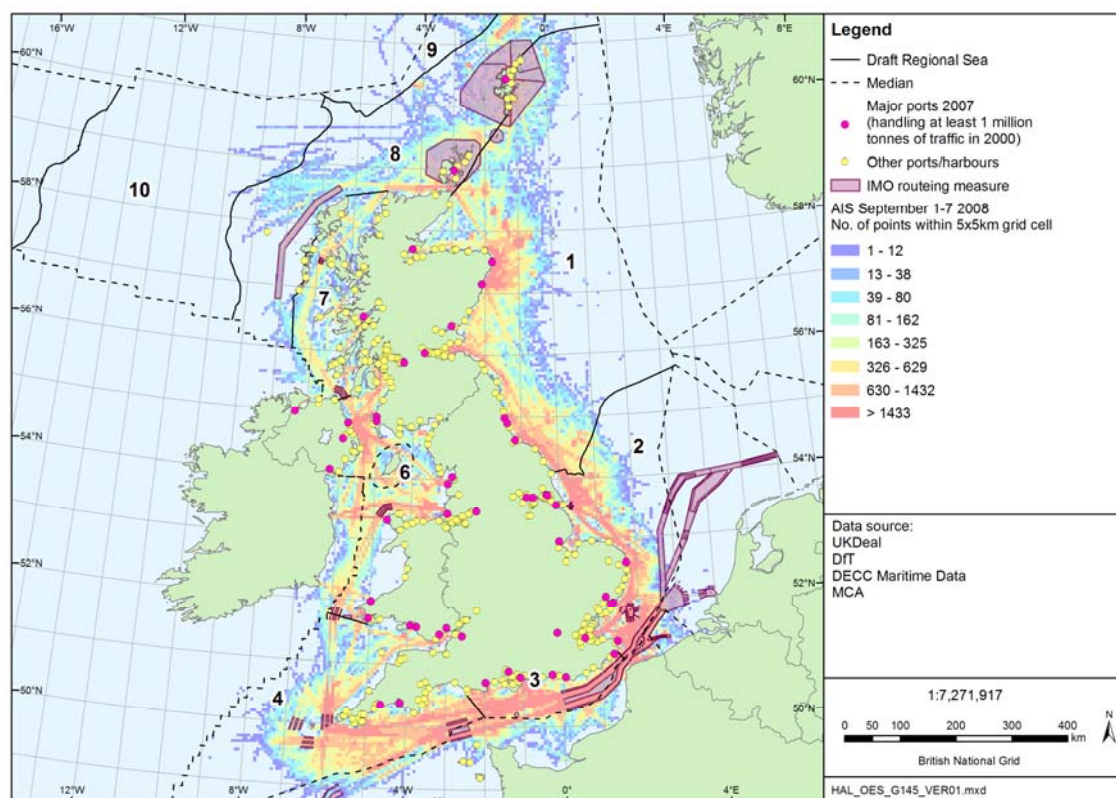


Figure A3h.5 – IMO Routeing and ship AIS tracking, September 1-7 2008



In relation to shipping routes and navigational safety, the Maritime and Coastguard Agency note MGN 371 (replaces MGN 275) provides guidance on UK navigational practice, safety and emergency response issues with regard to Offshore Renewable Energy Installations (OREIs). The note makes a number of recommendations around the themes: considerations on site position, structures and safety zones; and navigation, collision avoidance and communications. A template for assessing the best distance between wind farm boundaries and shipping lanes is also provided, and attention is drawn to the BERR (2007b) guidance on applying for safety zones around offshore renewable energy installations. The MCA guidance indicates a number of scenarios with difference spacing of wind farms from shipping lanes, indicating the relative tolerability of wind farm distances from lanes. The minimum distance at which risks to shipping would be very low is recommended to be a distance greater than 5nm. A number of recommendations are also provided in relation to search and rescue operations, counter pollution or salvage incidents which should be borne in mind during turbine design (e.g. turbines should have illuminated unique identification numbers visible in normal lighting and all tidal conditions, structures should be illuminated for aviation purposes and have high contrast markings, there should be control mechanisms so the OREI can be fixed). In addition to MGN 371 content, stakeholder engagement raised several additional points to consider regarding wind farm site design:

- Search and Rescue operations are easier where turbine spacing is wider
- It can be easy to become disorientated when navigating within wind farms; turbine arrangement in a regular, square grid pattern assists orientation
- Wind farms consisting of a square/rectangular block of turbines are potentially considered safer from a navigational perspective; depending on the location, odd shapes and single turbines pose a greater navigational risk
- Construction phase activities must include appropriate lighting and in some cases safety zones.

A3h.2.3 Anchorages and places of refuge

A number of charted anchorages are located around the UK coast, often in association with port or ferry terminal activities. Table A3h.1 lists the principal anchorages in UK coastal waters.

Table A3h.1 – Anchorages and harbours of refuge

RS	Name	Location	Type
1	Bridlington Bay	North Sea (West)	Anchorage
	Fraserburgh Bay	South side of Moray Firth	
	Banff Bay		
	Cromarty Firth	Moray Firth	Large anchorage
	Inverness Firth		Anchorage
	Sinclair's Bay	Wick	
4	Saint Mary's Road	Isles of Scilly	Open anchorage
	Carrick Roads	England – south coast	Anchorage within estuary
	Dartmouth		Sheltered harbour
	Tor Bay Harbour		Open anchorage
	Portland Harbour		Protected anchorage
	Dale Shelf	Milford Haven	Anchorage
	Sandy Haven		
	Blue Anchor Road	Severn	
	Lundy	Lee of Lundy	

RS	Name	Location	Type
6	Breaksdale Point	West coast England & Wales	Deep-draught anchorage
	Barry Roads		Anchorage
	Holyhead Harbour		Harbour of refuge
	South Haven	Skomer Island	Anchorage
	Caldey Island	Carmarthen Bay	
	Laxey Bay	Isle of Man	
	Tremadog Bay	North Wales	
	Brodict Bay	Firth of Clyde	Anchorage and ferry port
	Campbeltown		Landlocked anchorage
	Strangford Lough	Northern Ireland	Anchorage
	Belfast Lough		
	Carlingford		
	Dundrum Bay		
	Larne Lough		
	Carnlough Bay		
	Red Bay		
	Dundrum Bay		
	Lough Foyle		
	Church Bay		
	Ballycastle Bay		
	Portstewart Bay		
7	West Loch Tarbert, Port Ellen, Port Askaig	Sound of Jura and offshore islands	Ferry terminal and anchorage
	Loch Melfort		Anchorage
	Loch Tarbert (Jura)		
	Tobermory	Firth of Lorn and offshore islands	Fishing port, ferry terminal and anchorage
	Loch Sunart		
	Ballachulish		Anchorage
	Loch Scridian	Island of Mull	
	Loch na Keal		
	Loch Bracadale	Skye	
	Loch Dunvegan		
	Uig Bay	Ferry terminal, fishing port and anchorage	
	Mallaig and Loch Nevis	Sound of Sleat and Loch Alsh	Anchorage in Loch Nevis
	Kyle of Lochalsh		Anchorage in Loch Alsh
	Loch Kishorn	Inner Sound and approach from south	Anchorage
	Loch Carron		
	Loch Torridon		
	Ullapool and Loch Broom	West side of North Minch	Fishing port, ferry terminal and anchorage
	Loch Ewe		Anchorage and fuelling depot
	Loch Glendhu		Anchorage
	Loch Laxford		Anchorage
	Kinlochbervie & Loch Inchar		Fishing port and anchorage
	Castle Bay	Outer Hebrides	Ferry terminal and anchorage
	Loch Boisdale		Ferry terminal and anchorage
	Loch Maddy		Ferry terminal and anchorage

RS	Name	Location	Type
	East Loch Tarbert (Harris)		Ferry terminal, fishing port and anchorage
	Loch Skipport		Anchorage
	Oitir Mhór		Anchorage
	Loch Seaforth		Anchorage
	Loch Shell		
	Loch Eisort		
	West Loch Tarbert (Harris)		
	Loch Roag		Anchorage and harbour of refuge
8	Scapa Flow	Orkney	Large anchorage
	Longhope		Anchorage
	Pierowall Road		
	Veantrow Bay		
	Scalloway	Shetland	Restricted anchorage
	Lerwick		Anchorage and port
	Colgrave Sound		Anchorage (for ships awaiting berth in Sullom Voe)
	Balta Sound & Harbour		Anchorage and port
	Nor Wick		Anchorage
	Loch Eriboll		
		North Scottish coast	

Source: UKHO (1996, 1997a, b, c, 1999, 2004), MCA partial inventory of ports and anchorages

Key: RS=Regional Sea

Safe anchorages are locations around the coast which offer particularly protected environs and good holding ground in which ships can shelter during adverse conditions. Locations include the Caister and Yarmouth road off Great Yarmouth (Regional Sea 2), the lee of Lundy, Clovelly Road, Milford Haven and Saint Tudwal's Roads (Regional Sea 4 and 6). The UKHO sailing directions and charts provide a more comprehensive account of these.

The MCA considers any location around the coast (anchorage or port) a potential place of refuge, which is defined as a location into which a ship in need of assistance can be brought to be stabilised through repair or transshipment of cargo, ultimately averting a pollution incident (MCA website, also see IMO Resolution A.949). Due to the unique nature of each incident, there is no ranking given to any area of refuge.

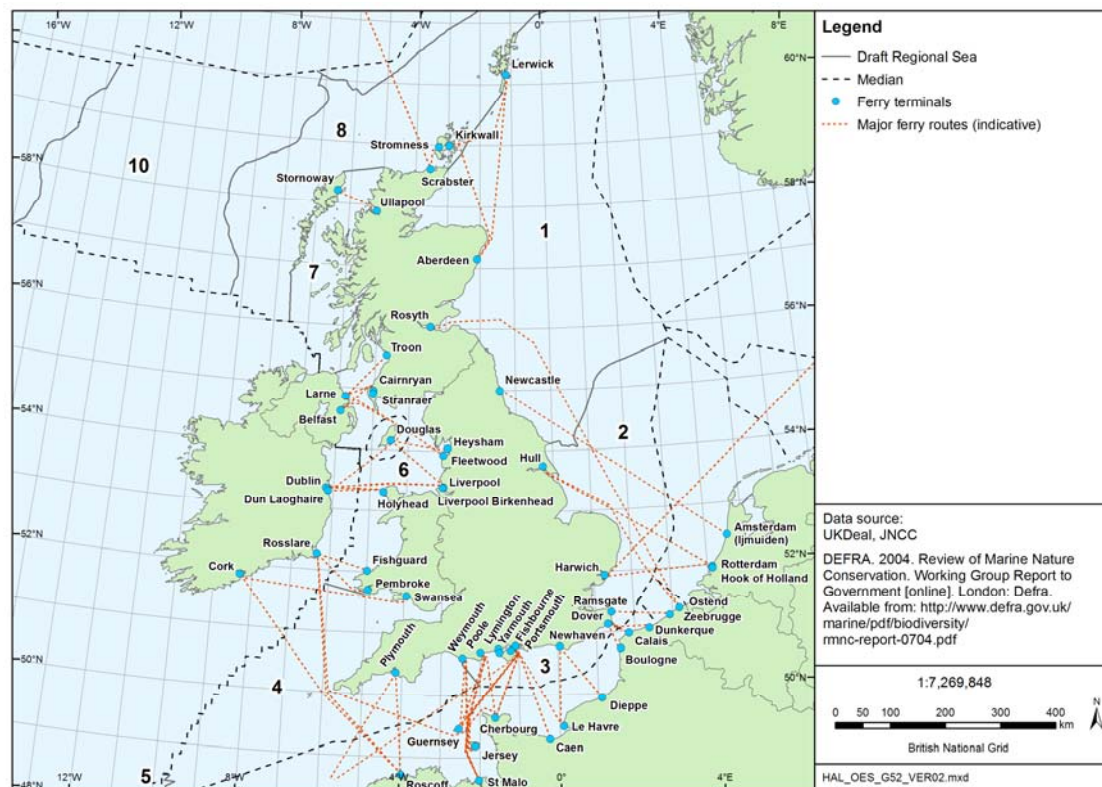
A3h.2.4 Ferry routes

There are a number of regular internal and national ferry routes around the UK (Figure A3h.6). There is a complex network of ferry routes in Regional Sea 7 which connects the numerous islands (e.g. Islay, Coll, Tiree, the Outer Hebrides) to the Scottish mainland (not shown on map). In Regional Sea 6 the North Channel is traversed by ferries travelling between Larne and Belfast to Troon, Stranraer or Cairnryan, while the southern half of the Irish Sea sees traffic between English ports and the Isle of Man and Ireland. The Celtic Sea has ferries travelling between Ireland and Wales and Ireland and mainland Europe.

Ferries depart from numerous ports along the south coast of England and channel hop to the Channel Islands and several different mainland European ports. Ferry routes within Regional Sea 1 are predominately between Aberdeen and the Northern Isles and Newcastle and Amsterdam, and as well as having routes with starting ports originating in Regional Sea

2, the southern North Sea is traversed by routes emanating from the north and travelling to mainland Europe.

Figure A3h.6 – Ferry terminals and Indicative ferry routes



Notes: The ferry running from Rosyth to Zeebrugge was cancelled in 2008. A replacement operator, Norfolkline, will be reviving the route in spring 2009

Following the *Braer* oil spill (5th January 1993), the Donaldson Inquiry of 1994 proposed the establishment of Marine Environmental High Risk Areas (MEHRAs) to protect marine areas of high environmental sensitivity at risk from shipping. An assessment was carried out to identify the environmental sensitivity of the UK coastline and coastal waters. Thirty-two MEHRAs have been established (Table A3h.2) and the location of these are indicated by markings on UK Hydrographic Office charts and through Marine Guidance Notices issued by the Maritime and Coastguard Agency.

Table A3h.2 – MEHRAs around the UK

RS	Sites
1	Flamborough Head; Farne Islands; Berwick, Tees; Holy Island; St. Abb's Head and Eyemouth; Isle of May; Kinnaird Head; Dunbar; Bass Rock; Newburgh
2	South Foreland to Ramsgate (2 MEHRAs); Harwich & Felixstowe (2 MEHRAs); Spurn Bight
3	Portland; Western Solent; Hastings; Dungeness
4	Plymouth; Berry Head
6	Islandmagee, County Antrim; Pembrokeshire Islands; West Islay, Argyll and Bute
7	West Islay, Argyll and Bute
8	Gallan head, Isle of Lewis; South St. Kilda; North St. Kilda; Tor Ness, Hoy; Muckle Flugga; Fethaland, mainland Shetland

Source: DfT (2006)

Key: RS=Regional Sea

A3h.2.5 Recreational Sailing

In response to the lack of information highlighted by the Round 2 Wind Strategic Environmental Assessment (SEA), the Royal Yachting Association (RYA), supported by the Cruising Association, began identifying cruising routes, general sailing and racing areas around the UK. This initial work published in, *Sharing the wind* (RYA & CA 2004), was based on extensive consultation and qualitative data collection from RYA and Cruising Association members. The RYA was then commissioned by the DTI (now DECC) as part of the SEA process, to produce a report describing the recreational boating use within Regional Sea 6 (RYA 2005a). These activities are largely transferrable to the other Regional Sea areas being considered in the current Offshore Energy SEA. Recreational sailing includes:

- canoeing, sail-boarding and personal watercraft limited to a few places inshore
- dinghy sailing in most estuaries in suitable weather and tide conditions
- day-sailing and racing around the coast approximately out to 15 miles
- cruiser passage making between most combinations of yachting base

Unlike surveys of commercial use, there is currently little available survey data to assess the intensity of use of these routes, though consultation with recreational users has led to the generation of indicative routes of varying intensity. The level of facilities available in an area can also be taken as a proxy for comparable levels of intensity (RYA 2005b). Recreational boating takes place ubiquitously along the coast of the UK though there are some notable areas of high usage. Coastal marinas, RYA clubs and cruising routes as well as racing and sailing areas from the RYA cruising routes atlas are shown in Figures A3h7 to A3h.10. Table A3h.3 synthesises information contained in the atlas in relation to each Regional Sea. The routes listed are indicative only and it is recommended that the summaries below are read in conjunction with the RYA (2005b) report.

Table A3h.3 – Indicative use of waters around the UK coast for recreational sailing

RS	Area	Level of Recreational Use
1	North East: Flamborough Head to St Abb's Head	Moderate use, becoming light further offshore. Recreational use concentrated all along coast, with racing also taking place to the south of Flamborough Head.
	East Scotland: The Forth to Wick	Moderate use of the Firth of Forth, Firth of Tay, the north eastern coastal waters and Moray Firth. Recreational use here is centred on the Firth of Forth, Firth of Tay, St Andrew's Bay and the inner Moray Firth.
2	Thames Estuary	High usage made of routes around inner Thames, in the Medway, around Isle of Sheppey and to the Virley Channel and around Felixstowe in the North. Moderate use made of numerous routes connecting Suffolk coast and Kent, extending further north, and east to southern North Sea. Areas off North and east Kentish coast, and off Suffolk coast to the south are used as recreational and racing areas.
	Norfolk Coast, the Wash and Humber	Light use made of numerous routes around the Wash. Moderate use made of routes extending from Norfolk to Humber and further North. Most of area from the North Norfolk Coast and around the greater Wash and Humber used for general recreational use and racing.
3	Portland Bill to Selsey Bill	High use made of a route around Portland Bill and east around St Alban's Head to Poole Harbour. High use made of route connecting Poole Harbour to Solent, extending into Southampton Water and Portsmouth, Langstone and Chichester Harbours.

RS	Area	Level of Recreational Use
	Selsey Bill to Dover Strait	High use made of a route between Littlehampton and the Brighton and Hove area. High use is made of a route between Eastbourne, Rye and east to the Strait of Dover. High use is made of several routes connecting the UK mainland with France.
4	Bristol Channel and Severn Estuary	Heavy use is made of Carmarthen Bay and an area around Caldey Island is used for recreational and racing purposes. Heavy use is made of routes in the inner Severn from Cardiff, Newport, Bristol and Weston-super-Mare into the outer Severn, where moderate use is made of routes along the coast and west into the Bristol Channel
	Celtic Sea and western English Channel	Moderate to light use is made of a number of routes extending in all directions from the Isles of Scilly, along the Cornish and Devon coasts, north into the Bristol Channel and east into the English Channel. High use is made of Falmouth Bay and Carrick Roads and from there east to Plymouth. High use is made of a coastal route extending from Plymouth, around Start Point and north into Babbacombe and Lyme Bay. Mount's Bay, Falmouth Bay, St Austell Bay and an area extending into the English Channel from Plymouth are used for recreation and racing purposes
6	South west Scotland	Heavy use is made of a route from the Crinan Canal, south through Loch Fyne and the Firth of Clyde via the Kyles of Bute and south of the Isle of Bute. Heavy use is made of routes between Arran and the mainland. Numerous, moderately used routes are present in the North Channel.
	The Irish Sea and Liverpool Bay	Extensive, moderate use is made of the Irish Sea and Liverpool Bay areas, which includes routes extending between the western English coast, Northern Ireland, the Republic of Ireland, the Isle of Man and Anglesey. High usage is made of the Menai Strait. Morecambe Bay is used for both general recreation and racing, as is the area along the coast from Anglesey to the Dee Estuary.
	Wales: Anglesey to Pembrokeshire coast	Moderate use is made of routes in Cardigan Bay which traverse between the Pembrokeshire and Llyn Peninsulas and west to Ireland. High usage is made of a route between the Llyn Peninsula west to the Republic of Ireland and east to Pwllheli and Porthmadog. Heavy use is made of routes around the Pembrokeshire Coast from Goodwick, south to Milford Haven and Carmarthen Bay. The waters to the west of Anglesey and the south of the Llyn Peninsula in Tremadog Bay are used for both general recreation and racing activities.
7	North west Scotland	Moderate to light use is made of routes between the west coast, Skye and the Outer Hebrides across the Minch and Little Minch. There is heavy recreational use of routes between Skye, Raasay, Kyle Akin, Kyle Rhea and the Sound of Sleat. Recreational use is most concentrated on near the west coast and within the sounds of the inner Hebrides.
	South west Scotland	Heavy recreational use is made of the Sound of Mull, the Firth of Lorne, the north of the Sound of Jura, and the Crinan Canal. Heavy use is made of routes in the Sound of Luig, Seil Sound, Shuna Sound and Loch Melfort. Recreational use is most concentrated on the many sounds between the islands of the south-west coast.
8	West of the Outer Hebrides	Moderate to light recreational use between Lewis, Benbecula, North and South Uist and St Kilda.
1,8	Northern Scotland and the Northern Isles	Light recreational use of the routes connecting the North East and Moray Firth to the Northern Isles. Moderate use of the Pentland Firth and routes along the northern coast. Recreational use is concentrated around Orkney where there are numerous anchorages, and Shetland.

Key: **Heavy use** = very popular - 6 or more recreational craft may be seen at all times during summer/daylight hours. Includes entrances to harbours, anchorages and places of rescue; **Moderate use** = popular - some recreational craft will be seen at most times during summer daylight hours; **Light use** = routes known to be commonly used. RS = Regional Sea.

Source: RYA (2005b)

Figure A3h.7 – Recreational sailing, north east coast and Northern Isles

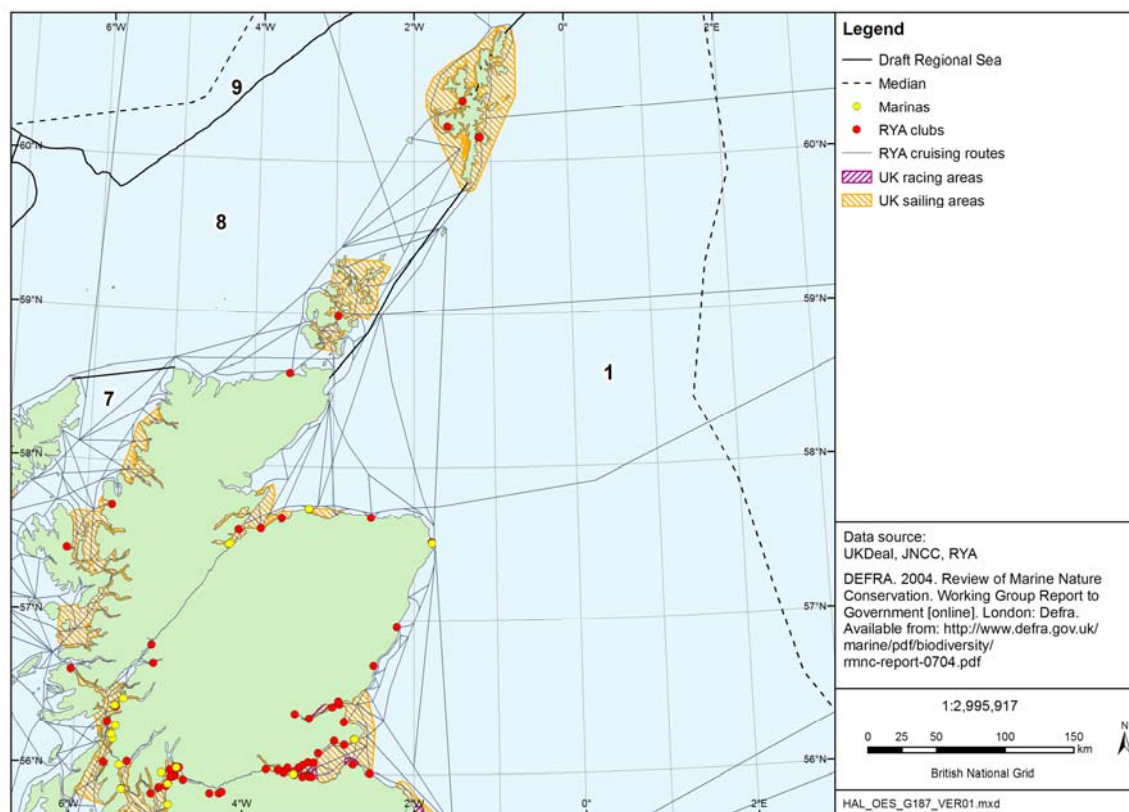


Figure A3h.8 – Recreational sailing, north west coast

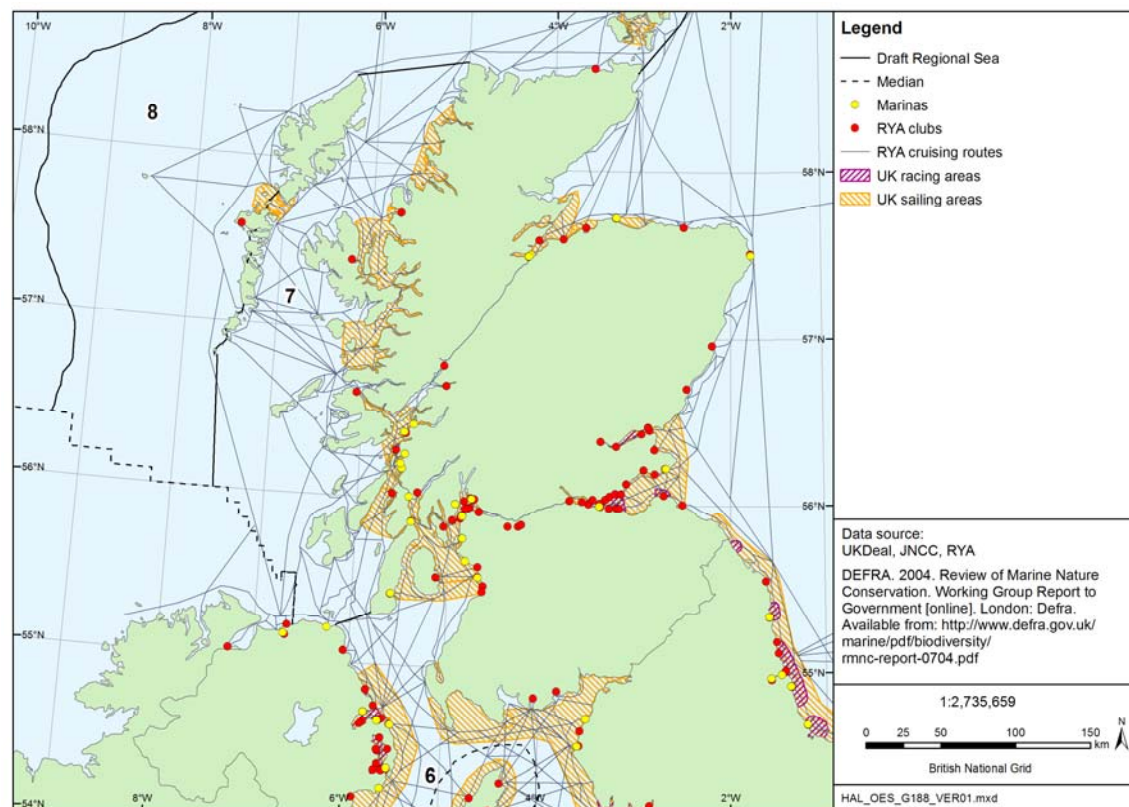


Figure A3h.9 – Recreational sailing, Southern Irish Sea, south west coast and Channel

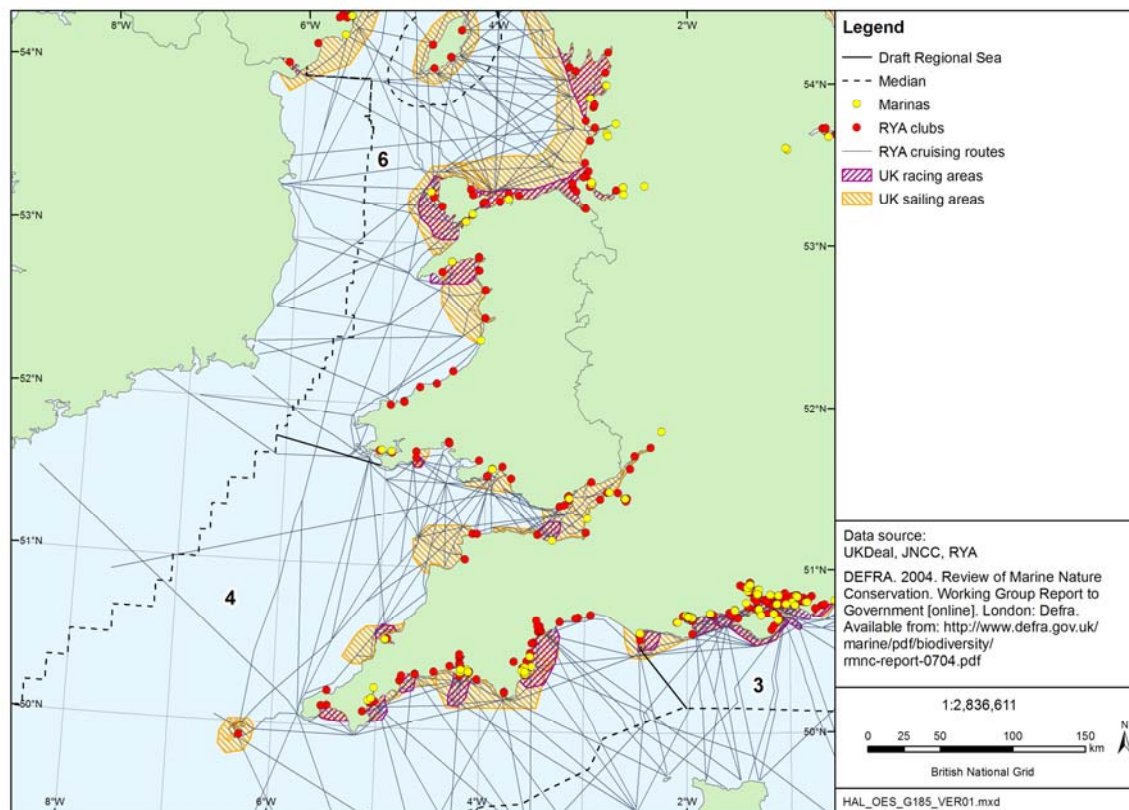
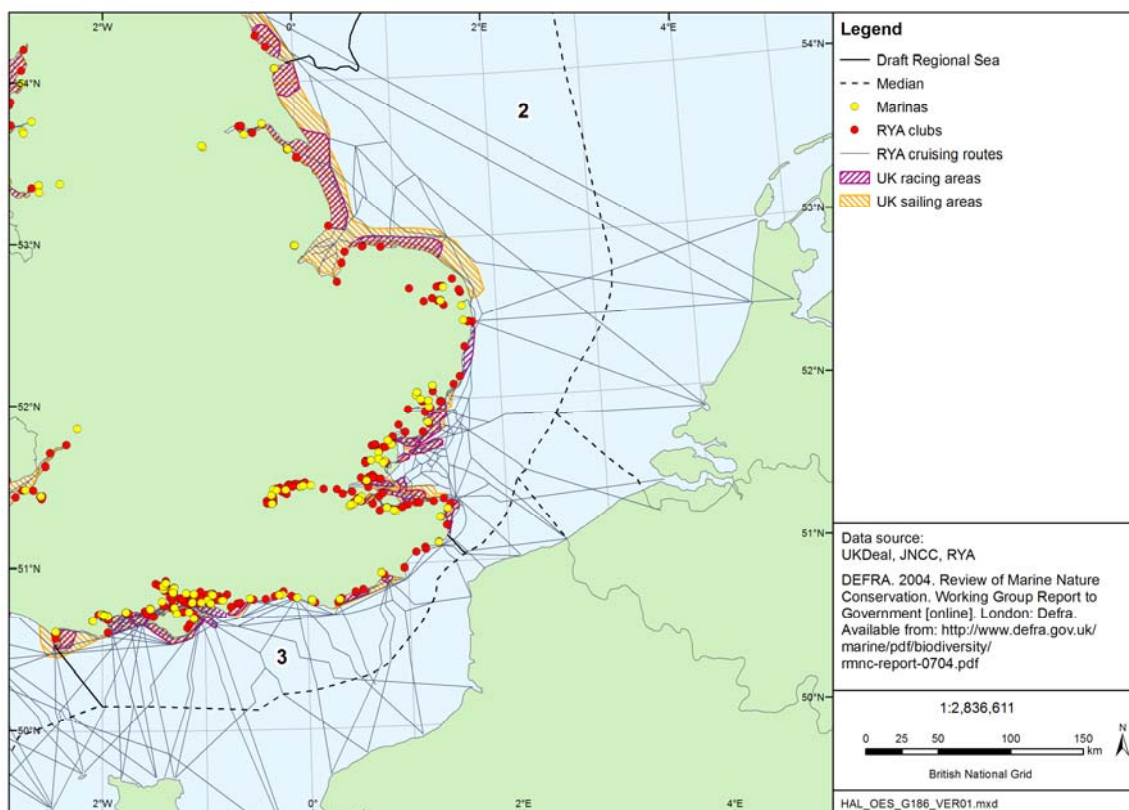


Figure A3h.10 – Recreational sailing, east coast and Channel



A3h.3 AVIATION

Aviation operations may be impacted by wind farm development in two ways; the physical obstruction caused by the turbines and the effect that the turbine structure and rotating blades may have on communications, navigation and surveillance (CNS) systems (including radar and meteorological radar) and other equipment, referred to as technical sites (DTI 2002).

The performance of civil radar may be degraded by the electromagnetic signal generated by turbine motion. Resulting effects include false radar responses and the masking of objects in the sky in the lee of wind farms. Turbine density, individual turbine size, construction material and blade shape are factors which may influence the degree to which radar is impacted (DfT 2008b).

Certain civilian and military aerodromes and technical sites are officially safeguarded to ensure that their operation is not compromised by developments such as wind farms. Safeguarding maps produced for civilian sites indicate areas within which consultation is required before a development takes place (see Figure A3h.11). A 15km buffer is colour coded to indicate the height above ground level for which any proposed development must be consulted. A 30km buffer delineates the area for which a local planning authority is required to consult the relevant aerodrome regarding any wind turbine proposal. The safeguarding of military technical sites is conducted on a case by case basis.

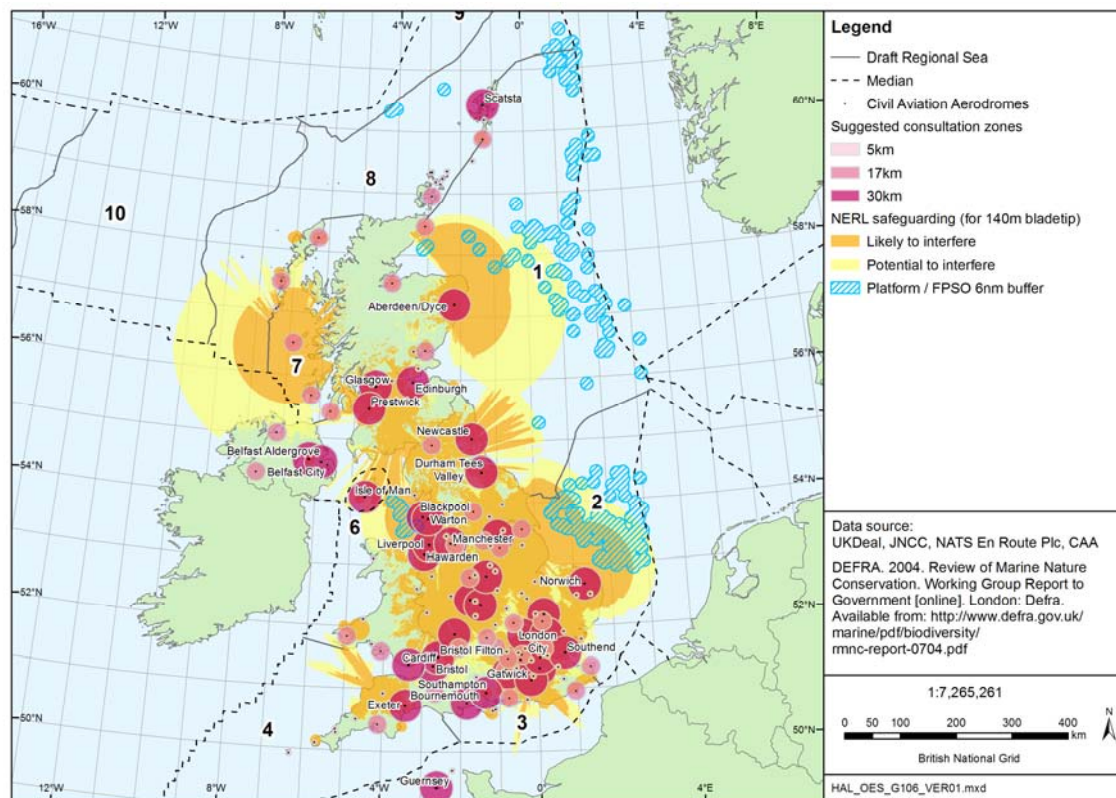
Similar effects can generate operational problems for NATS En-Route Ltd. (NERL), the air traffic service for aircraft flying in UK airspace, and over the eastern part of the North Atlantic (NATS website). NERL has made available map data indicating the likelihood of interference from wind turbines on its radar network (see Figure A3h.11) for a range of blade tip heights (20 to 140m). These buffers are indicative, and do not affect the consultation requirements for formal planning applications set out in The Town and Country Planning (Safeguarded Aerodromes, Technical Sites and Military Explosive Storage Areas) Direction 2002 (BWEA website b). NERL is working with Raytheon, its radar manufacturer, and with output stage radar data in order to try and mitigate some wind turbine effects, though these are still in development (NATS 2008). In recognition of the potential for larger offshore wind turbines, NERL have prepared line of sight coverage maps for tip heights up to 200m. Drafts have been made available to the SEA in hard copy and are not shown in Figure A3h.11. The increase in tip height from 140m to 200m typically extends the line of sight by around 10km.

Additional aviation related constraints are associated with offshore oil and gas surface infrastructure. The CAA indicate the need to maintain 6nm radius obstacle-free zones around platforms and FPSOs (Floating Production, Storage and Offloading vessels) to ensure helicopter activities are not impacted during routine flights, Missed Approach Procedures (MAP) and in emergency evacuations (CAA 2006). The approach of helicopter traffic is into the wind and so may be from any direction, and a typical minimum decent height of 200ft during the day and 300ft during the night, is achieved within 2nm of the destination. Wind turbine placement may impact on helicopter activities within this 6nm zone in a number of ways:

- steeper and quicker descents
- obstacles to MAPs
- more complicated platform rescue operations
- economic impacts and possible cessation of viable helicopter activity

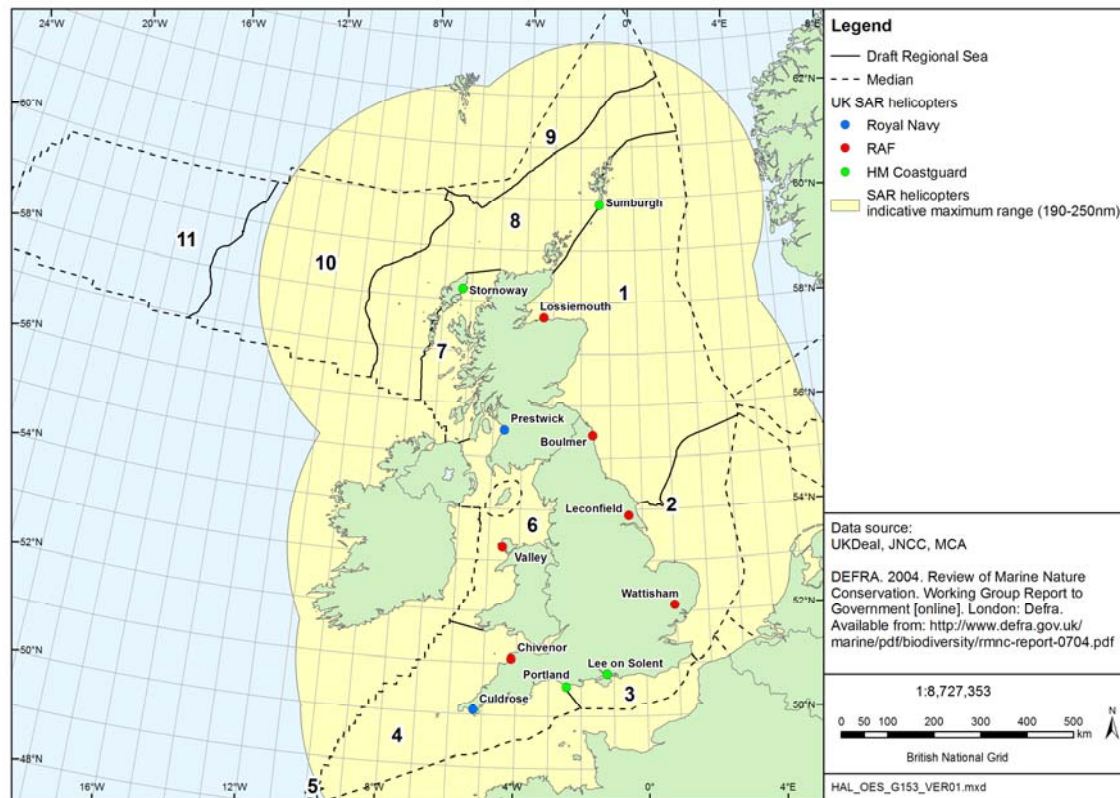
Obstacle-free zones are primarily distributed in the North Sea, west of Shetland and eastern Irish Sea, coincident with oil and gas infrastructure (Figure A3h.11).

Figure A3h.11 – Possible aviation related constraints



Helicopter based Search and Rescue (SAR) operations are coordinated from a number of bases throughout the UK, operated by HM Coastguard and the MoD (Figure A3h.12). HM coastguard operates four SAR helicopter units providing suitably equipped helicopters and facilities at Sumburgh Airport (Shetland), Stornoway (Isle of Lewis), Portland and Lee-on-Solent (MCA 2008). The helicopters are capable of working at night and in all weather conditions for civil maritime and civil aviation SAR and medical evacuation from ships and offshore installations. In addition to these services, the MoD (Navy, RAF) SAR network may render assistance to persons, aircraft or vessels in distress when required, though they are principally involved in military operations, exercises and training (MCA 2008). These consist of a network of RAF Sea King helicopters operating out of Boulmer, Chivenor, Leconfield, Lossiemouth, Valley, Wattisham, Culdrose and Prestwick. These helicopters have full day/night and all weather capability, and include night vision goggle, search radar and thermal imaging capabilities. The RAF helicopters have a radius of ca. 250nm with an average operating time of 6 hours, whereas the naval helicopters have a response radius of ca. 200nm and an average of 4.5 hours operating time, which may be extended through the use of refuelling sites.

Figure A3h.12– UK Search and Rescue (SAR) helicopter response bases



A trial of helicopter SAR operations at the North Hoyle wind farm, off the North Wales coast, was performed in 2005 (MCA & RAF 2005). A number of constraints on safe helicopter operation within the wind farm were observed which included:

- Target vessels within 100m or wind turbines were difficult to distinguish due to radar side lobe returns from structures
- The inability to lock the movement of turbines poses a potential hazard
- Approach distances are limited in clear weather
- Inability to conduct a rescue in restricted visibility
- Tracking of the helicopter by shore-based radar was poor
- There was an increase in the aircraft power requirement
- There were limitations on helicopter radar search platforms in large and irregular wind farms
- Thermal imaging camera use was less effective in mist and precipitation, though clearly identified persons, turbines and vessels in dry weather
- There was no influence on compass operation
- VHF radio was affected

A3h.4 MILITARY ACTIVITY

Practice and Exercise Areas (PEXA) charts, produced by the UK Hydrographic Office, provide information relating to military activity within the UKCS. These are kept up to date through the Admiralty Notices to Mariners (NMs) service and show areas which are in use, or available for use by the Ministry of Defence for military practice and exercises. PEXA designations occur in every Regional which meets the coast and in Regional Sea 10 (Figure A3h.13, Table A3h.5).

Airforce training areas have a primarily eastern distribution, extending from the area around the Dogger Bank, north to east of Aberdeen, and encompassing the entirety of the Moray Firth, Caithness and much of Orkney (Regional Seas 1, 2 & 8). There are a significant number of activities associated with airforce training area which includes: Air to Air Firing, Air Combat Training, High Energy Manoeuvres and Bombing.

The UK low flying system (LFS) allows training within the whole of the UK airspace and seas out to 3nm from the shore, and encompasses a vertical distance from ground level to 2000ft – the operational heights of aircraft within low flying range are listed in Table A3h.4 below. Low flying is unlikely to impact upon offshore wind farms as no designated Tactical Training areas are present over the sea, and any possible interference can be resolved through appropriate consultation, charting and lighting of developments (DTI 2002).

Table A3h.4 – Operational altitude for low flying military training aircraft

Elevation	Maximum potential height of turbine	Description of activities
< 2000 ft	No interference	Fixed wing low flying
< 500 ft	Possible Interference from turbine below 500ft (assuming 140m bladetip)	Low flying for helicopters and specified training aircraft
< 250 ft		Limit for low flying fixed wing aircraft – outside Tactical Training Areas
100ft		Limit for low flying fixed wing aircraft – inside Tactical Training Areas
Ground level		Limit for helicopter training

Source: DTI (2002)

Military radar, like civilian radar, may suffer from degraded performance due to wind farm operations (see sections above). Military radar tends to be more sophisticated and may be able to filter out some interference (though this still requires some research), but those used for civil aviation may not be able to do this (DTI 2002). It was previously MoD policy not to let any wind farms development take place within 74km of Air Surveillance and Control Systems (ASACS) if it would be in the direct field of view (Figure A3h.14).

Naval operations encompass almost all of Regional Sea 7, parts of 6, much of 3 and 4, and the greater Thames Estuary in Regional Sea 2. In Regional Sea 1, naval exercise is concentrated on the Firth of Forth, and activities include the use of marine counter measures and explosives training. The only other military activity takes place off of the North Yorkshire coast at the Flamborough Head submarine exercise area. In Regional Sea 2 activity takes place almost exclusively in the vicinity of the Outer Thames where practice using marine counter measures takes place. This Regional Sea also includes a submarine exercise area in Outer Silver Pit. In Regional Seas 6 and 7, most operations consist of general air exercises, non-firing exercises involving HM ships and submarine exercises. Regional Seas 3 and 4 are used principally for Naval training, and many areas in, particularly in Regional Sea 4, are considered danger areas, being used for general firing, surface to air firing, surface to surface firing, smoke, pilotless target aircraft and general submarine exercise. A limited amount of army operations also take place in Regional Sea 4 around St Alban's Head, and Carmarthen Bay and St Govan's Head, consisting of firing and the demolition of unexploded ordnance.

Figure A3h.13 – Location of PEXA areas

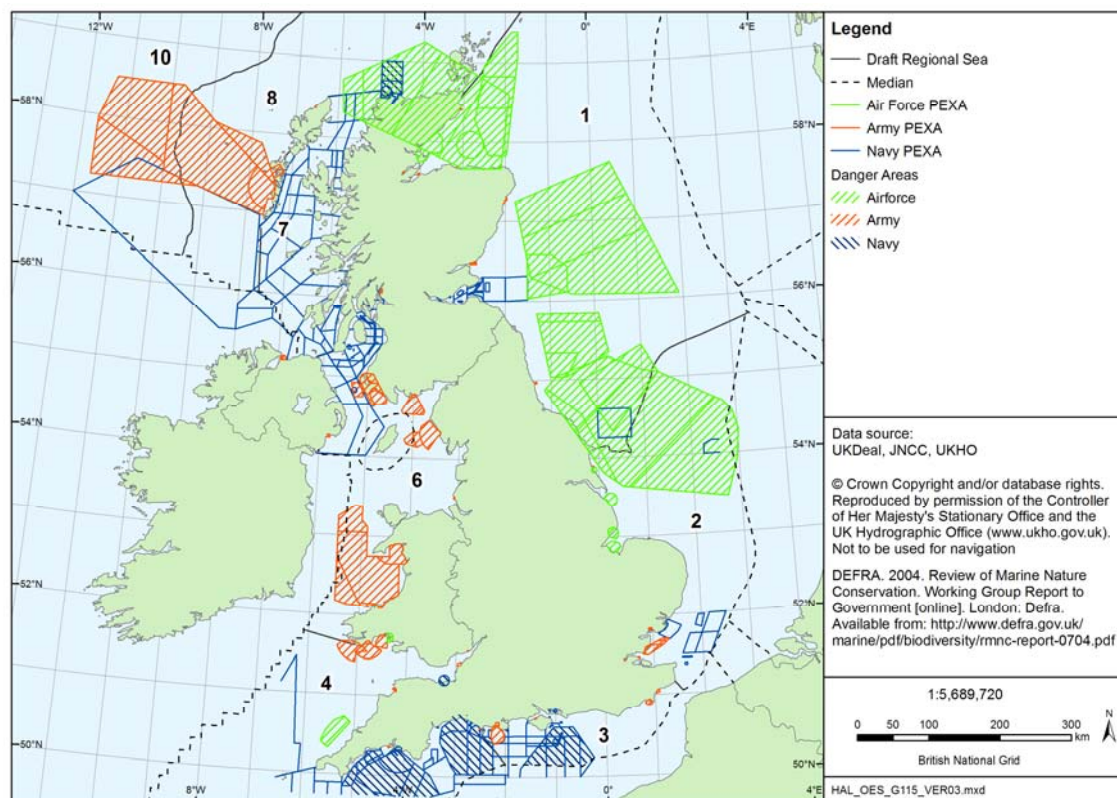
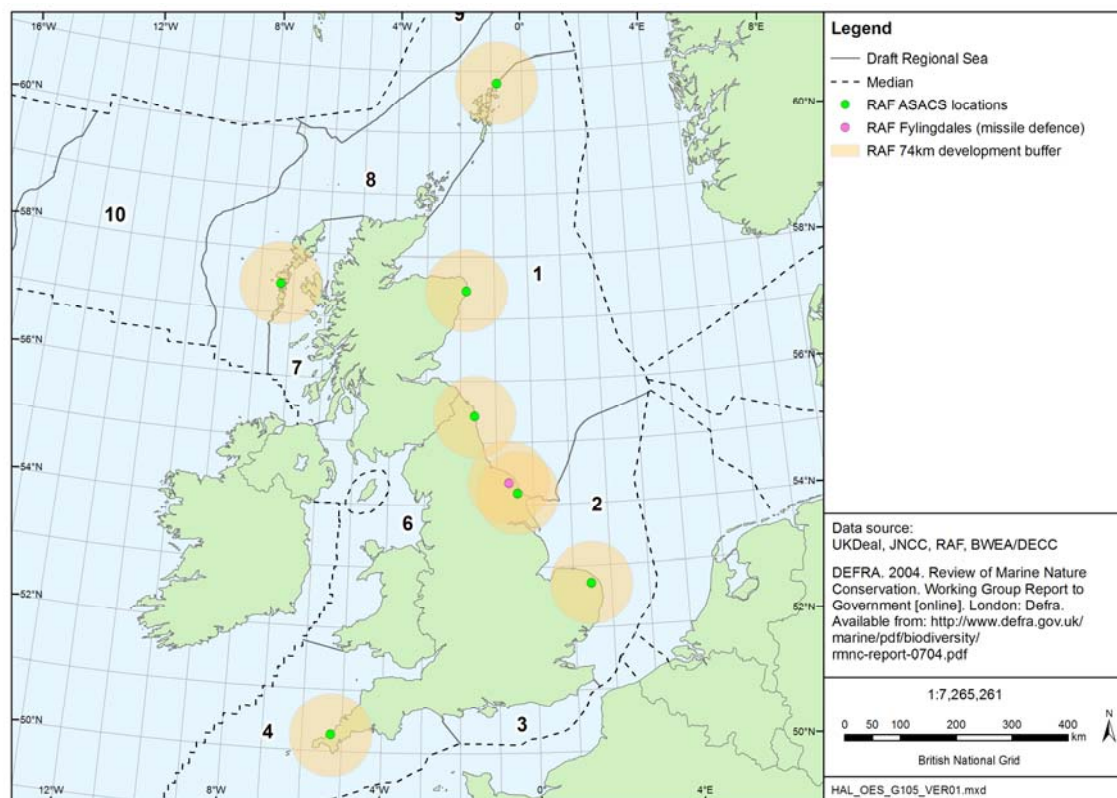


Figure A3h.14 – Development buffers around military ASACS



Army exercise areas are numerous and appear on the coast of every Regional Sea. Most consist of relatively small rifle ranges, though there are extensive areas offshore located to the west of the Outer Hebrides, in the north-east of the Irish Sea, Cardigan Bay, off south Wales in the area around Carmarthen Bay and in the outer Thames Estuary. These areas invariably involve live firing and are therefore almost exclusively considered danger areas. In Cardigan Bay, firing exercises, bombing and pilotless target aircraft (PTA) training takes place. PTA training and missile firing also take place to the west of the Hebrides in Regional Seas 8 and 10.

The presence of a PEXA does not preclude other activities except for some danger areas marked with the prefix D where airspace restrictions apply and where live firing may take place (indicated on Figure A3h.13). Planning and consultation between the offshore energy industries and the MoD should help to minimise any conflicts of interest where PEXAs exist.

Table A3h.5 – PEXA descriptions by Regional Sea

RS	Serial #	Name	Activity
Navy areas			
1	X5607	Crombie Stub Pier	F
	X5610	Burntisland	DG
	X5611	Kirkcaldy Bay (F)	MCM, MD
	X5612	Aberlady Bay	MCM
	X5613 (N&S)	Firth of Forth	GP, MCM
	X5614	May Island	ASW, SE
	X5615	Forth Deep	MCM
	X5616	Blackness	ET
	X5617	Society Bank	ET
	X5625	Anstruther	MCM
	X5637	Firth of Forth	MCM
	X5638	Firth of Forth	MCM
	X5641	Firth of Forth (Middle)	GP
	X5642	Firth of Forth (Outer)	GP
	-	Flamborough Head Submarine Exercise Area	-
2	X5117	Outer Gabbard	MCM
	X5118	Gunfleet	MCM
	X5119	Kentish Knock	MCM
	X5120	South Galloper	MCM
	X5121	North Galloper	MCM
	X5122	-	MCM
	X5123	-	MD
3	-	Outer Silver Pit Submarine Exercise Area	-
	D031	November One	AIR, F, HMS, NGS, SU
	D036	Papa Four/Five	AA, GP, HMS, PTA, SU, Sub
	D036	Quebec Two	AA, GP, HMS, SU
	D036	Quebec Three/Four	AA, GP, HMS, PTA, SU, Sub
	D039	Romeo Two/Three	AA, GP, HMS, PTA, SU, Sub
	D040	Sierra One/Two	AA, GP, HMS, SU
	X5028	Papa One	GP, Sub
	X5029	Papa Two	GP
	X5030	Papa Three	GP

RS	Serial #	Name	Activity
	X5037	Romeo One	ET
	X5039	Quebec One	GP, MCM
	X5050	-	MCM
	X5051	Langstone Harbour	GP
	X5053	Tipner	F
	X5059	-	MCM, TA
	X5060	-	MCM
	X5061	Sandown Bay	MCM
	X5062	-	MD
3, 4	X5023	Oscar One	GP, Sub
	X5024	Oscar Two	GP
	X5025	Oscar Three	GP
	X5026	Oscar Four	GP, Sub
	X5054	November Three	AIR, ASW, FI, GP, HMS, MCM, Sm, Sub, TA
	X5055	November Four	ASW, HMS, Sub
	X5057	November Two	ASW, F, FI, GP, HMS, Sm, Sub
4	D003	India One, India Two	AA, Air, ATT, Firing, GP, PTA, SU, Sub, SS, Sur, TT
	D004	Juliatt One	AA, Air, ATT, Firing, GP, PTA, SU, Sub, SS, Sur, TT
	D006	Falmouth Bay	Air, ASF, AT, Sub, Sur
	D006A	Falmouth Bay North	Air, AT, Firing, NGS, Sur, TT
	D007	Fowey Inner	Air, Sur
	D007A	Fowey	Air, Firing, NGS, Sur, TT
	D007B	Fowey Outer	Air, Firing, NGS, Sur, TT
	D008	E1, F1, F2, G1, G2, H1, H2	AA, Air, ATT, Firing, GP, GW, PTA, SS, SU, Sub, Sur, TT
	D008A	E2, F3, G4	Air, Firing, GP, PTA, Sub, Sur TT
	D008B	Golf Three, Hotel Three	AA, Firing, GP, PTA, SS, SU, Sub, Sur, TT
	D009	Wembury A	ATT, Firing, TT
	D009A	Wembury	AA, Firing, PTA, SS, SU, Sur, TT
	D012	Lyme Bay North	AAF, B, Trials
	D013	K1, K2, K3	AA, AAF, Air, ASF, B, FI, GI, GP, GW, MS, PTA, RP, Sm, SS, SU, Sub, Sur
	D014	Chesil Bank	Air, AS, ASF, MS, PB, RP, Sur
	D017	L1, L2, L3	AA, Air, AS, ASF, AT, Firing, FI, GI, GP, GW, MS, PTA, Sm, ST, Sub, Sur
	D021	Mike Two	Air, AS, AT, FI, GP, MS, NGS, Sm, ST, Sub, Sur
	D023	M3, M4, M5	AA, Air, AS, ASF, AT, Firing, FI, GI, GP, GW, MS, PTA, Sm, ST, Sub, Sur
	D119	Bridgewater Bay	AAF, B
	X4917	Start	Air, GI, GP, Sub
	X4918	Lima Seven	AS, Sub, T
	X4919	Mounts Bay	Air, GP, Sub
	X4920	Alpha One	Air, GP, Sub
	X4921	Bravo One	Air, GP, Sub
	X4922	Charlie One	Air, GP, Sub
	X4923	Charlie Two	Air, GP, Sub
	X4924	Delta One	Air, GP, Sub
	X5001	Fleet Exercise Area	Fleet Exercises

RS	Serial #	Name	Activity
	X5008	Whitsand Bay	Air, GP, Sub
	X5010	Cawsand	DG
	X5014	Dart	Sub, Sur
	X5015	Lympstone	Rifle
	X5016	Bexington	MS, Test, Sur
	X5020	Mike One	Air, GP, MS, Sur, MH
	X5021A	Harbour	GP, Sur
	X5047	Dart North	Sub, Sur
	X5058	-	ML
	X5063	Mortar	Mortar Firing
	X5064	-	ML
6	X5605	Cove	AIR, HMS, SE
	X5504	Triplane Target	AIR, HMS
	X5506	Rosneath	AIR, HMS
	X5507	Cumbræ	AIR, HMS, SE
	X5509	Laggan	AIR, HMS, SE
	X5510	Brodict	AIR, HMS, SE
	X5511	Irvine	AIR, HMS, SE
	X5512	Ayr	AIR, HMS, SE
	X5513	Lamlash	AIR, HMS, SE
	X5551	Corridor Alpha	MCM
	X5620	Gareloch	HMS, SE
	X5514	Davaar	AIR, HMS, SE
	X5515	Lochranza	AIR, HMS, SE
	X5516	Skipness	AIR, HMS, SE
	X5550	ATF Anchorage	MCM
	X5553	Corridor Charlie	MCM
	X5558	Campbeltown Loch	MCM
	X5518	West Kyle	AIR, HMS, SE
	X5519	East Kyle	HMS
	X5517	Tarbert	HMS, SE
	X5602	Minard	HMS, SE
	X5603	Fyne	AT, MCM
	X5604	Goil	NR
	X5606	Long	HMS, SE
	X5639	Coulport South	MCM
	X5640	Coulport North	MCM
	X5520	Striven	HMS, SE
	X5401	Londonderry	DC
	X5406	-	MD
	X5407	Magee	AIR, HMS, SE
	X5408	Beaufort	
	X5521	Turnberry	AIR, HMS, SE
	X5522	Pladda	AIR, HMS, SE
	X5523	Stafnish	AIR, HMS, SE
	X5524	Ailsa	AIR, HMS, SE
	X5525	Ballantrae	AIR, HMS, SE
	X5526	Corsewall	AIR, HMS, SE
	X5527	Maiden	AIR, HMS, SE
	X5528	Torr	AIR, HMS, SE
	X5529	Mermaid	AIR, HMS, SE

RS	Serial #	Name	Activity
	X5530	Sanda	AIR, HMS, SE
	X5552	Corridor Bravo	MCM
	X5554	Campbeltown North	MCM
	X5555	Campbeltown Middle	MCM
	D509	Campbeltown (Zulu)	A/A, HMS, PTA, SU, T
	X5402	Ardglass	AIR, HMS, SE
	X5403	Peel	AIR, HMS, SE
	X5559	-	MCM
7	X5508	Garroch	AIR, HMS, SE
	X5531	Kintyre	AIR, HMS, SE
	X5533	Earadale	AIR, HMS, SE
	X5534	Gigha	AIR, HMS, SE
	X5535	Otter	AIR, HMS, SE
	X5536	Rathlin	AIR, HMS, SE
	X5537	Skerries	AIR, HMS, SE
	X5538	Islay	AIR, HMS, SE
	X5539	Orsay	AIR, HMS, SE
	X5540	Boyle	AIR, HMS, SE
	X5541	Place	AIR, HMS, SE
	X5542	Blackstone	AIR, HMS, SE
	X5543	Colonsay	AIR, HMS, SE
	X5556	Campbeltown South	MCM
	X5557	Jura Sound Deep Field (N)	MCM
	X5623	Jura Sound	HMS
	X5624	Linnhe	HMS, SE
	X5626	Mackenzie	AIR, HMS, SE
	X5627	Staffa	AIR, HMS, SE
	X5628	Mull	AIR, HMS, SE
	X5630	Ford	AIR, HMS, SE
	X5631	Hebrides South	AIR, HMS, SE
	X5632	Hebrides Central	AIR, HMS, SE
	X5633	Barra	AIR, HMS, SE
	X5634	Tiree	AIR, HMS, SE
	X5635	Hawes	AIR, HMS, SE
	X5636	Eigg	AIR, HMS, SE
	X5706	Sleat	AIR, HMS, SE
	X5707	Rhum	AIR, HMS, SE
	X5708	Canna	AIR, HMS, SE
	X5709	Bracadale	AIR, HMS, SE
	X5710	Hebrides North	AIR, HMS, SE
	X5711	Neist	AIR, HMS, SE
	X5712	Ushenish	AIR, HMS, SE
	X5713	Lochmaddy	AIR, HMS, SE
	X5714	Dunvegan	AIR, HMS, SE
	X5715	Trodday	AIR, HMS, SE
	X5716	Rona West	AIR, HMS, SE
	X5717	Rona North	AIR, HMS, SE
	X5718	Rona South	NR
	X5719	Raasay	SE
	X5720	Portree	AIR, HMS, SE
	X5721	Crowlin	DC

RS	Serial #	Name	Activity
	X5813	Ewe	AIR, HMS, SE
	X5814	Minch South	AIR, HMS, SE
	X5815	Shiant	AIR, HMS, SE
	X5816	Tiumpan	AIR, HMS, SE
	X5817	Minch North	AIR, HMS, SE
	X5818	Stoer	AIR, HMS, SE
8	D801	Cape Wrath (North West)	A/A, AIR, ASW, HMS, PTA, T
	D802	Cape Wrath (North East)	A/A, ADT, AIR, ASF, ASW, B, NGS, PTA, T
	D803	Garvie Island	ASF, B, MI
	X5802	Eriboll	HMS
8, 10	X5501	Fleet Exercise Area	GP
Air Force areas			
1	D323A	Southern MDA	ACT, HEM
	D412	Straxton	AAF
	D513	Druridge Bay	AAF
	D513A	Druridge Bay	AAF, HMS
	D513B	Druridge Bay	AAF
	D609	St Andrews	F, HMS, MI, SD
	D613A	Central MDA	ACT, HEM
	D613B	Central MDA	ACT, HEM
	D613C	Central MDA	ACT, HEM
	D703	Tain	B
	D712C	Northern MDA	ACT, HEM
	D712D	Northern MDA	ACT, HEM
	D807	Moray Firth	B, F, RTB
	D809(S)	Moray Firth (South)	A/ A, AAF, AIR, ASF, MHS, PTA, T
	D809 (N)	Moray Firth (North)	A/A, AAF, AIR, ASF, HMS, PTA, T
	D809 (C)	Moray Firth (Central)	A/A, AAF, AIR, ASF, HMS, PTA, T
	D809 (S)	Moray Firth (South)	A/A, AAF, AIR, ASF, HMS, PTA, T
1, 2	D323D	Southern MDA	ACT, HEM
	D323E	Southern MDA	ACT, HEM
	D323B	Southern MDA	ACT, HEM
1, 8	D712C	Northern MDA	ACT, HEM
2	D323C	Southern MDA	ACT, HEM
	D306	Cowden	DUO
	D307	Donna Nook	ASF, B, F
	D308	Wainfleet	ASF, B, F
	D207	Holbeach	ASF, B
4	D001	Trevose Head	Helicopter Exercises
	D118	Pembrey	ASAF, B. Ordnance demolition within on-shore area.
7, 8	D712A	Northern MDA	ACT, HEM
8	D712B	Northern MDA	ACT, HEM
Army areas			
1	D604	Barry Buddon	DUO, F, P
	D702	Fort George	DUO, F
	X5405	Whitburn	F
	X5702	Binnhill	F
	X5703	Black Dog	F
	X5705	Dingwall	F

RS	Serial #	Name	Activity
	X5722	Drums Links	F
	X5819	Old Wick	F
2	D139	Fingringhoe	F, DUO
	D146	Yantlet	DUO
	D136	Shoeburyness	F, PTA
	D138	Shoeburyness	F, PTA
	D138A	Shoeburyness	F, PTA
	D138B	Shoeburyness	F, PTA
	X5124	Milton	F
	X5309	Rowlston	F
	X5052	Newtown	F
3	D141	Hythe Ranges	F, DUO
	D044	Lydd Ranges	F, DUO
	D026	Lulworth	Sur, Firing Amphibious
4	D110	Braunton Meadows	Firing, Demolition Firing
	D113	Castlemartin	Firing
	D115A	Manorbier	Firing
	D115B	Manorbier	Firing
	X5009	Tregantle	Rifle
	X5018	Chickerell	Rifle
	X5104	Penally	Rifle
	X5105	Braunton Barrows	Amphibious
	X5108	Rogiet Moor	Rifle
	D117	Pendine	Firing
	D121	S. Thomas' Head	Underwater Explosions – Trials
	X5306	Altcar	Rifle, Grenade
6	D201	Aberporth	Firing, B, PTA
	D201A	Aberporth	PTA manoeuvring
	D201B	Aberporth	PTA manoeuvring
	D202	Llanbedr	PTA
	D401	Ballykinler	F
	D601	Garelochhead	DUO, F
	D402A	Luce Bay (N)	B
	D402B	Luce Bay (N)	B
	D402C	Luce Bay (N)	DUO
	D403	Luce Bay	AAF, B
	D403A	Luce Bay	DUO, SX
	D405	Kirkcudbright	DUO, F
	D405A	Kirkcudbright	F
	D406	Eskmeals	F
	D406B	Eskmeals	F
	D406C	Eskmeals	F
	D411	Portpatrick (Wigtownshire)	SD
7	D505	Magilligan	F
8	D701	Hebrides	MI, PTA
	D701A	Hebrides	MI, PTA
	D701C	Hebrides	MI, PTA
	D701E	Hebrides	PTA
7	D710	Raasay	ADT
8	X5801	Lower Barvas	F

RS	Serial #	Name	Activity
10	D701B	Hebrides	MI, PTA
	D701D	Hebrides	MI, PTA

Source: Admiralty PEXA chart; Q6401, Q6402, Q6403, Q6404, Q6405

Notes: Danger Areas are indicated in **bold** type.

Key: A=Amphibious, AA=Anti Aircraft (ground to air), A/A=High and Low Angle Gunnery, AAF=Air to Air Firing, ACT=Air Combat Training, ADT=Air Dropped Torpedo, AIR=Air General, ASF=Air to Surface Firing, ASW=Anti Submarine Warfare Exercises, AT=Acoustic Trials, AAT=Air Tactical Training, B=Bombing, D=Diving, DC=Depth Charge Dropping/Firing, DG=Degaussing, DUO=Demolition of Unexploded Ordnance, ET=Explosives Trials, F=Firing, Fl=Flares, Gl=Glow-worm, GP=General Practice, GW=Guided Weapons, H=Helicopter Exercises, HEM=High Energy Manoeuvres, MHS=HM Ships (non firing), MCM=Marine Counter Measures, MD=Marine Disposal, MI=Missile Firing, MO=Mortar Firing, NGS=Naval Gunfire Support, NR=Noise Ranging, P=Parachute Dropping, PTA=Pilotless Target Aircraft, RTB=Radar Training Buoy, SE=Submarine Exercises, Sm=Smoke, SD=Sonobuoy Dropping, SS=Starshell, STT=Surface Target Towing, SU=Surface to Surface Firing, Sub=Submarine General (non firing), SX=Surface Explosions, T=Torpedo Firing, TA=Towed Array, TT=Aerial Towed Target or Target Towing Aircraft, WT=Weapon Training.

A3h.5 OIL AND GAS ACTIVITY

Oil and gas related activities are chiefly centred on the southern, central and northern North Seas (Regional Seas 1 & 2), west of Shetland (Regional Sea 8), and the eastern Irish Sea Basin (Regional Sea 6) – Figures A3h.15 and 16.

In Regional Sea 2, gas developments predominate with a comprehensive network of installations and pipelines in quads 43, 44 and 47-49 and three gas terminals located at the coast, Bacton being one of the largest in the UK. Great Yarmouth on the Norfolk coast is the main supply base for the southern North Sea gas fields. In the central and northern North Seas of Regional Sea 1, oil is the dominant hydrocarbon resource produced. Production in the UKCS of Regional Sea 1 is primarily located in a north-south axis along the median line from quads 29-30 in the south to 11 in the west (Moray Firth), reaching quad 211 in the far north and east of Shetland. Quads 204 and 206 in Regional Sea 8 are the centre of the most recent discoveries at the Foinaven, Schiehallion and Clair oil fields. The oil and gas fields of the UKCS are at a mature stage of development, many fields having been discovered in the 1960s and 70s. Hydrocarbon resources in UK waters are steadily declining and decommissioning of certain infrastructure is likely to increase as a result, though the area remains of great importance for future licensing of blocks for hydrocarbon prospecting and production. It is expected that by 2010, the UK will be a net importer of oil and gas, though development continues to grow in UK fields (amounting to £4,831m in 2005). The industry employs 290,000 people directly and 90,000 indirectly – total export value in 2005 was £10,861m (Pugh 2008).

A substantial array of fixed surface infrastructure is associated with oil and gas production which includes production and accommodation platforms and numerous FPSOs. Pipelines carrying oil, gas, condensate and other chemicals connect these fields to coastal infrastructure. Major pipeline landfalls in Regional Sea 1 include those at Sullom Voe, Shetland and the Flotta terminal, Orkney. St Fergus gas terminal is the largest in the UK and is supplied from installations in the central and northern North Sea, including the east Shetland Basin, and also from the Norwegian Sector (Pugh 2008). The BP-owned Forties Pipeline System extends from the Forties Charlie platform, via the Forties Unity Platform, to Cruden Bay in Aberdeenshire, and constitutes one of the most substantial pipeline systems in the North Sea. Gas pipelines serving the platforms of the southern North Sea include Bacton, Theddlethorpe and Easington/Dimlington, and are the only terminals in Regional Sea 2. In Regional Sea 6 gas pipelines meet the coast of the Irish Sea at Barrow-in-Furness gas terminal and Point of Ayr.

Figure A3h.15 – Location of existing oil and gas infrastructure (north)

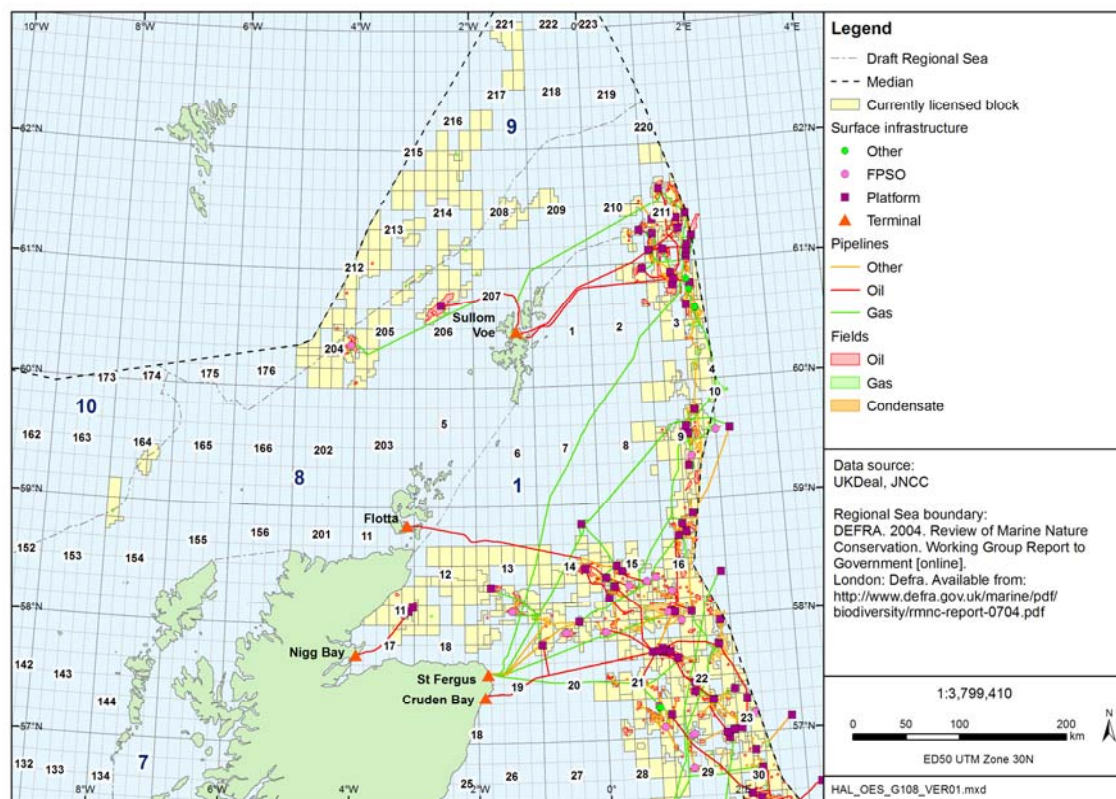
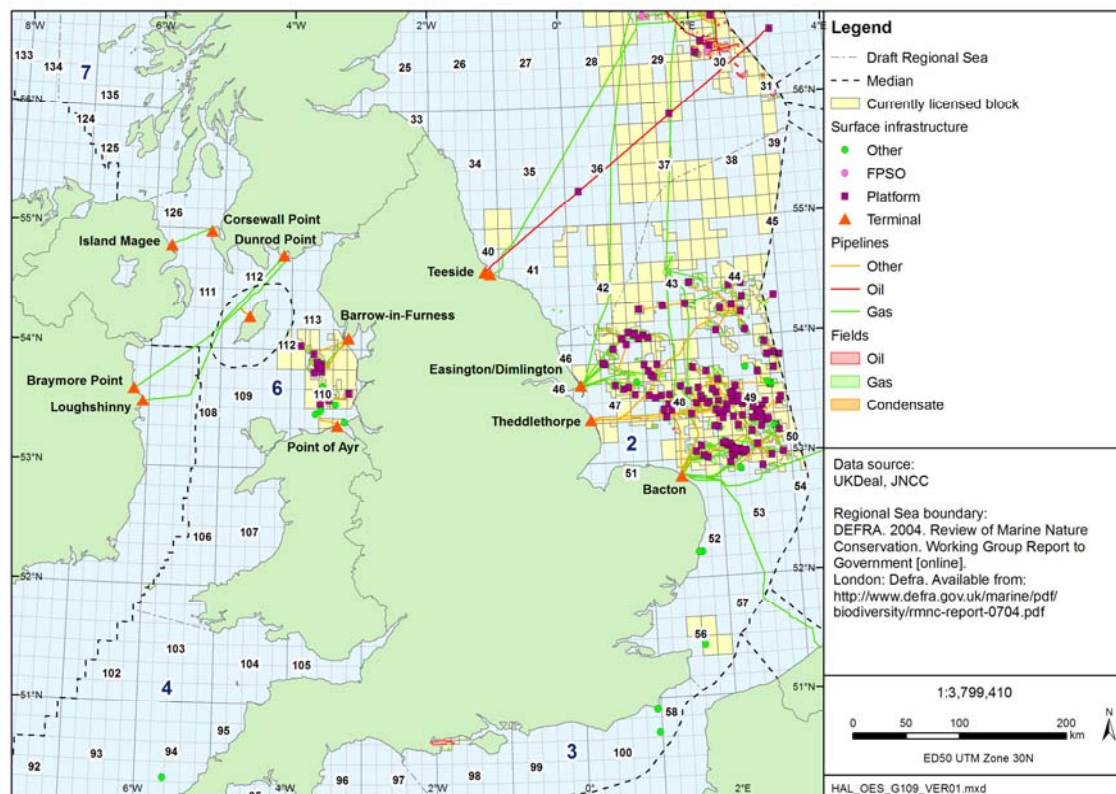


Figure A3h.16 - Location of existing oil and gas infrastructure (south)



A3h.6 OFFSHORE RENEWABLE ENERGY ACTIVITY

Offshore renewable energy is a rapidly growing sector, principally from offshore wind farm development, but also through wave and tidal sectors. At present, wind power presents the most cost-effective marine renewable energy source estimated to generate 1 MWhr of electricity for £73-88 – though still higher than conventional costs (Pugh 2008). Between 2003 and 2005 marine based renewable energy generation increased by 22%, producing 17,000GWh in 2005, with an estimated turnover of £32m (Pugh 2008).

A3h.6.1 Wind

Current technological/economic restrictions on viable water depths for offshore wind farm construction and grid connection restraints in remote areas, have made the southern North Sea and eastern Irish Sea the focus of offshore wind development during leasing Rounds 1 and 2 (Figure A3h.17). As a result of these two rounds there are 7 operational sites to date, with a further 5 under construction, 9 applications have been consented, 3 are under consideration, and a further 4 applications are awaited. In addition to projects awarded in Rounds 1 and 2, there are 2 operational demonstrator projects (Beatrice and Blyth) and 1 consented project in pre-construction (Ormonde). Table A3h.6 provides full details of all these projects. From a Regional Sea perspective, the majority of offshore wind projects constructed and consented to date are within Regional Seas 2 and 6.

Table A3h.6 – Current status of UK offshore wind developments

Wind farm	Location	Round	Status
Regional Sea 1			
Beatrice	Outer Moray Firth	n/a*	Operational
Blyth	Off northeast England	n/a*	Operational
Teesside	Off northeast England	1	Consented, pre-construction
Regional Sea 2			
Lynn	Greater Wash	1	Operational
Inner Dowsing	Greater Wash	1	Operational
Scroby Sands	Off Norfolk coast	1	Operational
Kentish Flats	Thames	1	Operational
Gunfleet Sands I	Thames	1	Under construction
Gunfleet Sands II	Thames	2	Under construction
Greater Gabbard	Thames	2	Consented, pre-construction
London Array	Thames	2	Consented, pre-construction
Thanet	Thames	2	Consented, pre-construction
Sheringham shoal	Greater Wash	2	Consented, pre-construction
Lincs	Greater Wash	2	Consented
Docking Shoal	Greater Wash	2	Under consideration
Humber Gateway	Humber (Greater Wash)	2	Under consideration
Race Bank	Greater Wash	2	Awaiting application
Triton Knoll	Greater Wash	2	Awaiting application
Dudgeon East	Greater Wash	2	Awaiting application
Westernmost Rough	Humber (Greater Wash)	2	Awaiting application
Regional Sea 4			
Scarweather Sands	Bristol Channel	1	Under consideration**
Regional Sea 6			
North Hoyle	Eastern Irish Sea	1	Operational

Wind farm	Location	Round	Status
Barrow	Eastern Irish Sea	1	Operational
Burbo Bank	Eastern Irish Sea	1	Operational
Robin Rigg I	Eastern Irish Sea - Solway Firth	1	Under construction
Robin Rigg II	Eastern Irish Sea - Solway Firth	1	Under construction
Rhyl Flats	Eastern Irish Sea	1	Under construction
Walney	Eastern Irish Sea	2	Consented, pre-construction
West of Duddon	Eastern Irish Sea	2	Consented, pre-construction
Gwynt y Môr	Eastern Irish Sea	2	Consented, pre-construction
Ormonde	Eastern Irish Sea	n/a*	Consented, pre-construction

Notes: * Beatrice, Blyth and Ormonde projects were all consented outside of Rounds 1 and 2.

**Scarweather sands has been consented, but has not yet acquired the necessary FEPA license.

Source: DECC, January 2009

Round 1 windfarm leases are more dispersed around the UK coast than those of Round 2; while the greatest number of projects are located in the eastern Irish Sea, Greater Wash and Thames areas, projects are also at various stages of development off the northeast coast of England, off the Norfolk coast, in the Bristol Channel and in the Solway Firth in the northeast Irish Sea.

Under Round 2, leases were awarded in three strategic areas: the Greater Wash, Thames area and the Eastern Irish Sea. In the Greater Wash area (stretching north to the Humber estuary area), 8 leases have been awarded of which there are currently 2 consented, 2 applications under consideration and a further 4 applications awaited. In the Thames area, 4 leases have been awarded of which 2 are currently under construction (only onshore works in the case of Greater Gabbard), while a further 2 applications have been consented. In the eastern Irish Sea strategic area, 3 leases have been awarded - all of which are currently consented.

In addition to sites awarded under Rounds 1 and 2, three other offshore wind projects exist. These include the fully constructed Beatrice wind farm demonstrator project located in the Moray Firth 25km off the coast (Regional Sea 1), which consists of two 5MW turbines in water depths of up to 45m, and represents the first 'deep-water' wind farm; the operational Blyth wind farm, consisting of two 2MW turbines located 1km off the coast of Blyth, Northumberland; and the consented Ormonde project in the eastern Irish Sea, consisting of a gas-wind hybrid development.

The Crown Estate has identified several areas of the UKCS that they believe to be potential indicative development zones for a third round of wind leasing (Figure A3h.17). The largest areas being considered are within Regional Sea 2 in the southern North Sea, which are located in the area of the Dogger Bank, North Norfolk Sand Banks and an area to the east of the Holderness coast, extending to the median line. Smaller areas are being considered in the Moray Firth, to the east of the Firth of Forth (Regional Sea 1), the Irish Sea (Regional Sea 6), Bristol Channel (Regional Sea 4) and central English Channel (Regional Sea 3).

A3h.6.2 Other marine renewables

Around the coast of the UK there are a number of other marine renewable energy projects at various stages of development and completion, though few are as of yet commercially operational. Table A3h.7 indicates the distribution of these sites around the UK and their capacity.

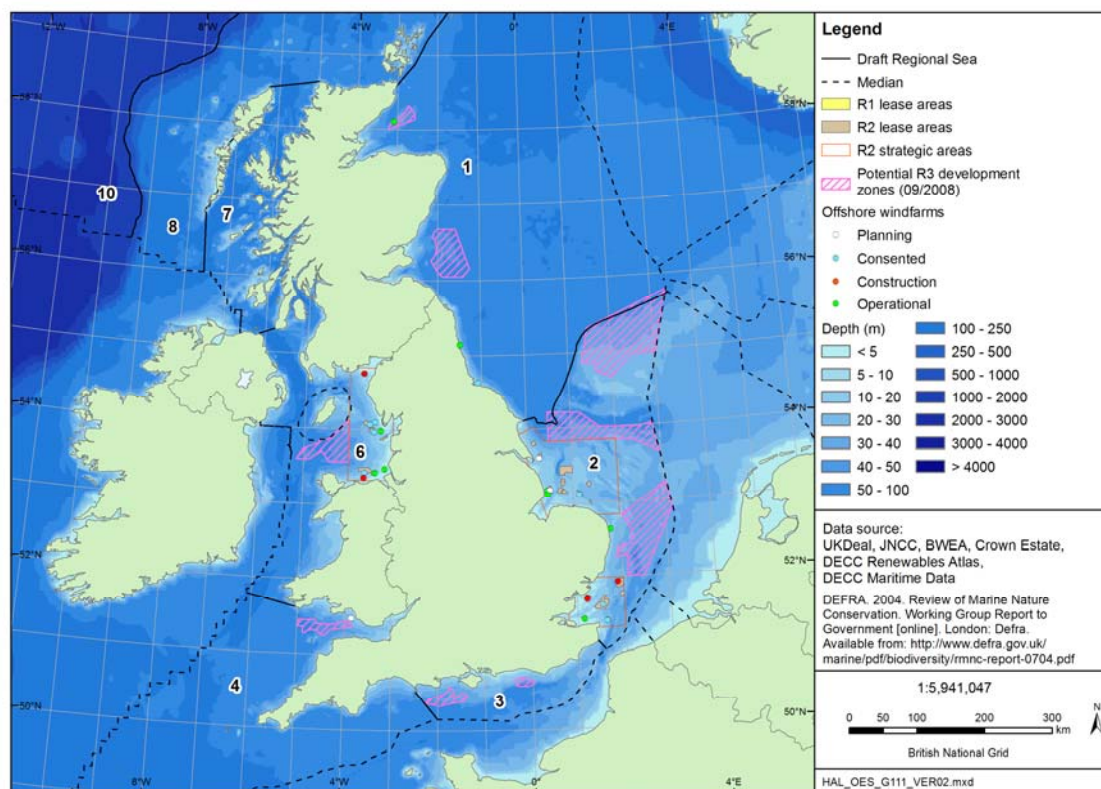
Table A3h.7 – Other forms of marine renewable energy

RS	Name	Type	Status	Capacity	Summary
2	Pulse Tidal Scheme	Tidal	Piling works completed in May 2008	0.15MW	Tidal power generation device. 1km from the south bank of the Humber
4	Seaflow	Tidal	Operational (2003)	0.30MW	The world's first test tidal turbine, installed in 2003 off Lynmouth, Devon.
	Milford Haven Wave Dragon	Wave	Under consideration	7.00MW	1.7km west off St Ann's Head at Long Point, Pembrokeshire
	West Wave	Wave	Pre-planning	5.00MW	10 miles off Hayle on north coast of Cornwall, the project scope includes up to 7 Pelamis wave energy converters
	Swansea Bay Tidal Lagoon	Tidal	Pre-planning	60.00MW	Measures 5 km ² and resides about a mile offshore.
6	SeaGen	Tidal	Operational (2008)	1.20MW	Installed in Strangford Lough, Northern Ireland
	Skerries SeaGen	Tidal	Consent application likely in 2009	10.50MW	Anglesey, North Wales
7	Machir Bay Wave Power Scheme	Wave	No application made	0.91MW	A potential site at Machir Bay, Rhinns of Islay
	Islay Wave Energy Plant	Wave	Operational (2000)	0.61MW	A Limpet (Land Installed Marine Powered Energy Transformer) has been installed on the south-west coast of the Rhinns of Islay
8	Siadar Wave Energy Generation Scheme	Wave	Under consideration	4.00MW	Installation of Wavegen Active breakwater technology at Siadar, on the north coast of Lewis
	Fall of Warness Tidal Scheme (EMEC)	Tidal	Operational (2007)	4.00MW	A tidal test site to the west of the island of Eday, Orkney.

Key: RS=Regional Sea

Source: Renewable Energy Statistics website, Wavegen website, E.On website a, Marine Current Turbines website, Tidal Electric website, SeaGen website, EMEC website

Figure A3h.17 – Wind energy activity and leasing areas



The current suite of marine renewable energy devices located in Scotland is limited to a few small non-commercial wave and tidal developments (see Regional Seas 7 & 8 in the above table), in addition to the Beatrice offshore wind farm demonstrator project. However, the level of marine renewables activity in Scottish waters is set to increase.

In May 2008, the Crown Estate invited companies with an interest in developing offshore wind in Scottish territorial waters to make applications to be considered for exclusive development rights over certain areas. Considerable interest was generated, with 14 development companies submitting a total of 23 site applications with a combined generation capacity some around 10GW. The selection process is due to end in January 2009 and the Scottish Executive has indicated it will carry out an SEA for offshore wind in Scottish waters, to be completed within one year. In November 2008, the Crown Estate invited proposals for a first round of tidal energy leasing in the Pentland Firth area aimed at generating 700MW by 2020. The outcome is expected by the summer of 2009.

An SEA considering offshore wind and marine renewables was commissioned in December 2008 for Northern Irish waters. The coverage for this SEA extends to 12nm from the coast and will concentrate on sites off the North Coast, Lough Foyle, the Copeland Islands and Strangford Lough, which have been previously identified as having the potential to generate viable quantities of energy from marine renewable technologies (e.g. the SeaGen tidal project in Strangford Lough). The report is expected to be completed in early 2010.

A3h.7 ELECTRICITY NETWORK

A3h.7.1 Electricity supply

There are three main components to the supply of electricity in the UK, these are:

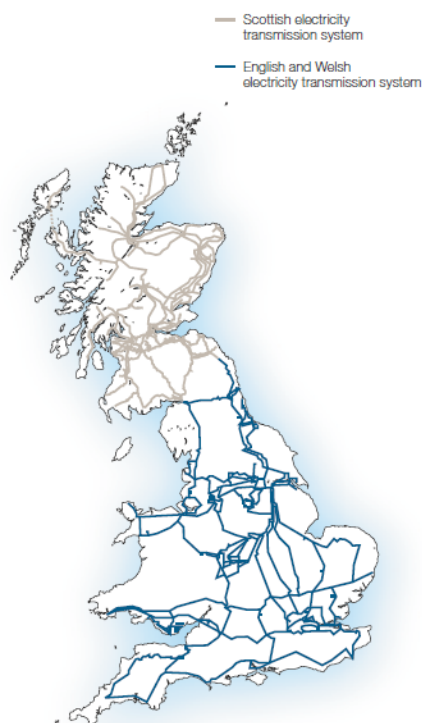
- Generation, dominated by large power stations
- The transmission network or National Grid which transmits electricity across the UK from power stations via ~25,000km of high voltage (400kV and 275kV) overhead lines, and
- Regional distribution networks comprising over 80,000km of overhead lines and cables delivering lower voltage power (from 132kV to 230kV) from the grid to consumers (POST 2001, 2007).

Offshore wind farms are linked to the National Grid via export cables and onshore substations allowing the electricity that is generated to be delivered to consumers.

A3h.7.2 The National Grid

The UK National Grid is made up of four transmission networks. The largest in terms of length and share of total transmission covers England and Wales and is owned by the National Grid Company (POST 2007). There are two networks in Scotland owned by Scottish Power and Scottish and Southern Energy, and one in Northern Ireland owned by Northern Ireland Electricity. The National Grid Company is the transmission network operator for Great Britain and overseas and manages the flow of electricity across the grid. To illustrate system performance of the grid and to consider power transfer across critical boundaries, the grid system has been divided up into SYS Zones which are used in the National Grid Seven Year Statement (National Grid website).

Figure A3h.18 – Transmission Network (GB)



Source: National Grid website

The transmission network (Figure A3h.18) is used to transport electricity from generation plants to areas of demand. Much of the network was built in the 1950-60s when large coal-fired power stations constructed close to mines were a primary form of electricity generation. As a consequence of this, the grid is heavily reinforced in former coal mining regions (Regional Seas 1 & 2) with fewer high voltage lines in areas like north west Scotland (Regional Sea 7) and mid-Wales (Regional Sea 6). The net flow of electricity is from the north of the country where most generation occurs to the south where demand is highest (POST 2001, 2007). Overhead interconnectors connect the Scottish network to England and subsea interconnectors exist between Scotland and Ireland (Auchencrosh to Ballycronan More, Regional Sea 6) and England and France (Baker's Gap to Sangatte - Regional Sea 2).

A3h.7.3 Offshore Grid Connections and networks

Bringing electricity onshore from offshore wind farms to the point of use requires a link to the National Grid transmission system which may involve the construction of new onshore cables and substations or substation upgrades allowing the electricity supply to be transformed to the correct voltage for the National Grid. There are currently five operational offshore wind farms each with connections to the National Grid (see Table A3h.8).

Table A3h.8 – Existing grid connections for operational offshore wind farms

RS	Wind farm	Offshore Cable	Onshore Cable	Substation location
2	Kentish Flats	Up to four buried subsea cables with landfall adjacent to Hampton Pier, west of Herne Bay	Buried onshore cable 2km long	Existing substation (subject to upgrading) south of Herne Bay
	Scroby Sands	Three subsea cables	Buried onshore cable approximately 3km long	Existing substation at Admiralty Road, Great Yarmouth
6	Barrow	Single buried 132kV subsea cable approximately 26km long with landfall south of Heysham power station	Buried onshore cable 3km long	Existing substation at Heysham with new small extension
	Burbo Bank	Three buried subsea cables approximately 7.2km long with landfall at Mockbeggar Wharf, the Wirral	Buried onshore cable 3.5km long	New substation on brownfield site close to Wallasey substation
	North Hoyle	Three buried subsea cables approximately 10km long with landfall at Rhyl	Buried onshore cable approximately 5km long	Existing substation at Manweb complex next to Rhyl Technical College

Source: E.ON website b, Global Renewable Energy Partners (2002), NWP Offshore Ltd (2002), Seascope Energy Ltd (2002), Warwick Energy Ltd (2002).

Examples of other offshore electricity networks include:

- The Beatrice platforms connection to the National Grid with landfall near Berriedale (Moray Firth, Regional Sea 2).
- The Beatrice Wind farm demonstrator (Moray Firth, Regional Sea 2) – two 5MW wind turbines at 1.6km and 2.3km from the Beatrice Alpha platform supplying electricity to the platform using buried 33kV cables (Talisman Energy 2005).
- The Brae fields (Regional Sea 2) electricity ring main controlled by a Power Management System which enables power generated on the Brae Alpha and Bravo platforms to be supplied to the East Brae platform which has no power generation facilities of its own (Marathon 2007).
- Subsea cables connecting Orkney to the National Grid with mainland landfall near Thurso (Regional Sea 8).

A3h.7.4 National Grid Capacity

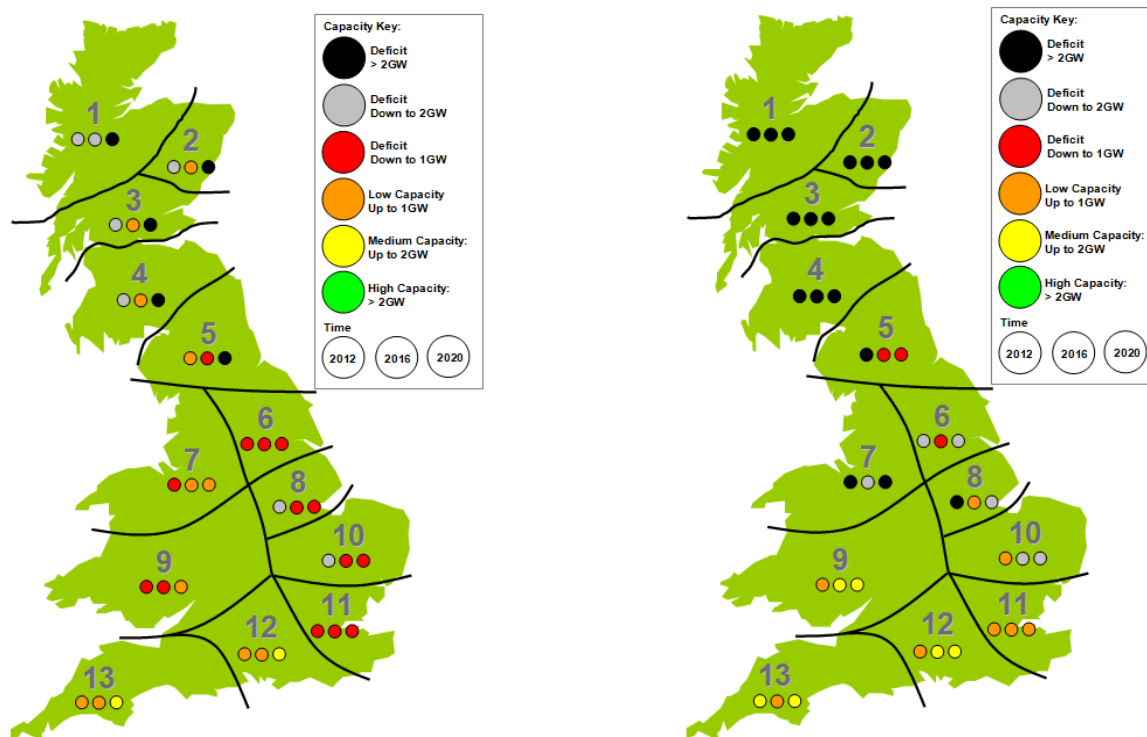
The existing onshore electricity transmission system has been built up over a period of time based on prevailing generation and demand characteristics across Great Britain and is designed to ensure that electricity can be supplied at times of peak load (National Grid 2008a). In the future, new forms of energy generation (such as offshore wind) and changes in demand will require investment to reinforce the grid in key areas, ensuring continued system performance and reliability of supply (DTI 2007c).

The National Grid Company has undertaken a study for the SEA, to analyse existing system capacity and to assess and quantify the impact of connecting up to 25GW of offshore wind generation to the onshore grid (see National Grid 2008a, 2008b). The capacity analysis covers the years 2012/13, 2016/17, and 2020/21 and considers two different generation scenarios. Scenario A was agreed with DECC (formerly BERR) with input from the Crown Estate and reflects one possible trajectory for reaching 2020 targets for energy generation. Scenario B is based upon National Grid's contracted position. (see National Grid 2008a) The scenarios consider both the closure of existing power generation plants (reducing demand for capacity) and the commissioning of new plants (increasing demand for capacity). This includes power generated by nuclear, coal, gas, hydro and large volumes of wind penetration. The modelled capacities have been divided up into 13 SYS zones shown in Figure A3h.19 which summarises the findings of the capacity analysis for the two scenarios and indicates how the transmission network capacity may evolve over time. The maps show that in most areas there will be a deficit in transmission capacity by 2020 and that spare transmission system capacity for additional renewable generation projects to connect to the grid is minimal (National Grid 2008a).

Despite this shortfall, there is sufficient capacity in the current system to accommodate 10GW of the 25GW 2020 target without significant system reinforcement (taking into account closures of conventional plants and greater sharing of system capacity for wind generation), though this 10GW is not uniformly dispersed. In addition, most offshore developments will have to build a substation large enough to accommodate HVDC converters and/or reactive compensation equipment and transformers to connect to the grid (National Grid 2008b). The current installed capacity making up the 10GW threshold is greatest in the southern North Sea and Irish Sea at 5 and 3GW respectively, with the Western Channel & Celtic Sea having 2GW and the northern North Sea having no appreciable capacity. The east coast transmission system will require reinforcing following the breach of 10GW. The National Grid (2008b) also indicate that when 15GW has been exceeded, there will be the requirement for additional overhead power lines in the Yorkshire, Lincolnshire, Derbyshire, Essex and Suffolk regions, and the ability to deliver extra capacity through reinforcements to the grid are dependent upon coordinated development with offshore wind. Attention is brought the accompanying SEA supporting document (National Grid 2008b) for further technical details of grid reinforcements, capacity and potential connection sites.

In February 2007, the Crown Estate commissioned Econnect consultants to examine the technological feasibility and costs of installing an east coast subsea transmission cable from Shetland to the south east of England using Voltage Source Converter (VSC) High Voltage Direct Current (HVDC) technology. The report concluded that such a project could be a success and would allow new offshore renewable developments to be connected to the National Grid although onshore reinforcements would still be required (Crown Estate 2008).

Figure A3h.19 – Transmission capacities for Scenarios A (left) and B (right)



Source: National Grid (2008b)

A3h.8 SUBMARINE CABLES

Submarine cables may be used for telecommunications and electricity transmission offshore. An estimated turnover of £4,933m was generated in the submarine telecommunications sector, roughly employing 26,750 people in 2005 (Pugh 2008). The economics of submarine electricity cables is more difficult to quantify, though in 2006 97.5% of transfers were made from France to the UK (Pugh 2008). Submarine telecommunication and power cables have their highest densities in the southern North Sea, South West Approaches, Bristol Channel, Irish Sea and North Channel - Figure A3h.20.

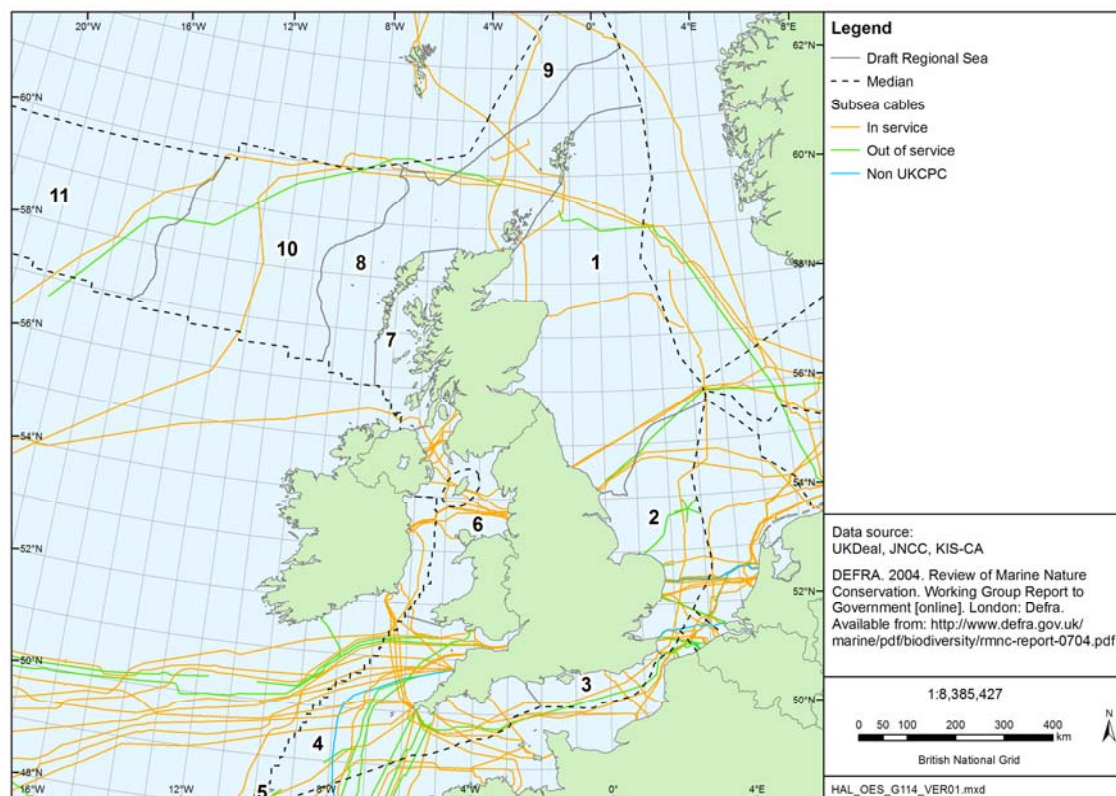
In Regional Sea 1, a number of cables traverse the North Sea between Orkney and Shetland, with the Farice communications cable travelling in a north-south direction to the west of Shetland towards Iceland. The only other cable of note is the BP-owned CNS fibre optic cable which has its landfall at St Fergus, Aberdeenshire. The southern section of Regional Sea 2 has a particularly high concentration of cables traversing west to east between the UK to the continent. There are three main landing areas in Regional Sea 2 around Lowestoft, Aldeburgh and Ramsgate. Two cables cross the northern part of the area in an east-west direction and the Norseas Coms telecommunications cable runs in a north-south direction through the entire Regional Sea.

The England-France interconnector, a 2,000MW High Voltage Direct Current (HVDC) cable, crosses the Strait of Dover in Regional Sea 3 from Baker's Gap in Folkestone, Kent, to the French mainland, travelling a submarine distance of 45km.

In Regional Sea 4, a number of cables extending to France, the Republic of Ireland and across the North Atlantic have their main landing areas at Sennen and Porthcurno on the Southwest Peninsula. Further north, the VSNL Atlantic South and North cables have their

landfall at Saunton Sands and Brean respectively. A number of cables also interact with the coast further south at Crooklets in Devon. In Regional Sea 6, several cables traverse the Irish Sea from the area around Dublin, terminating at the Lancashire coast. Further north, cables interconnect Northern Ireland with the Scottish coast in the North Channel. Regional Seas 10 and 11 have just a few cables which are in service and the low likelihood of development in these areas make the possibility of interference with these very small.

Figure A3h.20 – Location of submarine cables



Cables are unlikely to interfere with oil and gas activities and offshore wind farm development given that their location would be identified early on in the screening process of a development and the appropriate measures taken to avoid or cross the cables. Future cable routes and landings may however be restricted by oil and gas or wind farm infrastructure. Several cables are planned for areas around the UK over the next few years:

- East-West Interconnector – Woodland (Co. Meath), North Wales. A 185km 500MW HVDC cable due for completion 2012
- BritNed – Isle of Grain, Kent to Maasvlakte (Rotterdam). A 260km 1000MW HVDC submarine cable due for completion late 2010
- North Sea Interconnector – Seaham to Hylen. Originally conceived as a 730km 1200MW HVDC cable, this project has been halted.

A3h.9 DREDGING AND AGGREGATE EXTRACTION

Marine sand and gravel account for 20% of all industrial aggregates in England and Wales used for concrete production for roads and building construction and as a source of material for beach replenishment. Aggregate extraction occurs in three main areas in the southern North Sea (Figure A3h.21); off the Humber Estuary, east of Great Yarmouth and Lowestoft

and in the Greater Thames Estuary where there are extensive sand and gravel deposits, and extraction in this area accounts for 75% of the UK's aggregate landings. Cumulative footprints for aggregate dredging (where areas are repeatedly dredged over several years) are relatively large for both the Humber region and for the Thames. The licence areas in the Thames are amongst some of the oldest and are nearing exhaustion which means that over time the total area dredged has effectively increased as vessels work harder to obtain a cargo. The other principal dredging areas in UK waters are located in Regional Seas 3, 4 and 6. Aggregate extraction in Regional Sea 3 is centred on the south-east and south-west of the Isle of Wight, in the Owers region and also in the wider east English Channel. The principal target for extraction is the Quaternary gravel and sand lag deposit which covers much of the central and eastern English Channel. There are a number of areas in the Severn estuary and in the east Irish Sea which are currently licensed for marine aggregate extraction. There are currently no landings of marine aggregates in Northern Ireland or Scotland (Pugh 2008).

Overall, new technologies have allowed the dredging industry to reduce its spatial footprint (both in terms of licensed area and dredged area) and its potential for impact on other users, which includes the offshore renewables industry (Crown Estate & BMAPA 2002). In addition, more detailed active dredging records can now be used to generate a 'cumulative footprint' map in order to determine what constitutes a 'new' area of dredging and the overall spatial and temporal impact on the marine environment (Crown Estate & BMAPA 2002).

Figure A3h.21 – Licence and application areas for marine dredging activities

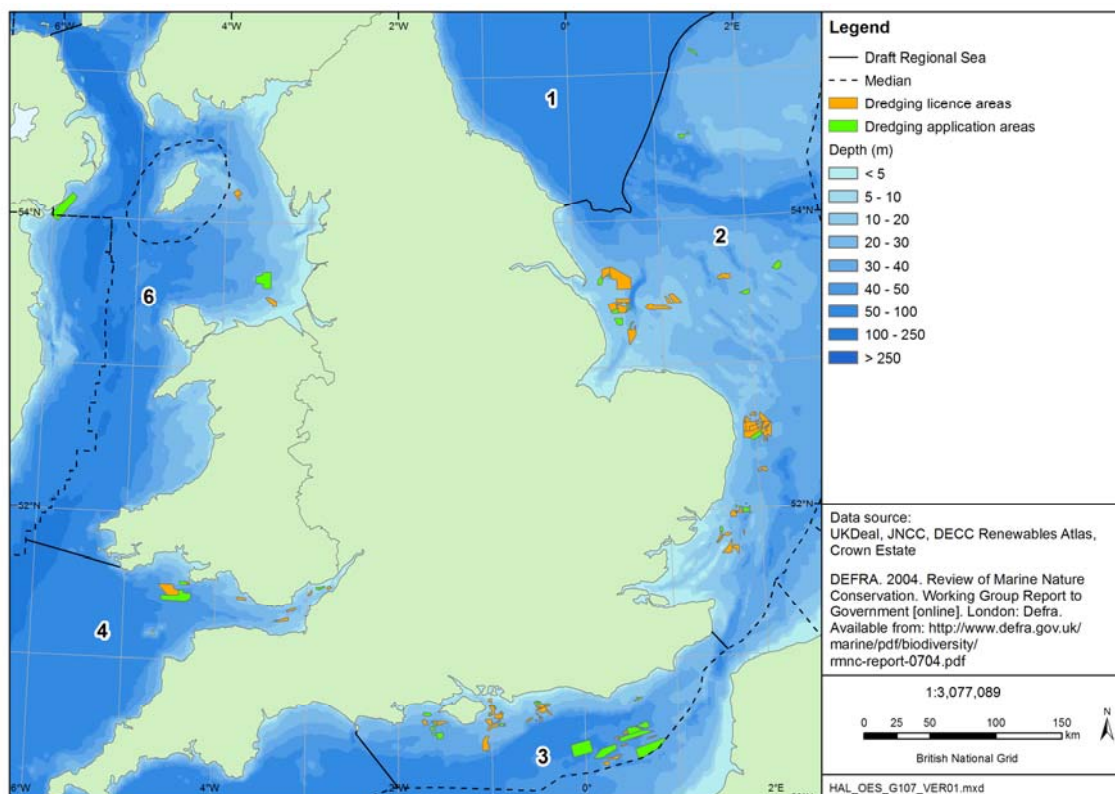
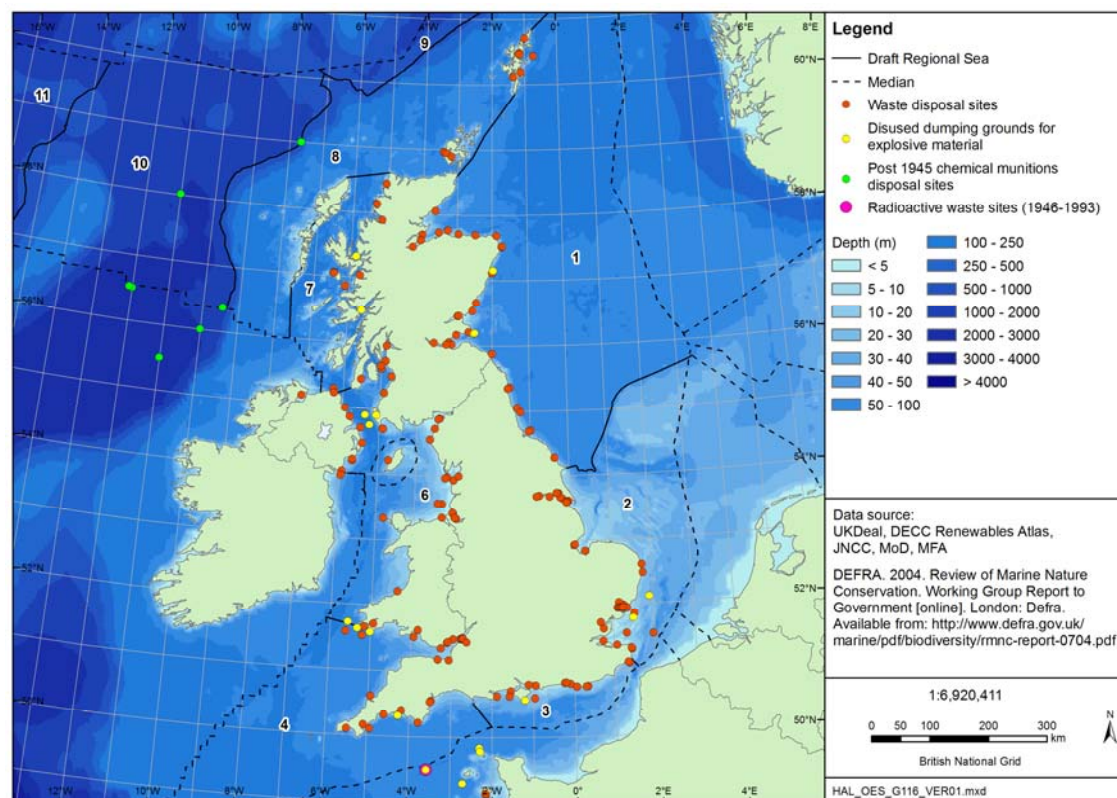


Figure A3h.22 – Known¹ dredged material and munitions disposal sites

Notes: ¹ these are all the known sites for disposal of dredged material – licenses for all areas are not awarded every year

A3h.10 MARINE WASTE DISPOSAL

Figure A3h.22 shows the approximate location of disposal sites for dredged material and munitions around the UK.

A3h.10.1 Disposal of dredged material

Since 1994, the dumping at sea of most forms of industrial waste has been prohibited, with the disposal of sewage sludge phased out in 1998. Dredged waste from excavated ports and navigation channels now forms the majority of the remaining material eligible for disposal at sea. Previously, responsibility for statutory licences to carry out disposal in UK waters for England and Wales lay with the Marine Consents & Environment Unit (MCEU) of DEFRA. In April 2007, work previously carried out by MCEU was integrated into the Marine Fisheries Agency, which as well as expending its environmental responsibilities also changed its name to the Marine and Fisheries Agency. The Scottish Executive Environment and Rural Affairs Department through the Fisheries research Services (FRS) is the responsible body for Scotland and the Department of the Environment for Northern Ireland.

Licensed waste sites for the disposal of dredged material are generally located in inshore waters and every Regional Sea area that abuts a coastal regional has waste sites located within it. Regional Sea areas 5, 9, 10 and 11 are entirely marine and do not contain any of these sites. The majority of sites are on the east coast of the country.

In 2006, the United Kingdom was granted 92 permits for the disposal of dredged material and 3 permits for the disposal of fish waste. 6,000 tonnes dry weight of fish waste was

licensed for deposit in the sea in 2005 under a three year licence issued in December 2005 to run from 1st February 2006 to 31st January 2009 (i.e. 2,000 tonnes per annum). The material was licensed for deposit directly onto the intertidal zone, but is not dumping under the terms of the Convention 1,203 tonnes of fish waste were deposited under this licence during 2006. In 2006 a total of 14,919,103 tonnes (dry weight) was licensed for dumping in the UK and some 15,349,471 tonnes (dry weight) was actually dumped (OSPAR Commission 2008). Table A3h.9 below describes the disposal sites and the approximate quantity of material deposited (OSPAR 2008).

Table A3h.9 – Marine disposal sites around the UK licensed in 2006

Origin (name of waterway)	Type of area dredged	Dredging operation type	Total quantity (tonnes, dry weight)
Regional Sea 1			
Moray Firth	Harbour	Maintenance	8,154
Spey Bay/Moray Firth	Harbour	Maintenance	10,508
Grampian Coast	Harbour	Maintenance	3,105
Dee River	Harbour	Maintenance	88,050
South Esk River	Harbour	Maintenance	4,570
Tayside Coast	Harbour	Maintenance	7,091
Firth of Tay	Harbour	Maintenance	46,021
Firth of Forth (5 sites)	Harbour	Maintenance	66,726
Firth of Forth	Harbour	Capital + Maintenance	474,999
Tweed River	Harbour	Maintenance	6,026
Coquet River ¹	Harbour + Estuary	Maintenance	0
Northumberland Coast	Harbour	Capital + Maintenance	89,675
Tyne River ³	Harbour + Estuary	Capital + Maintenance	750,124
Wear River	Harbour + Estuary	Maintenance	107,681
Durham Coast	Harbour + Estuary	Maintenance	17,718
Tees River/Hartlepool Bay	Harbour + Estuary + Sea	Capital	193
Tees River/Hartlepool Bay	Harbour + Estuary + Sea	Maintenance	1,139,569
Esk River	Harbour + Sea	Capital + Maintenance	18,614
North Yorkshire Coast	Harbour	Capital + Maintenance	34,564
Regional Sea 2			
Kent Coast	Harbour + Sea	Capital + Maintenance	163,443
Kent Coast	Harbour	Maintenance	405
Rother River + Kent Coast	Harbour	Maintenance	30,577
Humberside Coast	Harbour	Maintenance	4,229
Humber River (4 sites)	Harbour	Maintenance	710,166
Humber River	Harbour + Estuary + Sea	Maintenance	2,029,737
Humber River (2 sites)	Harbour + Estuary	Maintenance	457,227
Humber River	Estuary	Maintenance	13,706
Great Ouse River	Harbour + Estuary	Maintenance	42,280
Yare River	Harbour + Estuary	Maintenance	10,242
Witham River	Harbour + Estuary + Sea	Maintenance	26,093
Orwell River	Harbour	Maintenance	128,691
Norfolk Coast	Sea	Capital	195,269
Waveney River	Harbour	Maintenance	31,082

Origin (name of waterway)	Type of area dredged	Dredging operation type	Total quantity (tonnes, dry weight)
Orwell River	Estuary	Capital + Maintenance	5,334
Orwell River (2 sites)	Harbour + Estuary	Maintenance	35,029
Orwell/Stour Rivers + Thames Estuary	Harbour + Estuary + Sea	Maintenance	1,390,690
Thames Estuary (2 sites)	Sea	Capital	99,011
Kent Coast	Harbour	Maintenance	61,448
Orwell River	Harbour + Estuary	Maintenance	253,896
Regional Sea 3			
Blackwater River	Estuary	Maintenance	246
Ouse River (E. Sussex)	Harbour + Sea	Maintenance	19,672
East Sussex Coast	Harbour	Maintenance	16,017
Sussex Coast	Harbour	Maintenance	61,619
Sussex Coast	Sea	Maintenance	1,864
Chichester Harbour	Harbour + Estuary	Maintenance	1,762
So'ton Water, IoW, Portsmouth	Harbour + Estuary + Sea	Capital + Maintenance	253,532
So'ton Water, IoW, etc	Harbour	Maintenance	14,129
So'ton Water, IoW, etc	Sea	Capital	2,421
Poole Harbour	Harbour + Estuary + Sea	Capital + Maintenance	228,527
Regional Sea 4			
Camel River	Harbour	Maintenance	1,167
Somerset Coast	Harbour	Maintenance	2,888
Avon River	Harbour + Estuary	Maintenance	228,809
Taff River/Severn Estuary	Harbour	Maintenance	247,411
Severn Estuary	Harbour	Maintenance	14,756
Tawe & Neath Rivers/Swansea Bay	Harbour + Estuary + Sea	Maintenance	771,081
Usk River	Harbour	Maintenance	113,551
Fowey River/Cornwall Coast South	Harbour + Estuary	Maintenance	27,109
Penrhyn River	Harbour	Maintenance	3,775
Falmouth Harbour/Truro River/Mounts Bay	Harbour	Maintenance	5,242
Teign River ¹	Harbour	Capital + Maintenance	0
Regional Sea 6			
Cumbria Coast	Harbour	Maintenance	17
Anglesey Coast	Harbour	Maintenance	7,317
Dee River, Wales	Estuary + Sea	Maintenance	336,985
Mersey River	Harbour + Estuary	Maintenance	174,282
Mersey River/Liverpool Bay	Harbour + Sea	Maintenance	202,679
Mersey River	Estuary	Maintenance	391,315
Mersey River	Harbour + Estuary + Sea	Maintenance	1,476,854
Mersey River/Liverpool Bay	Harbour + Estuary	Capital	1,836
Wyre River	Harbour	Maintenance	515,129
Lune River	Harbour	Maintenance	2,263

Origin (name of waterway)	Type of area dredged	Dredging operation type	Total quantity (tonnes, dry weight)
Morecambe Bay	Harbour + Sea	Maintenance	292,975
Cumbria Coast	Harbour + Sea	Maintenance	457,573
Cumbria Coast	Harbour	Maintenance	97,646
Belfast Lough	Estuary	Maintenance	435,227
Down Coast ¹	Harbour	Maintenance	0
Carlingford Lough	Harbour	Maintenance	14,030
Milford Haven	Harbour + Estuary	Capital + Maintenance	168,619
Milford Haven	Estuary	Maintenance	2,040
Foyle River	Harbour	Maintenance	58,685
New Quay, Wales	-	-	1,203
Regional Sea 7			
Firth of Clyde	Harbour	Maintenance	122,449
Islay Coast	Harbour	Maintenance	9,888
Loch Broom	Estuary	Maintenance	2,065
Regional Sea 8			
Shetland Coast ¹	Harbour	Maintenance	0
Ham Voe	Harbour	Maintenance	875

Notes: ¹ 2 sites were licensed in 2006, but no material was deposited

A3h.10.2 Munitions dumping

Chemical weapons and munitions have been dumped at sea since the end of the First World War. As recovery of these munitions is not technically feasible at the present time, it is important that accurate records of the extent, location and present condition of dumped material are kept and regularly reviewed (OSPAR 2002b). To this end, contracting parties to the OSPAR Convention have supplied information in order to determine the location and extent of marine dumped chemical weapons and munitions.

All post 1945 chemical munitions disposal sites are located to the west of the UK, two on the shelf edge along the Regional Sea 8 and 10 boundary, one in the Rockall Trough area of regional Sea 10 and four others in the deeper waters of the Atlantic, north west of Ireland. Chemical weapons disposed of in the Atlantic were packed into sealed drums and then placed into redundant merchant ships, which were then scuttled.

There is a single site listed in the above figure for the disposal of radioactive waste, this is a MoD site, Hurd Deep. This site is out with any of the Regional Sea areas, lying in the eastern Channel, just south of the Regional Sea 4 Median Line boundary and was used for dumping low and intermediate level radioactive wastes between 1946 and 1973. There is another site known as Atlantic Deep, lying some 644km (400 miles) south west of Lands End, which was also used to dump radioactive waste – this has not been included in the above figure. There are other known sites for the disposal of radioactive waste, however these have not been listed here as it is unknown if they are solely MoD sites.

The London Convention on the Disposal of Wastes at Sea and the Oslo Convention on the prevention of Marine Pollution in the North East Atlantic was adopted by the UK in 1972. These Conventions ended munitions disposal on the UK continental shelf and the London Convention also introduced a global ban on the sea dumping of high level radioactive waste.

One of the most heavily used areas for dumping of conventional and chemical warfare munitions in the North-East Atlantic is located in Regional Sea 6. The Beaufort's Dyke, a

200 to 300 meters deep trench is located between Scotland and Northern Ireland. This was the main disposal site for the UK after the war and it is estimated that a million tonnes of conventional munitions, ranging from small arms ammunition to heavy aircraft bombs were dumped there. Some 14,000 tonnes of shells containing phosgene were also known to be dumped into the Dyke and after the 1940s disposals continued here on a much smaller scale until the 1970s (MoD website). During the 1990s reports of large numbers of phosphorous devices stranded on Scottish and Irish coasts were commonplace.

A detailed survey of the Beaufort's Dyke disposal site was undertaken by the Marine Laboratory, Aberdeen (SOAEFD 1996). This report showed that fish, shellfish and sediment samples collected adjacent to, and from the general area of the Beaufort's Dyke, did not contain chemical warfare agents or contaminants associated with the dumped munitions. It also clearly showed munitions and munitions-related materials at high densities outside the charted dumpsite.

A3h.11 TOURISM AND RECREATION

A3h.11.1 UK context

The tourism industry is socially and economically important to the UK and the coast in particular has been a popular destination for British holidaymakers of all age groups. From large traditional seaside resorts to small-scale coastal attractions, this sector makes an important contribution to the local, regional and national character of the coast. Devon, for example, receives 3.5 million visitors a year, and Blackpool attracts 17 million visitors a year supporting around 52,000 jobs (Atkins 2004).

Coastal tourism is a difficult sector to estimate as seaside recreation is not usually distinguished from general tourism in statistics, and the difference is hard to define. Fortunately the Minister for Creative Industries and Tourism has given Departmental statistics in a response to a recent House of Commons Committee Enquiry into the economics of coastal towns (Pugh 2008).

As a nation on an annual basis, the British public take 27.9 million days on seaside holidays in the UK spending £5.1 billion. England accounts for 21.6 million of these seaside days attracting £4 billion. In Wales, the equivalent figures are 3.5 million holidays and £0.52 billion spend and in Scotland 2.2 million holidays generating £0.44 billion. As a proportion of all holidays in England taken by the British, seaside holidays account for 27% of all holiday trips, 34% of all nights and 31% of all spend. In Wales, coastal holidays account for 42% of all holiday trips, 49% of all holiday nights and 42% of all spend. In Scotland, because of the different tourist product, coastal holidays account for a smaller but nevertheless important 19% of all holiday trips, 23% of all holiday nights and 19% of all holiday expenditure (Atkins 2004). In addition, there were in excess of 240 million day visits made to the British coast, generating a further £2 billion spend (Atkins 2004).

The coast is a vital resource for the Welsh recreation and tourism industries and of strategic importance to the Welsh economy, as it currently represents 7% of the Welsh GDP generating £1.5-2 billion revenue per annum. The sector employs 100,000 people (10% of the workforce) and 50% of tourism revenue accrues to communities in rural Wales. Over 7 million residential holidaymakers visit Wales each year with more than 60% going to the coast (Atkins 2004).

In Northern Ireland, two of the largest visitor attractions have coastal locations: the World Heritage Site at the Giant's Causeway and Carrickfergus Castle. The Giant's Causeway Visitor Centre on the Antrim coast was visited by 383,133 people in 2002.

Seaside tourism is distributed throughout the UK, with many smaller resorts depending on a very local clientele. Big centres such as Blackpool and Brighton also attract conventions and conferences. A study lead by the National Trust has estimated a total income for seaside tourism in Wales in 2003 of over £700m. Within the general category of holiday tourism, the economics of recreational angling has been studied in detail for England and Wales. The 2004 Drew report for DEFRA estimates an annual aggregate expenditure of £538m, made up of £178m shore based (54% of all participants), £82m for charter boat (22%) and £278m for own boat activities (23%) (Pugh 2008).

Any offshore development will invariably have an impact on the nearby coast through visual disturbance, landward infrastructure, etc. The implications of such disturbance should be considered in relation to the effect it would have on the local tourism industry.

A3h.11.2 Bathing Waters, Blue Flag beaches and Marinas

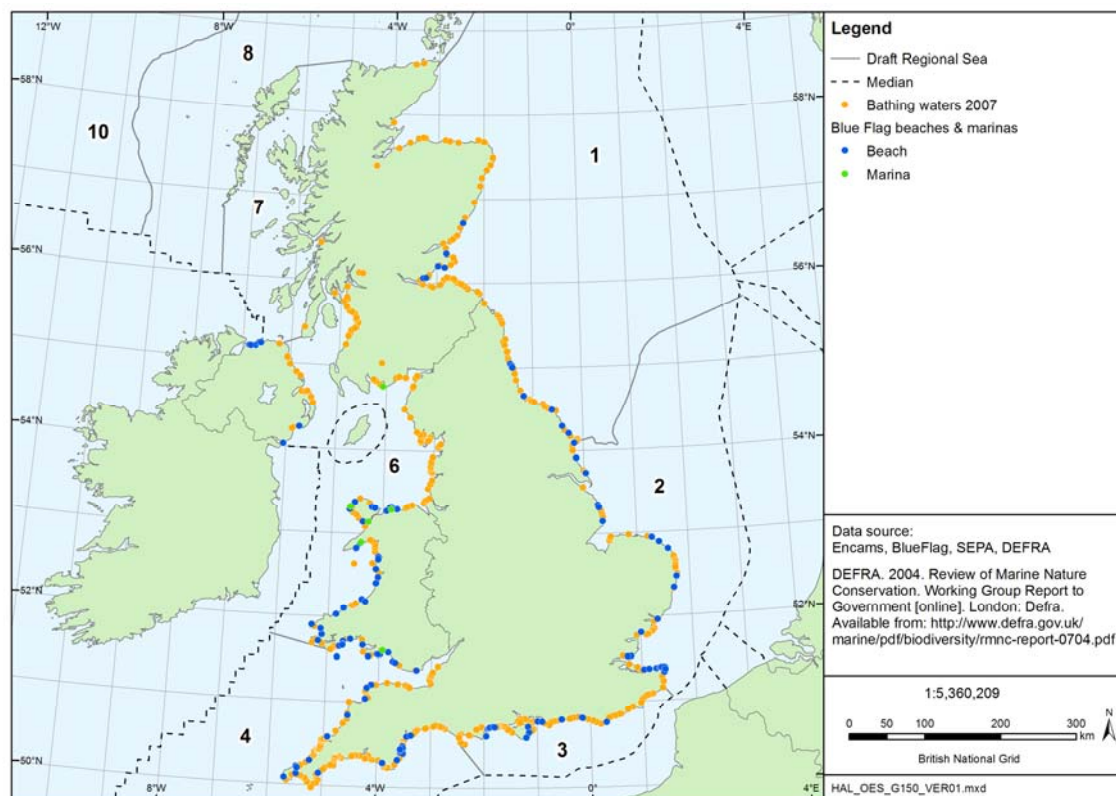
In the last 18 years, the number of sites in England and Wales meeting strict European guidelines has risen from 32.4% (1990) to 71.7% (2008) and those sites with declining standards have reduced substantially from 21.9% (1990) to 3.4% (2008). In Scotland in recent years, bathing quality measurements have varied from being 100% compliant with EU regulations (2006) to a number of beaches failing to meet acceptable standards (2007) apparently due to increased runoff of pollutants due to high precipitation. In 2008, all but one (Ballyholme) of Northern Ireland's 24 identified bathing waters achieved the mandatory standards of the European Commission's Bathing Water Directive. The regulations pertaining to the quality of bathing waters in the UK are currently under review as part of the implementation of the Revised Bathing Water Directive (2006/7/EC), which came into force in March 2008. Its transposition into UK law further tightens bathing water standards and stipulates requirements to provide information about bathing waters to the public using signage on beaches and online. Figure A3h.23 indicates the location of bathing waters around the UK coast for 2007 in relation to each Regional Sea.

In addition to bathing waters, Blue Flag beaches and Marinas are located extensively throughout the UK coast. Criteria for their successful selection are exhaustive and attention is brought to the Blue Flag website which provides this information. In brief, beach and marina designations are subject to 29 and 23 criteria respectively covering aspects of:

- Environmental Education and Information
- Water Quality
- Environmental Management
- Safety and Services

Some of these criteria are imperative while others are provided as guidance, and some are not applicable in all geographic areas. Blue Flags are awarded on a seasonal basis, and may be withdrawn if criteria are not met at any time.

Figure A3h.23 – UK Bathing waters and Blue Flag sites (2007)



A3h.11.3 National Trails & Long Distance Routes

There are a number of National Trails around the coast of the UK that traverse areas of distinctive coastline, often coinciding with National Parks or Areas of Outstanding Natural Beauty (AONB). These are major attractions for an increasing number of outdoor enthusiasts intent on walking part or the entirety of a trail, often camping along the way. Table A3h.10 indicates the location of the 18 national trails in England, Wales, Scotland and Northern Ireland in relation to each Regional Sea area.

Table A3h.10 – National Trails and Long Distance Routes

RS	Trail Name	Length	visitors (000's)*	Summary
1, 6	Hadrian's Wall Path	135km	603	A riverside route along the Tyne gives way to predominantly arable farmland above Tynedale, opening out to rough grazing upland dominated by the Whin Sill escarpment. The route then descends to the richer pastures of Cumbria and the open salt marsh of the Solway Estuary.
1	Cleveland Way	177km	415	Half encircles the largest open moorland in England, the rest follows the Heritage Coast on top of rugged cliffs. 80% of the Trail is within the North York Moors National Park.
	Speyside Way	135km	-	Links Buckie on the Moray Firth coast with Aviemore in Strathspey. The route provides fairly gentle walking in varied scenery, mainly along the strath of the River Spey. Much of this route is contained within the Cairngorms National Park.

RS	Trail Name	Length	visitors (000's)*	Summary
1, 6	Southern Upland Way	341km	-	The route runs from Portpatrick, near Stranraer on the south west coast, to Cockburnspath on the Berwickshire coast and provides varied and challenging walking, taking in coastline, hill, forest, river and loch.
1, 7	Great Glen Way	118km	-	Extends between Fort William and Inverness and links with the West Highland Way. In places the route combines with and complements the Great Glen Cycle Route and the towpath of the Caledonian Canal.
1	Pennine Way	429km	1,646	17% of the Trail is within the Peak District National Park, 20% in the Yorkshire Dales National Park and 24% within the Northumberland National Park (Total 61% designated). 10km of the trail lies on the Scottish coast terminating at Kirk Yetholm in the Scottish Borders.
2	Peddars Way & North Norfolk Coast Path	150km	44	A distinctive Roman road through the Brecks and on to the open arable farmland of north west Norfolk. The Coast Path starts on the cliffs at Hunstanton with views across the Wash to the Lincolnshire Wolds AONB. The Trail then follows extensive sandy beaches and dunes, rising at the cliffs of Cromer. 65% of the route passes through the Brecks, the Norfolk Coast AONB and the North Norfolk Heritage Coast. 43% runs through or borders either a SPA or SAC.
3	North Downs Way	246km	487	Follows the chalk escarpment of the North Downs passing through a rich diversity of woodland, open fields and natural chalk grassland, often tracing the Pilgrims Way. 85 % within the Kent Downs and Surrey Hills designated AONB.
	South Downs Way	160km	479	Wide grassy or flinty tracks on chalk downland, grazed by sheep on the hills with arable crops below. 100% within Sussex Downs and East Hampshire designated AONB. The western part of the downs is rolling farmland, the West Sussex Downs are dominated by a steep, often wooded scarp with views across the Weald below, while the East Sussex Downs are classic open grassland running down to the sea cliffs.
4	Cotswold Way	163km	207	Follows the escarpment of the Cotswold hills giving panoramic views across the Severn Vale, passing through beech woods and open pasture with dry stone walls, picturesque villages with limestone cottages. 96% within the Cotswolds designated AONB.
4&5	South West Coast Path	1014km	5,463	Extremely varied from rugged and remote cliff tops to sheltered estuaries and busy harbours and resorts. Moorlands, plateaux incised by steep coastal valleys, intimate coves and long pebble or sand beaches, spectacular 'drowned' estuaries, landslips with undercliffs in East Devon and Dorset. 65% of length is within AONBs, 56% Heritage Coast, 5% National Park. England's first natural World Heritage Site between Orcombe Point, Exmouth, East Devon and Old Harry Rocks, Swanage, Dorset.
4, 6	Offa's Dye Path	285km	-	Rural with mountains, hill pasture, river valleys and lowland fields. 31% is within Three AONB, 9% is within a National Park. Total 40% within designated areas, Two-thirds of this National Trail is in Wales.

RS	Trail Name	Length	visitors (000's)*	Summary
6	Pembrokeshire Coast Path	300km	-	Spectacular coast, rugged cliffs, sweeping beaches, just about every type of coastal landform. Over 50% of the Trail is within designated conservation sites. 85% of the Trail is within the National Park, the National Park's dedicated Coast Path team manages 100%.
	Antrim Hills Way	35km	-	This route lies within the Antrim Coast & Glens AONB and affords spectacular views of Slemish and the coastline.
	Lecale Way	64km	-	Within the Lecale Coast AONB, features of this area include St Patrick's Monument, sandy beaches, seabirds and seals.
	Mourne Way	42km	-	Within the Mourne AONB, this trail traverses the foothill of the Mourne Mountains from Newcastle on the Irish Sea to Rostrevor on Carlingford Lough.
6, 7	Moyle Way	32km	-	Resides within Antrim Coast & Glens AONB. Principal interest features are five of the Glens of Antrim and Glenariff Forest Park.
7	West Highland Way	153km	-	The route starts at Milngavie on the outskirts of Glasgow and finishes at Fort William at the foot of Ben Nevis. The route follows the shores of Loch Lomond and passes through dramatic scenery in its northward journey from the lowlands to the highlands.

Notes: * Figures are for 2004; RS=Regional Sea

Source: National Trails website, SNH website, WalkNI website, Natural England website

A3h.11.4 Notable features by Region

A3h.11.4.1 Regional Seas 1 & 2

In 1999 and 2001 a Tourist Attitudes Survey conducted by the Scottish Executive suggested that over 90% of visitors rated the 'beautiful scenery' as the most important factor in choosing Scotland as a destination (Scottish Executive (2002) 'Tourism framework for action 2002:2005'). The coastal zone is an important resource for this key industry. Regional Sea 1 contains all the elements of this diverse resource (with the exception of the scenic interplay of sea lochs and mountains, which is found along Scotland's west coast). There are numerous coastal nature conservation areas along the coastline of Shetland, Orkney and the mainland. Examples include the Dornoch Firth, Loch of Strathbeg, Sands of Forvie, Fowlsheugh, St. Cyrus, Montrose Basin, Eden Estuary, Aberlady Bay and the Firth of Forth Islands.

Within Regional Sea 1 particular developments highlight the local importance of wildlife based attractions, for example:

- The Montrose Basin Wildlife Centre which was hailed in 2004 as a model development by the Scottish Minister for tourism, culture and sport
- The North Berwick Seabird centre contributes £1m a year to the local economy and was the site for the launch of Wild Scotland (the new wildlife tourism association) in 2004
- Boat based observation of marine life, especially dolphins in the Moray Firth, is a fast growing sector (increased by 79% since 1997)

Such developments also demonstrate the importance of wildlife tourism to the Scottish economy, now valued at £74m, with 3,000 jobs throughout Scotland and a growth rate of 50% since 1997 (Wild Scotland (2004) Press release 18/08/04).

The north eastern coast of Scotland has little formal coastal activity, however, numerous coastal archaeological sites, such as Jarlshof in Shetland; and historical and cultural sites such as Dunnottar Castle in Aberdeenshire, Culross in Fife and the Fisheries Museum at Anstruther are to be found along the Region's coastline. Dolphin watching occurs at several locations within the Moray Firth, from Cromarty to Nairn. There is a pony trekking centre at Melvich, east of Strathlyon, and horse riding occurs along the long stretches of sandy beaches at places such as Dornoch. There are many coastal paths in the area, for example around Sandside Bay, John o' Groats and Duncansby Head and Wildfowling takes place on at least six of the area's estuaries: Loch Fleet, Dornoch Firth, Cromarty Firth, Inner Moray Firth, Spey Bay and Ythan Estuary.

The many coastal golf courses in the area, some of which are recognised internationally e.g. St. Andrews, Carnoustie and Muirfield are of great significance as an attraction for overseas visitors. Golf courses, like historical and archaeological sites, also tend to have a longer 'season', being less dependent on summer weather conditions.

A number of beaches have European Blue Flag status. Many old and relatively underused harbours have developed small-scale marinas and sailing centres e.g. Whitehills near Banff and Peterhead (Aberdeenshire). The coastline and nearshore area of the Region provides a variety of opportunities for other water-based sports and recreational activities including sport fishing, wind-surfing, sailing and diving. There is no official coastal footpath around the region but the Fife Coastal Footpath stretches from North Queensferry in the south for 150kms to the Tay Bridge in the north and attracts many walkers annually.

In order to maintain and enhance the value of this diverse and rich coastal resource base, management and promotion have to be developed both sensitively and selectively. This management ranges from conservation protection to investment in infrastructure (e.g. transport linkages). In July 2004 the Scottish Coastal Forum produced a comprehensive report which gave prominence to the importance of tourism and leisure activities within the context of the need for an Integrated Coastal Zone Management approach.

Across the border into England, tourism is not a major land use or coastal activity in the northern section, where the largest centres are Berwick and Holy Island. Birdwatching is popular in the Lindisfarne National Nature Reserve and Budle Bay. Boat trips are available to the Farne Islands, to watch the seals. In contrast, the central heavily developed area of the coast has only one major tourism centre, at Whitley Bay, which is close to the major conurbations of Tyne & Wear and an important traditional seaside resort. Tourism is a crucial source of income and employment on the stretch of coastline between Staithes and Flamborough Head, which includes the traditional coastal resorts of Whitby, Scarborough and Filey. These record over 9 million tourist days per annum. The coastline is well served by footpaths with a ten mile coastal path from Beadnell to Howick Haven. In Cleveland and North Yorkshire the Cleveland Way Long Distance Footpath follows the Heritage Coast between Saltburn and Filey, with breaks at Whitby and Scarborough (Barne *et al.* 1995b).

Further south into Regional Sea 2 the wild and unspoilt natural scenery of much of the North East attracts many tourists in pursuit of open-air leisure activities including walking, bird watching, wildfowling and golf. Fortresses line much of the coastline such as Tynemouth, Dunstanburgh and Bamburgh Castles. The Christian seat of learning once found at Lindisfarne and the seal colony on the Farne Islands also attract further tourists to the area.

Many of the area's coastal towns have had a long association with the tourism industry, most notably Mablethorpe, Skegness in Lincolnshire and Great Yarmouth in Norfolk. The Norfolk Coast Path National Trail, in addition to many other coastal footpaths and the Region's rich

wildlife (popular for birdwatching and wildfowling alike) attract further visitors. The North Norfolk coast is also a popular destination for dinghy sailors and windsurfers. The small number of yachts based on this coast is partly due to the general unsuitability of the area for cruising and yachting, as many of the harbours are shallow and dry out for much of the tidal cycle (Barne *et al.* 1995b).

Coastal areas of Essex and Kent are major areas for tourism with a number of highly developed traditional seaside resorts, particularly Southend-on-Sea, Clacton-on-Sea, Margate and Ramsgate. The area's accessibility from London has helped encourage a dramatic increase in water-based activities in the last 20 years and boating is now a significant industry in some areas, most notably within the Essex estuaries e.g. Blackwater and the Crouch and along the Thames Estuary. Windsurfing, sea angling and wildfowling are also popular activities (Barne *et al.* 1995b). Essex is also one of the most important areas in Britain for wildfowling, with shooting taking place on nearly all the major estuaries.

There are several well used coastal paths in the area that attract many walkers and sightseers; the Suffolk Coastal Path runs for 50 miles from Lowestoft to Felixstowe, around the Kent coast the Saxon Shore Way runs from Gravesend to Rye, the North Downs Way follows the cliff top between Dover and Folkestone and there are many other areas of open public access along sections of the coast. Such access points allow easy routes to the 78 designated bathing waters of the southern coast of which 36 have been awarded an ENCAMS Seaside Award for 2002 and 8 a Blue Flag award.

A3h.11.4.2 Regional Sea 3

This Region is one of the most highly-developed in Britain for coastal tourism and leisure, and some of Britain's largest coastal resorts are found here (Barne *et al.* 1998b). The total number of berths and moorings in West Sussex has been estimated as upwards of 7,800 (mostly within Chichester Harbour), together, the Solent and Chichester Harbour represent one of the densest concentrations of water recreation in Europe (Barne *et al.* 1998b). Tourism is centred on the larger urban areas, including Hastings, Bexhill, Eastbourne, Brighton, Worthing, Littlehampton and Bognor Regis. A long distance footpath, the South Downs Way, ends at Eastbourne, one route following the coast past Beachy Head and the Seven Sisters cliffs before heading inland. The South Downs Way was the first national long-distance bridleway and cycling is popular along or near the coast.

The Solent area (Hampshire and Wight coasts) is of very high value for coastal recreation. Parts of the southern half of the Isle of Wight have popular beaches. The Dorset coast is less intensively used, but there is considerable visitor pressure on some areas, such as Poole Harbour and Bournemouth beaches, and Studland, Swanage and Lulworth Cove. Tourism, much of it centred on the coast, is the largest employer and source of revenue in Dorset (Dorset County Council 1994).

Regarding inshore recreation Regional Sea 3 is the single most heavily used water area in Britain and possibly in the north-east Atlantic, with reportedly the largest recreational fleet in the world (Barne *et al.* 1996c). The sheltered areas of Chichester and Langstone Harbours, the Solent, Southampton Water, Poole Harbour and Bay and Portland and Weymouth Harbours are ideal sites for watersports, which bring a significant income to the Region. Activities include yachting and motor-boating, dinghy sailing, windsurfing, diving, sea angling, sea canoeing, jet skiing, water-skiing and rowing. Leisure boating and sailing are high among the major industries in the region, catered for by a large number of harbours, marinas and moorings, slipways, boatyards and other facilities. There are nineteen purpose-

built marinas in the Solent, which account for more than a quarter of total moorings, and five other sites with marina-style facilities (Barne *et al.* 1996c).

The double high tide in the Region means that it is relatively easy for dinghy cruisers and shallow draft yachts to explore isolated creeks (Barne *et al.* 1996c). Many of the Region's dinghy racing clubs host national dinghy championships each year, with 200 or more boats entered in each. Windsurfing takes place from many beaches and much of the area is of national importance for this sport. Water-skiing and personal watercraft (jet skis) have undergone considerable growth in the past, and this looks set to continue (Barne *et al.* 1996c). Coastal rowing is well established, with at least twelve clubs in the Region. Canoeing is also widespread, with over 20 clubs in Hampshire alone. Less common activities such as parascending and inflatable towing (e.g. banana rides) are also becoming more widespread on resort beaches.

Southampton Water and the Solent together represent Britain's premier yachting centre. It has been described as "possibly the most densely populated sailing ground in the world" (Barne *et al.* 1996c). There are 140 sailing clubs and numerous activity centres of various descriptions within the Solent area, including 73 sea angling clubs (Barne *et al.* 1996a). The growth in watersports facilities in the Solent has been prodigious; for example, moorings have increased from an estimated 7,000 in the mid 1960s to around 25,800 moorings and berths in 1993, excluding dinghies on the shore. The Solent is particularly well known for hosting many prestigious yachting competitions, such as Cowes Week, the start and finish of the Whitbread Round the World Race, and the Round the Island Race. The latter is the largest single sailing competition in the world, with over 1,000 yachts competing each year. All of these events attract large numbers of spectators along with the associated income to the Region.

According to the estimates, there are 8,283 marina berths and 12,333 wet moorings in Hampshire on the Solent. Especially popular for dinghy sailing are Chichester, Langstone and Portsmouth Harbours, Southampton Water, Lymington Harbour and Stokes Bay; the latter is also an important site for dinghy racing, as is Hayling Bay, where the major Eurolymp regatta is held every year. There are especially popular sailing schools at Calshot, Hamble and the western harbours. Calshot, Hayling Island and Lee-on-Solent are also important for windsurfing, and the latter and some other parts of Southampton Water are main sites for water skiing and jetski launching. There is a well regulated water skiing area in Langstone Harbour. Power boat racing takes place in and around the Solent, which is the start and finish point for a number of offshore races, for example the Spithead Trophy. The River Itchen is popular for coastal rowing. The Region's maritime heritage means that SCUBA diving is also popular on the many wrecks (Barne *et al.* 1996c).

Shore-based angling is popular from the exposed shingle beaches in the Region, and bait digging is widespread. Many of the more undeveloped sheltered coastal areas of Hampshire are visited for birdwatching, including Chichester and Langstone Harbours, and the Keyhaven – Pennington marshes. The cliffs near Barton-on-Sea are popular for fossil collecting.

Parts of the coast of the Isle of Wight, for example Ryde, Sandown Bay and Compton Bay, are heavily used for beach recreation and general leisure, and have significant tourism associated infrastructure developments such as guest houses and amusements. The 60-mile Isle of Wight Coastal Path runs right round the island. Birdwatching is popular at Newtown Harbour. According to estimates by the Hampshire County Council in 1993 there were 990 marina berths and moorings and 3,064 other wet moorings on the Isle of Wight.

The Sports Council have mapped 34 launching sites on the north coast of the Isle of Wight from Bembridge to Freshwater Bay. Cowes, Gurnard and Bembridge are especially popular for dinghy sailing, and the main site for water skiing and jet-ski launching is Colwell Bay. Hang gliding takes place from several cliff-top sites on the island. Fossil collecting is pursued and a distinctive collection of dinosaur footprints exists.

In Dorset, the beaches adjoining Christchurch, Poole, Swanage and Studland Bays are heavily used, as is the Lulworth Cove area and the coast further west at Lyme Regis. Bournemouth, a traditional-style holiday destination and conference location, is one of the largest resorts on the south coast (Barne *et al* 1996c). The Christchurch Bay area is particularly well served for holiday facilities, which include golf courses, beach huts and camping and caravan sites. There are several ferries offering day trips in the Poole Harbour area and it is a popular place for birdwatching, there is a bird observatory on Portland Bill. The Dorset Coast Path (part of the South West Coast Path) runs westwards from Poole. Purbeck and the Isle of Portland are internationally important rock climbing sites; access to certain areas is strictly controlled and management agreements have been drawn up. Dorset County Council estimates that the cliffs may be used by hundreds of thousands of climbers each year. Fossil collecting is a popular activity at the cliffs near Lyme Regis.

Poole Harbour is the second major boating centre in the Region, after Southampton Water, with sailing and power boat club membership of about 8,000 persons (non-member use is likely to be similar or greater), 7,600 boats permanently accommodated in the harbour and up to 4,000 vessels on the water at peak times. There are about 6,000 visiting boat-nights per year. The harbour also supports national and international sailing events. Annual income from recreational activities in the harbour is estimated at in excess of about £6 million (Barne *et al* 1996a). The harbour's total of 7,600 berths and moorings is thought to represent 77% of the total in Dorset, and 8% of those in marinas on the whole of the south coast.

Windsurfing occurs notably at Poole Harbour, Christchurch Bay and Portland Harbour, and many international speed events have been held in the latter, which is also important for water skiing and jet-ski launching. Poole and Weymouth are popular locations for inshore power boat racing; the Royal Motor Yacht Club at Poole is the premier power boat racing club in the UK.

The clearer waters of Swanage and west Dorset are particularly heavily used by divers from the south and east of England, and there are training centres in Poole Harbour and at Swanage.

Wildfowling takes place on at least nine of the Region's estuaries. Wildfowling on some coastal sites involves both local wildfowlers and those from further afield. Two wildfowling clubs, as well as other areas of private shooting, operate in Chichester Harbour, and a club shoots over parts of Langstone Harbour. Around half the intertidal area of the Lymington Estuary is shot over, by two clubs. On the Isle of Wight some low intensity wildfowling occurs on the Newtown Estuary and the upper parts of Wootton Creek. In Dorset, much of Poole Harbour is shot over, some of it by a club and other parts as private shooting, with agreed no-shooting areas around the Arne Peninsula and Brownsea Island. There is some occasional wildfowling in the Fleet and Portland Harbour (Barne *et al* 1996c).

A3h.11.4.3 Regional Seas 4 & 5

The Office for National Statistics indicates that in 2007, UK residents made c. 20.46 million trips lasting 1 night or more in the south-west. The majority of visitors were from elsewhere

in England (94%), with the remainder from the other UK countries. 40% of the trips were to seaside resorts with an estimated input of £1.85 billion. A total of 11.5 million nights were spent in the South West by visitors from overseas with a spend of £526m (2001).

The Region has some of the most visited coastal locations in the southern UK; the largest tourist centres include the Mount's Bay area, the Isles of Scilly, St. Ives, Newquay, Padstow, Bude, Ilfracombe, Minehead, Watchet, Burnham-on-Sea, Weston-super-Mare, Penarth and a variety of other smaller destinations (Barne *et al.* 1996d).

Major land- and water-based leisure facilities are concentrated in traditional coastal holiday areas, most of which are in Devon; including Seaton, Sidmouth and Budleigh Salterton, Exmouth and Dawlish on the Exe Estuary, Teignmouth, the Tor Bay area and Salcombe. Beaches are important recreational sites and those with good water quality in the Region, include Branscombe, Torbay, Blackpool Sands, Slapton Sands, Mill Bay, South Milton Sands, Thurlestone, Bigbury-on-Sea, Challaborough and Bow Beach (near Gorran Head). There are several important coastal nature reserves in the region, popular locations for bird watchers and naturalists. Slapton Ley National Nature Reserve field studies centre and the visitor centre at Dawlish Warren Local Nature Reserve both provide programmes of guided walks and activities. Sites on the Exe Estuary and the inner Salcombe-Kingsbridge Estuary are also popular with bird watchers. The RSPB run 'avocet cruises' on the River Exe in the winter months, when the largest numbers of this important population occur (Barne *et al.* 1996d).

Several important coastal rock climbing locations exist in the Region, for example at Berry Head, and the Region hosts The South West Coastal Path. The path runs the length of the coast in Regional Sea 4 from Minehead in Somerset to Poole Harbour in Dorset and attracted 5.5 million people in 2004. The path is Britain's longest National Trail and the second most intensively used. It follows the coast for 560 miles (Barne *et al.* 1996d).

Most of the estuaries have yacht moorings and some, such as Plymouth Sound and the Dart, have marinas. In 1994 there were ten marinas on the south Devon coast three each in Tor Bay and the Dart Estuary and four in Plymouth Sound. In Devon, there are approximately 7,500 moorings at nine main sites and an estimated 2,550 berths. The yacht clubs at Exmouth, Torquay, Brixham, Salcombe and Plymouth regularly hold large regattas, and dinghy sailing is popular in the Region, both in estuaries, notably Salcombe and Plymouth Harbour, and on the open sea (Barne *et al.* 1996b). Beer, Sidmouth, Axmouth, Teignmouth, River Dart and Salcombe each have a dingy sailing club, while the River Exe, Tor Bay and Plymouth Harbour all have several (Barne *et al.* 1996d).

Torbay is one of the top ten seaside tourist resorts in the UK (Barne *et al.* 1996d) and the focus of many water-based activities in the Region. Other water-based activities of note in the Region include:

- Water skiing, in the Exe and Teign Estuaries, Salcombe, Thurlestone, Jennycliff Bay and Cawsand Bay
- Windsurfing at Exmouth, Dawlish, Teignmouth, Compass Cove, Blackpool Sands, Slapton Sands, Salcombe, Bigbury Bay, Wembury Bay and Plymouth Sound
- Coastal rowing in sheltered estuaries including Exeter, Dartmouth and Torquay
- Sea canoeing at Axmouth, Exeter, Exmouth, Paignton and Plymouth
- Scuba diving at Fort Bovisand, is one of the country's leading diver training schools

Looe and Fowey are the most important centres for leisure and recreation along the Region's Cornish coast. Looe Estuary drains at low tide and has very few moorings but does have a dingy sailing club and is popular for water skiing. Looe is the base for the Shark Angling Club of Great Britain (Barne *et al.* 1996d). The Fowey Estuary has up to 1,400 moorings and its yacht club regularly holds large regattas. Dinghy sailing is popular, with clubs at Fowey and Pentewan. As a sheltered estuary, Fowey is also a base for power boat racing, coastal rowing and sea canoeing clubs.

Angling from the shore occurs on most of the estuaries in the area. Sea angling is popular, and boat-based trips, are made from many of the Region's harbours. Sea anglers use the outer part of the Salcombe-Kingsbridge Estuary during the summer and the inner during the winter months. The River Exe is one of the premier salmon rivers in England, and recognised rod fishing locations exist in the upper reaches of the estuary (Barne *et al.* 1996d).

Wildfowling takes place on at least five of the area's estuaries - the Otter, Exe, Teign, Salcombe-Kingsbridge and Plymouth Sound. Wildfowling is most widespread on the Exe Estuary, where it occurs nearly everywhere except in the bird sanctuary on the west shore.

A3h.11.4.4 Regional Sea 6

In general, there has been a decline in the number of visitors to traditional seaside resorts and growth in the number of people partaking in a wide range of land and water-based leisure activities including walking, golf, bird watching, yachting, sailboarding, angling, surfing and diving throughout the Region. Available statistics indicate that tourism and leisure contributes in the order of £2.5 billion per annum to the Regional economy, with between 100,000-200,000 people directly employed in the sector (Vincent *et al.* 2004). In 2004 there were 28 Blue Flag beaches in the Regional Sea 6 area, most of which were in Wales.

Resorts along the eastern coasts of the area are significantly important to the tourism sector, for example Blackpool, the largest coastal resort in the UK, attracts 17 million visitors a year with an annual expenditure of £545m (Vincent *et al.* 2004), while in Ireland, interest in coastal and marine based activities is growing. Recreational angling is an increasingly important part of the rural economy and CEFAS calculated that the recreational fishery generated almost £19m of expenditure in England and Wales, while in Ireland local and long-distance sea angling tourism is valued at £17m per annum (Vincent *et al.* 2004).

The north Wales and Lancashire coasts are dominated by traditional seaside resorts, while Cumbria and Dumfries & Galloway are important for more active leisure pursuits. Tourism provides significant income for the region and is a major employer. Tourism on the north Wales coast is highly developed; in the 19th and early 20th century this was the traditional destination for residents of the developing industrial towns of Lancashire. Resorts such as Colwyn Bay, Rhyl and Prestatyn have benefited particularly from good road and rail links, however, as in many other Regions, in north Wales the tourism industry has suffered a major decline in both visitor numbers and spending in recent years (Barne *et al.* 1995a).

The Liverpool and Morecombe bay area presents various problems for potential water sports participants, owing to the strong tides, a large tidal range and a reputation for polluted waters around centres of population (Barne *et al.* 1995d). Perhaps because of these features, marine lakes, generally constructed in the late 19th century, are popular (Barne *et al.* 1995d).

Part of Birkenhead Docks has been turned into a tourist attraction. The Wirral has many recreation facilities, at Hoylake and New Brighton, for example, including coastal country parks and golf courses. There are sixteen coastal golf courses in the heavily urbanised stretch from the Dee Estuary to Fleetwood. The city of Liverpool is a major tourist attraction and the current holder of the European capital of culture title. Restored by the Liverpool Development Corporation, the Albert Dock has over five million visitors a year, and is second only to Blackpool as a Regional attraction. There are few caravan parks and/or campsites in Cheshire and Merseyside, with only ten between the Wirral and the Wyre (Barne *et al.* 1995d). The Blackpool coast, Morecambe and Southport are the other main holiday resorts in the region. Southport relies on its elegant 19th century charm to attract visitors, and is famous for its golf courses, many of which border the sea. The beach at Lytham St. Anne's is a nationally important centre for sand yachting.

The Lake District National Park in the north of the region is an important tourist destination, but most of the Cumbrian coast is not heavily used for recreation. There are 14 camping/caravan sites, concentrated around Silloth (Barne *et al.* 1995d). The whole of the Solway Firth is used for recreation and leisure activities, but at a very low level. Tides and currents in the Solway Firth are strong, limiting the further development of water-based recreation, although there are some moorings and marinas in the estuaries.

Dumfries & Galloway has many miles of unspoilt coastline and is a popular destination for low-intensity fishing, walking, golf and watersports. The area is now experiencing increased recreational pressure, as tourists who traditionally went to the Lake District attempt to avoid the high-season crowds there. There are 28 camping/caravan sites, generally small and widely scattered, and seven coastal golf courses. There are six RYA-affiliated sailing and yacht clubs in Dumfries & Galloway. The Countryside Sports Database, held by the Scottish Sports Council (SSC), lists 224 records of sport and recreation sites in the coastal 10 km squares of Dumfries & Galloway. The activities recorded are sub aqua (at 64 sites), walking (33), sea angling (24), game angling (18), wildfowling (18), coarse angling (14), sailing (12), orienteering (9), horse riding (7), board sailing (5), canoeing (5), cycling (5), motor sports (3), pony trekking (2), waterskiing (2), rock climbing (1), rowing (1) and shooting (1) (Barne *et al.* 1995d).

Wildfowling is widespread in the Region. Substantial areas are licensed to clubs and other groups. Shooting on some coastal sites such as parts of the Solway involves both local wildfowling and those from further afield. The Dee estuary marshes are shot over by a club, as are parts of the southern shore of the Mersey estuary. Three wildfowling clubs shoot over the Ribble estuary marshes. Within the Ribble Marshes National Nature Reserve (NNR) a substantial saltmarsh has been established as a no-shooting refuge, and this has been associated with a long-term increase in widgeon numbers.

In Wales as a whole there are currently 619 recorded sites of water-based recreation identified as being within 10 km of the coast, the most numerous recorded activities being game angling (at 105 sites), sea bathing (86), sailing (74), boardsailing (53), sub-aqua (47) and canoeing (44). The Gower Peninsula is an important tourism centre in the south-east of the Region, with a high concentration of caravan/camping sites and rural car parks, and many visitors as a result of its proximity to the conurbations of South Wales and the M4.

Further west, a major concentration of leisure activities is located around the tourist centres of Tenby and Saundersfoot. This high density of leisure land-use decreases slightly around the Pembrokeshire National Park coastline and into the southern section of Cardigan Bay, but the National Park coastline is popular with visitors for walking and beach recreation. The Pembrokeshire Coast Path is the only National Trail in the region and extends from Amroth to Cardigan. Much of the west Wales coast of Dyfed and Gwynedd is rugged and

undeveloped, but there are significant tourist areas. These include: Aberporth, New Quay, Aberaeron, Aberystwyth, Borth, Tywyn, Barmouth, Harlech, Porthmadog, Criccieth, Pwllheli and Abersoch. The beaches of Caernarfon Bay and Anglesey have all attracted leisure developments. A major and regionally important tourist area is located at Llandudno on Conwy Bay, in the north-east corner of the Region. This resort, along with Colwyn Bay to the east serves many visitors from the industrial towns of north-west England, and is a significant traditional seaside recreational area. Great Orme is a popular Country Park and attracts many visitors, particularly for walking.

There are numerous water-sports clubs, particularly along the sheltered coastal areas such as Swansea Bay, Milford Haven, Carmarthen Bay, Tremadoc Bay, Abersoch to Pwllheli and the Menai Strait, where the Welsh National Water Sports Centre is based. Casual surfing, canoeing and wind-surfing take place from many of the Region's beaches and there has recently been a dramatic increase in jet-skiing, particularly in the Swansea Bay/Mumbles area and off the Pembrokeshire coast. Scuba diving is a widespread activity on the west coast, particularly off the Gower Peninsula, Pembrokeshire and the shores of the Llyn peninsula and Anglesey. Angling takes place from the shore and at sea.

In 1993 the Isle of Man was visited by approximately 127,000 staying visitors plus 10,000 day trippers. Douglas (including Onchan) is the most important resort. The TT motorcycle racing fortnight in late May/early June is the busiest part of the year for tourism. There is a coastal (links) golf course on Langness peninsula, another at Port St. Mary that runs partly along the cliff top, and a third within 1 km of the coast at Port Erin.

Sea angling is a very popular pastime on the Isle of Man along with Sailing, including yachting and power boating. Tourist boat trips operate from Port Erin and Port St. Mary to the Calf of Man during the summer. The popularity of water-skiing and jet-skiing on the Isle of Man has increased over the last few years, especially in Bay ny Carrickey, off Port Erin and around the Calf. Other watersports practised around the Isle of Man include canoeing (common in Port Erin Bay), surfing (mostly at Bay ny Carrickey), windsurfing (Bay ny Carrickey, Castletown and Derbyhaven) and snorkelling.

There are popular bathing beaches at Laxey and White Strand as well as at the larger recreational centres of Ramsey, Douglas, Castletown, Port St. Mary, Port Erin and Peel. Parascending takes place occasionally in Port Erin and elsewhere, although there is no organised club. The Isle of Man has some of the best dive sites in the UK, a fact reflected in the number of diving clubs on the island. Diving is concentrated mainly around the south of the island and the Calf. There are recompression facilities at Douglas.

A3h.11.4.5 Regional Seas 7 & 8

The unspoilt coastal environment of Regional Sea 8 and the wild natural scenery attract tourists in pursuit of a wide range of activities and interests including walking, bird and cetacean watching, wildfowling, sailing, fishing, diving and the maritime and wartime history of the region. The Shetland Visitor Survey of 2000 found that, excluding the cruise and yacht market, over 47,000 people visited Shetland with a total expenditure of over £11m. Approximately 113,000 visited Orkney in the same year.

Foremost attractions in Shetland include the Fair Isle bird observatory, the National Nature Reserve on the Isle of Noss, Fetlar Nature Reserve and Sumburgh Head RSPB Nature Reserve. Wildlife interests are also important in Orkney and include a popular bird observatory at North Ronaldsay and several popular RSPB and Scottish Wildlife Trust reserves. Scapa Flow is a focus for waterskiing, windsurfing, motorised watersports and

wreck diving, while there are a number of coastal paths on the north coast of Scotland, including those at Duncansby Head, John O'Groats and Sandside Bay.

Marinas are becoming increasingly popular; and in Shetland in September 1996 there were fifteen operating, and a further five with outstanding planning permission (at Burravoe, East Voe, Gruting, Trondra and Skeld). At least one berth is retained in each marina for visiting yachts. Visitors also use anchorages in over a dozen locations on the sheltered channels through the islands. Around 500 visiting yachts were counted in Lerwick and Scalloway Harbours in 1995 compared with just over 100 in 1981 (Barne *et al.* 1997d). Local boat clubs are located at Sandwick, Walls, Scalloway, Aith, Tresta, Skeld (Reawick and District), Whiteness and Weisdale on West Mainland; Ness (South Mainland); Scalloway, Burra (Hamnavoe), South Nesting (Central Mainland); and at Lerwick. As well as sailing, canoeing is a popular activity, and there is a windsurfing club based in Brae (Barne *et al.* 1997d).

On Orkney the greatest concentration of tourist-related infrastructure and the greatest intensity of tourist and leisure-related activity is on Mainland, Burray and the north-west coast of South Ronaldsay. Important historical and ancient monuments such as Skara Brae are amongst Orkney's most visited sites. There are visitor centres located at Scapa Flow (wartime and naval history) and on Rousay. The only two camping/caravan sites, located near Kirkwall and Stromness, are small. There are golf courses on North Ronaldsay, Sanday and Westray and near Stromness and Kirkwall on Mainland. Sailing is a major recreational activity in Orkney. Facilities for the relatively small number of visiting yachts are provided in the main harbours of Stromness and Kirkwall (Barne *et al.* 1997e).

The three local authorities in the Region - Shetland Islands Council, Orkney Islands Council and Highlands and Islands Council - recognise the importance of tourism to the area and have implemented structure plans that contain tourism policies aimed at taking a proactive approach to the industry. Key objectives of these policies are to significantly increase and enhance the tourism industry, while ensuring wise and sustainable use of the natural environment and considering the needs of local communities.

The relative remoteness of the Northern Highlands and Western Isles means that they receive fewer tourists than southwest Scotland and the coast of Northern Ireland. Most of the Regions tourism and leisure infrastructure is concentrated to the south and east of the Firth of Clyde, one of the most intensively-used areas for coastal recreation in Scotland. Yachting takes place in most areas throughout the isles, but most activity is concentrated in the south, for example around 900 yachts pass through the Caledonian Canal to or from Loch Linnhe annually. Scenery, wild landscapes, unspoilt environment, nature and wildlife together comprise four out of the top five qualities attributed to Scotland and these are particularly important characteristics of the Regional coastline. Given their link to tourism in the Region, future development in the area should avoid negative impacts on the natural environment and coastal landscape.

The north coast of Northern Ireland has a developed tourist infrastructure and a number of coastal attractions. The Causeway Coast Way, for example, takes in attractions like the Giant's Causeway, Dunluce Castle ruins, and the Carrick-a-rede Rope Bridge. The Giant's Causeway received over 400,000 visitors alone in 1994 (Barne *et al.* 1997a). Beaches are used in the summer months, most of which are rural in nature. Ballycastle, on the coast of County Antrim is the only significant resort beach in Regional Sea 7 and held a Blue Flag award in 2005. Sailing and yachting is popular in the more sheltered coastal waters, bays and sea lochs (according to Barne *et al.* (1997a) around 5,000 people are believed to sail regularly on Strangford Lough, using around 2,000 craft), and in addition particular routes are used to traverse among the Scottish west coast, Northern Ireland and between islands. There are 13 Royal Yachting Association (RYA) clubs in the region and a number of

associated training areas, cruising routes and sailing areas. Other popular coastal recreational activities include golf, sea angling, swimming, surfing, canoeing, windsurfing and scuba diving.

A3h.11.5 Evolution of the tourism baseline

Due to the current economic crisis and the potential for a sustained recession it is likely that domestic coastal tourism will increase. As people who may have chosen to holiday overseas begin looking for cheaper holidays the United Kingdom's historical tourist destinations may see increases in the number of visitors of UK origin. As a function of the weakening pound it is also likely that international tourism will increase as foreign holiday makers seek to take advantage of the better deals available in the UK.

A3h.12 RECREATIONAL SEA ANGLING

A3h.12.1 UK overview

Recreational sea angling is an important contributor to coastal tourism. It was estimated in 2004 that 1.1 million households in England and Wales included at least one angler and that their total annual expenditures was some £538 million (Drew Associates 2004). Expenditure by anglers travelling over 50 miles to fish contributed just under 1% of total tourist spending (Drew Associates 2004). The activity is mainly coastal, with over half of anglers fishing from the shore. However, the remainder fish from privately owned or charter vessels, and these may venture further offshore, particularly when targeting large pelagic species. Within the sector, it is generally considered that the area within 1 nautical mile of the shoreline is of prime importance to anglers (DEFRA 2007). Key areas for angling in the UK appear to be along the south and northeast coasts of England and Wales, with less activity in Scotland, possibly due to a combination of the importance of commercial fishing in the country, lower abundances of popular game species (such as bass) and smaller coastal populations. The directory Charter Boats UK (CBUK) hold records on 476 charter boats in the UK (348 in England, 80 in Wales, 43 in Scotland, 5 in Northern Ireland) (Charter Boats UK website). The distribution of these charter vessels by Regional Sea is shown in Table A3h.11, with particularly high numbers in northeast and southern England. It should be noted that these numbers are based on voluntary registration with CBUK by skippers.

Table A3h.11 – Sea angling charter boats in the UK

Country	Region/County	RS	Number of Vessels	Number of Ports
Scotland	Highland	1, 7, 8	5	4
Scotland	Moray	1	1	1
Scotland	Aberdeenshire	1	3	2
Scotland	Fife	1	1	1
Scotland	East Lothian	1	1	1
Scotland	Borders	1	1	1
England	Northumberland	1	32	8
England	North Yorkshire	1	15	1
England	East Riding of Yorkshire	2	12	3
England	Lincolnshire	2	4	1
England	Norfolk	2	2	2
England	Suffolk	2	8	5
England	Essex	2	26	12

Country	Region/County	RS	Number of Vessels	Number of Ports
England	Kent	2, 3	19	9
England	East Sussex	3	33	3
England	West Sussex	3	18	5
England	Hampshire	3	37	7
England	Isle of Wight	3	4	2
England	Dorset	3, 4	41	5
England	Devon	4	38	11
England	Cornwall	4	29	9
England	Somerset	4	12	3
Wales	Cardiff	4	1	1
Wales	Vale of Glamorgan	4	17	3
Wales	Carmarthenshire	4	1	1
Wales	Pembrokeshire	4, 6	9	4
Wales	Ceredigion	6	7	2
Wales	Gwynedd	6	10	5
Wales	Anglesey	6	16	2
Wales	Conwy	6	12	2
Wales	Denbighshire	6	8	1
England	Merseyside	6	5	2
England	Lancashire	6	6	2
Scotland	Dumfries & Galloway	6	10	5
England	Cumbria	6	7	3
Scotland	South Ayrshire	6	1	1
Scotland	Inverclyde	6	1	1
Northern Ireland	County Down	6	2	2
Northern Ireland	County Antrim	6, 7	3	3
Scotland	Argyll & Bute	6, 7	15	8
Scotland	Western Isles	7	1	1
Scotland	Orkney	8	3	3
Total			477	148

Notes: RS = overlapping Regional Sea. Vessels include all those registered with the Charter Boats UK website, and the number of ports amongst which they are distributed; the level of activity of these vessels is likely to vary considerably. Source: Charter Boats UK website.

A3h.12.2 Features of Regional Seas 1 and 2

Recreational angling is particularly important in Northumberland and Essex. A summary of principal ports and angling locations along the east coast of England is shown in Table A3h.12.

Table A3h.12 – Angling activity in the east of England

Region	Principal locations for boat angling	Number of Charter Boats	Principal locations for shore angling
Northumberland	Hartlepool, Tyne, Amble, Seahouses	42	Saltburn, Whitley Bay, Alnmouth, Berwick upon Tweed
Humber & Yorkshire	Humberside, Bridlington, Whitby	34	Skegness, Mablethorpe, River Humber, Bridlington, Scarborough, Whitby
East	Southend, Burnham, Bradwell, Lowestoft	26	Canvey, Clacton, Aldeburgh, Lowestoft, Cromer
Kent	Folkestone, Dover, Ramsgate	29	Dungeness, Hythe, Dover, Deal, Whitstable, Medway

Source: Adapted from Drew Associates (2004).

A3h.12.3 Features of Regional Sea 3

A summary of principal ports and angling locations along the southeast coast of England is shown in Table A3h.13.

Table A3h.13 – Angling activity in the southeast of England

Region	Principal locations for boat angling	Number of Charter Boats	Principal locations for shore angling
Sussex	Littlehampton, Brighton, Newhaven	50	Chichester, Bognor, Worthing, Brighton, Eastbourne, Hastings,
Hampshire	Lymington, Keyhaven, Gosport, Langstone	55	Christchurch Bay, Southampton, Portsmouth & the Solent, Isle of Wight
Dorset	Lyme Regis, Weymouth, Poole	41	Lyme Bay, Chesil Beach, Portland Harbour

Source: Adapted from Drew Associates (2004).

A3h.12.4 Features of Regional Seas 4 and 5

A summary of principal ports and angling locations along the southwest coast of England is shown in Table A3h.14.

Table A3h.14 – Angling activity in the southwest of England

Region	Principal locations for boat angling	Number of Charter Boats	Principal locations for shore angling
South Devon	Plymouth, Dartmouth, Exmouth	36	Plymouth Harbour, Slapton Sands, Torbay, Lyme
Cornwall	Looe, Megavissey, Newquay, Padstow	37	Rame Head, Megavissey, Falmouth Bay, The Lizard, Mount's Bay, St Ives, Padstow
North Devon	Portishead, Watchet, Minehead, Ilfracombe	15	Severn Beach, Burnham on sea, Watchet, Ilfracombe, Westward Ho, Hartland

Source: Adapted from Drew Associates (2004).

A3h.12.5 Features of Regional Sea 6

A summary of principal ports and angling locations in Wales and along the northeast coast of England is shown in Table A3h.15.

Table A3h.15 – Angling activity in Wales and the northwest of England

Region	Principal locations for boat angling	Number of Charter Boats	Principal locations for shore angling
South & West Wales	Aberystwyth, Milford Haven, Swansea, Penarth	32	Aberystwyth, Fishguard Bay, Carmarthen Bay, Porthcawl, Newport
North Wales	Rhyl, Conway, Holyhead	44	Colwyn Bay, Anglesey, Pwllheli
Northwest England	Isle of Man, Morecambe, Blackpool, Liverpool	11	Barrow in Furness, Isle of Man, Morecambe, Blackpool, Liverpool Bay, River Dee

Source: Adapted from Drew Associates (2004).

A3h.12.6 Features of Regional Seas 7 and 8

Recreational sea angling takes place along the north and west coast of Scotland and the islands, although it is smaller scale than around the coasts of England and Wales.

A3h.13 FISHERIES

A3h.13.1 Introduction and UK context

The UK fishing industry operates throughout UK waters, from the shoreline to the national boundaries. The livelihoods of fishermen depend on their ability to make optimum use of prime fishing grounds and to adapt to changing circumstances to maximise profit. Consequently they are vulnerable to being displaced by other users. This section provides an overview of the UK fishing industry, followed by a more detailed look at specific fishing activity within each Regional Sea. The data used in this report were obtained largely from the Marine and Fisheries Agency (MFA), who collect Vessel Monitoring System (VMS) data and carry out aerial surveillance of fishing activity (along with the Scottish Fisheries Protection Agency (SFPA)) and the UK Sea Fisheries Statistics Unit, who collect landings and logbook data. This information is used to generate maps describing the distribution of fishing effort and landings around the UK, allowing detailed examination of fishing activity within each Regional Sea.

The UK fishing industry maintains an important position in the UK economy, particularly in remote coastal regions such as parts of Scotland, where the industry may support up to a quarter of all jobs (PMSU 2004). In 2007, there were 12,729 working fishermen in the UK (of which 79% were full time), operating 6,763 vessels (MFA 2008). These vessels landed 610,000 tonnes of sea-fish and shellfish in 2007 (440,000 tonnes into UK ports), with a total value of £645 million (£535 million into UK ports) (MFA 2008). On top of this, fish processing provides over 22,000 jobs in the UK (PMSU 2004). The UK is a net importer of seafood, with about half of UK catch (by value) exported, while 75% of UK demand is supplied through imports (PMSU 2004).

A3h.13.2 Fishing ports and vessels

There are over 350 ports around the UK coast supporting active fishing vessels. Vessels range in size from small day boats of just a few metres in length, to large pelagic and demersal trawlers, able to fish for weeks at a time and store large quantities of catch. Smaller vessels make up an inshore fleet that is both active and also very important to the economy of many coastal areas. For this baseline, vessels have been split into two groups: >10m and <10m. The <10m fleet comprises almost 77% of the total UK fleet. Vessels operating in the inshore fishery are considered to be day boats, typically completing and returning from a fishing port within a day. Discussion with stakeholders indicates that most inshore fisheries take place within 25nm of shore. Inshore fisheries may be particularly vulnerable to spatial exclusion as these smaller vessels are unable to travel further afield to fish new grounds. Figures A3h.24 and 25 illustrate the distribution of these two groups of vessels around the UK coast. Smaller vessels are distributed relatively evenly around the coast, with particularly large concentrations along the south and northeast coasts of England and the west of Scotland, where inshore fisheries are particularly important. Larger vessels are more abundant in ports on the northeast coast of Scotland, the Devon/Cornwall peninsula and Northern Ireland. Figure A3h.26 shows the division of the fleet by vessel size from ports within each Regional Sea. The specific features of each Regional Sea will be discussed in the relevant section.

Ports were ranked by the total weight of fish and shellfish landed at them. The top fifty UK ports are displayed in Figure 4 and landings at the individual ports have been detailed in the relevant Regional Sea section.

Figure A3h.24 – The distribution of UK vessels <10m in UK ports in 2007

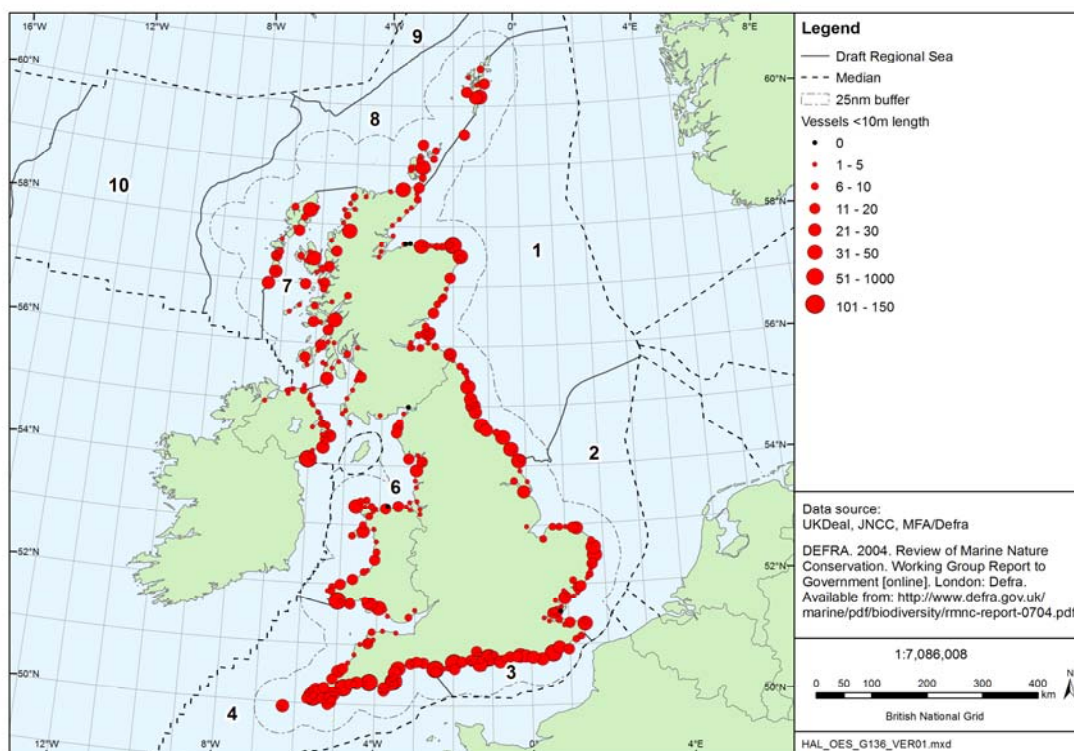


Figure A3h.25 – The distribution of UK vessels >10m in UK ports in 2007

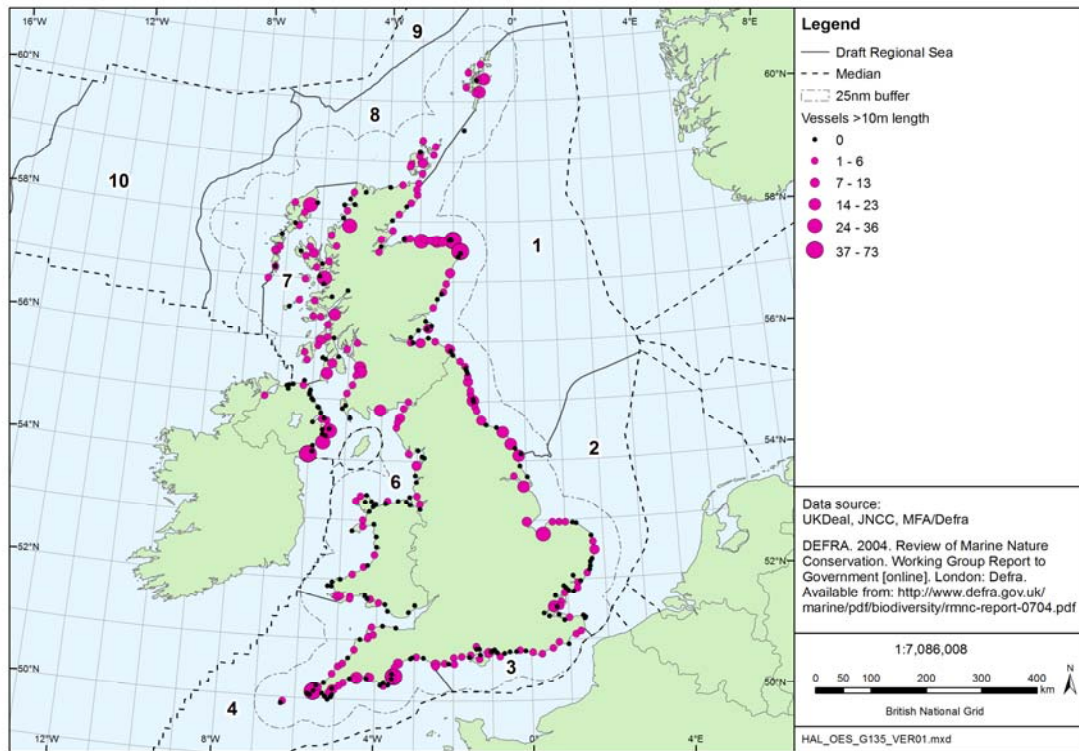
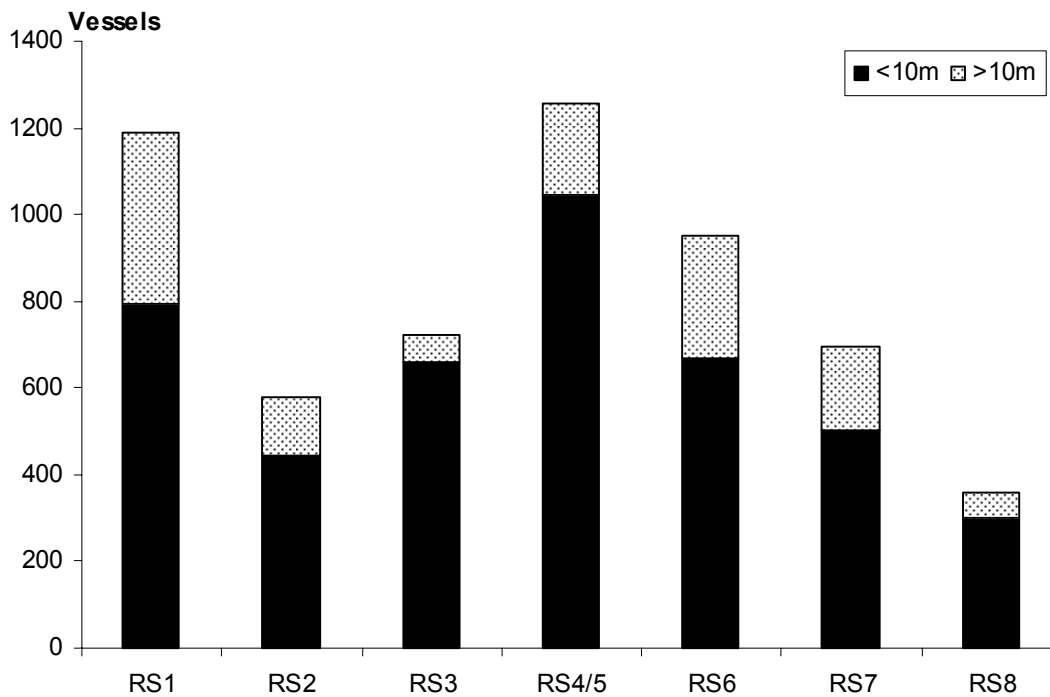


Figure A3h.26 – The number of fishing vessels based in each coastal Regional Sea in 2007

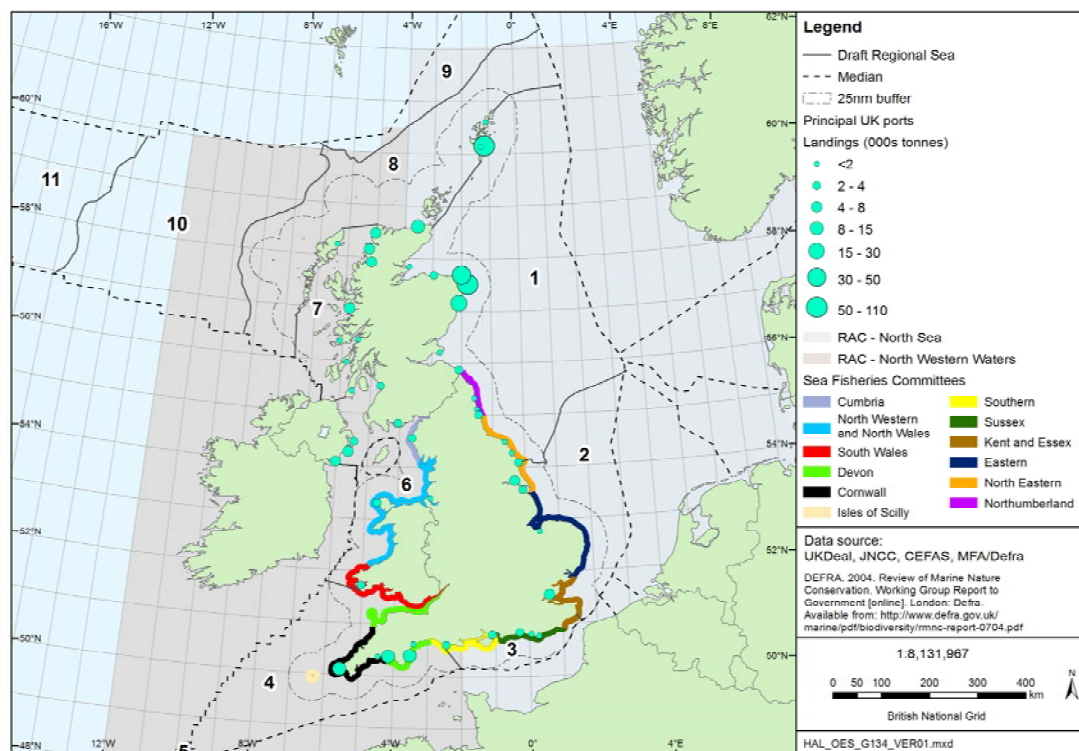


Source: Data provided by the MFA (MFA website)

A3h.13.3 Fisheries management

Fishing carried out within 200 nautical miles of the UK coast is managed by the European Union under the Common Fisheries Policy (CFP). The main method of management is the implementation of Total Allowable Catches (TACs) for certain species in designated areas (ICES areas), divided between fleets into quotas based on historical fishing records. The EU can also impose technical restrictions on fishing gear, such as minimum mesh size or maximum engine power. Advice from scientific bodies such as ICES (International Council for the Exploration of the Sea) is considered in the management process, as is the input of regional bodies such as Regional Advisory Councils (RACs). Two RACs operate within UK waters – the North Sea RAC and the North Western Waters RAC. As well as this, the inshore waters (within 6 nautical miles of the high mean water mark) of England and Wales are under the jurisdiction of twelve Sea Fisheries Committees (SFCs). These bodies are able to impose closed areas and technical measures within their local region. The fisheries departments of the Isle of Man, Jersey and Guernsey are associate members of the Association of Sea Fisheries Committees. Salmon and sea trout are managed by the Environment Agency which also exercises the powers of a Sea Fisheries Committee in many of the estuaries of England and Wales. UK registered vessels have exclusive access to all waters within 6 nautical miles of the mean high water mark. UK territorial waters extend out to 12nm from the coast, but in the region between 6-12nm, those countries with historical claims maintain fishing rights. Belgium, Germany, France, the Republic of Ireland and the Netherlands all hold claims to fishing rights at various locations in UK waters.

Figure A3h.27 – UK fisheries management and principal ports by landings in 2007



A3h.13.4 Distribution of fishing effort

A3h.13.4.1 VMS and logbook data

Total fishing effort is not evenly distributed around the UK coast, although it plays an important role in all coastal communities. VMS is a satellite based method of monitoring the position and movements of vessels in UK waters. Figure A3h.28 shows the average annual density of UK vessels between 2005 and 2007. This data shows shelf areas to the north and west of Scotland, along with the western English Channel, to be amongst the most heavily fished in the UK. The collection of VMS data however, is only mandatory for vessels over 15m in length and therefore activity of smaller vessels operating inshore is likely to be under-represented. It should also be noted that extraction of the data used to generate this map was carried out by individual ICES area, resulting in difficulty tracking vessels across boundaries. Abrupt changes in density (such as that seen in Regional Sea 8) at these boundaries are an artefact of this. VMS data for Regional Sea 11 and the west of Regional Sea 10, in which the deep-water and demersal fisheries of Rockall are found, has not been included. Similar patterns of fishing effort were found in UK waters by Witt & Godley (2007a) between 2000 and 2004, although prior to 2005, mandatory provision of VMS data was restricted to vessels greater than 24m (2000-2003) and 18m (2004).

In order to gain a better understanding of the fishing activities of small inshore vessels, information from logbooks (annual averages for 2005-2007) was used to derive maps of fishing effort density (Figure A3h.29), which were split by gear type (Figures A3h.30 and 31) and by season (Figure A3h.32). It is clear that the greatest density of fishing effort takes place in coastal waters, for both static (such as pots, traps and gillnets) and mobile gears (such as trawls and dredges). Total fishing effort is generally greater among vessels using mobile gears. There is little seasonal variation in fishing effort, although many fisheries are seasonal, because many fishermen will target different species throughout the year. It should be noted that skippers of vessels <10m are not obliged to complete logbooks, although many now do. Both datasets show similar patterns of distribution, although logbook data emphasises effort around the coast, due to the higher proportion of small vessels included.

Figure A3h.28 – Density of mean annual fishing effort of UK vessels, 2005-2007, derived from VMS data

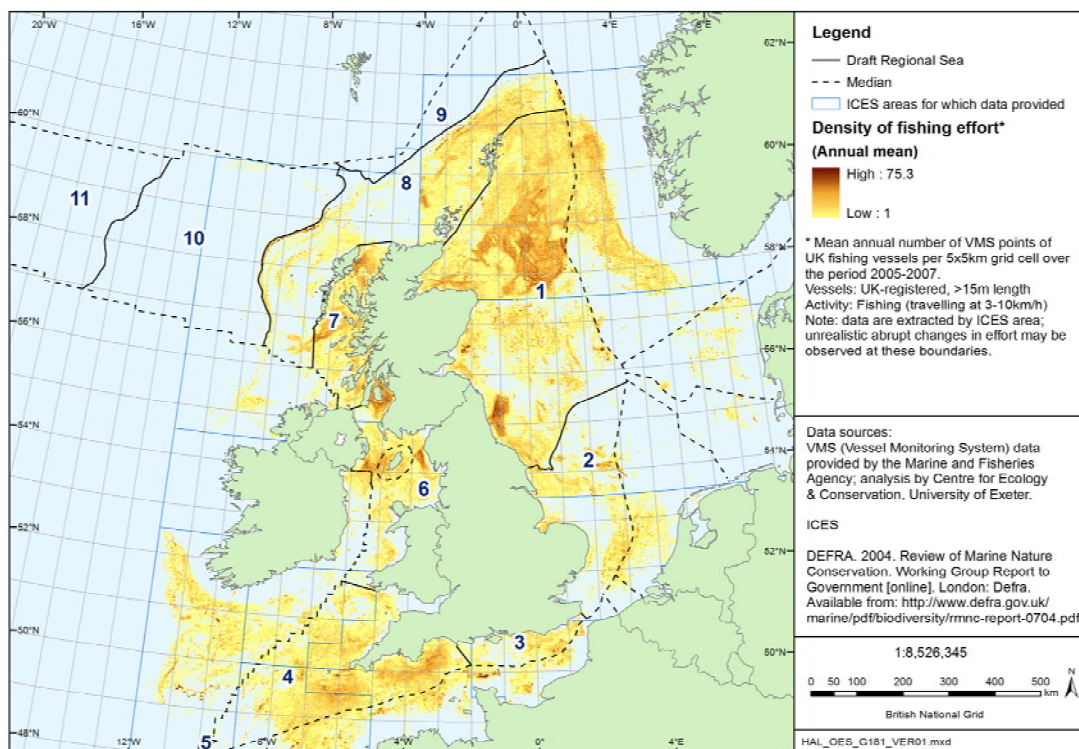


Figure A3h.29 – Density of fishing effort in UK waters, 2005-2007, derived from logbook data

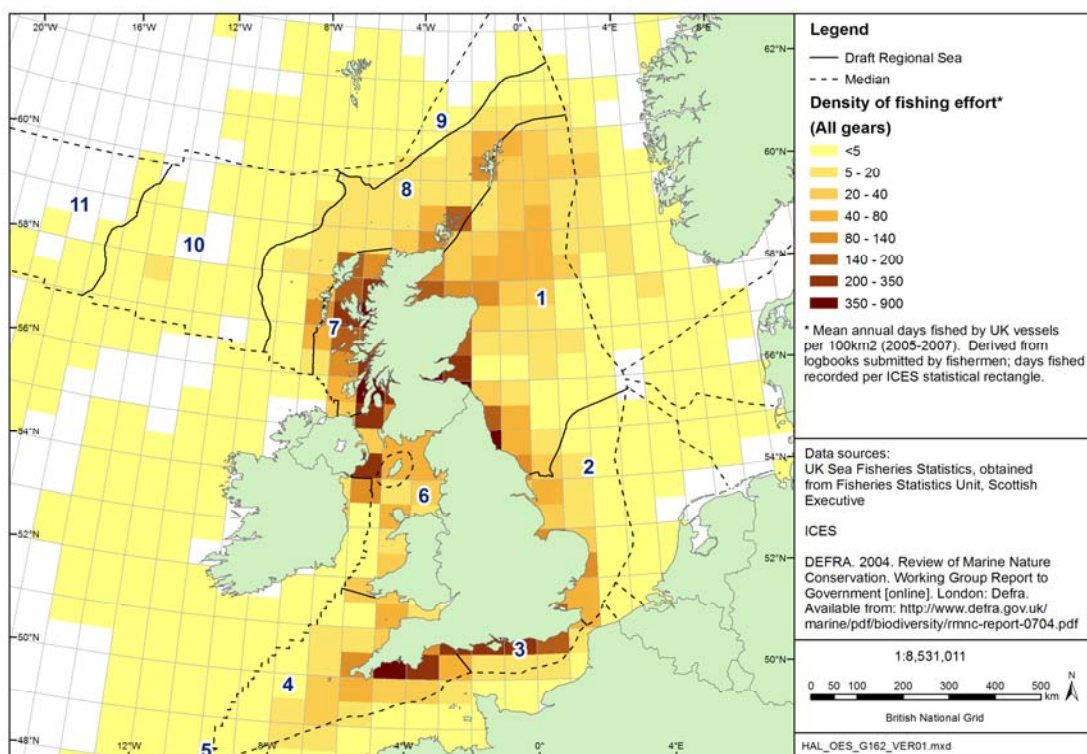


Figure A3h.30 – Density of fishing effort by UK vessels using mobile gears, 2005-2007, derived from logbook data

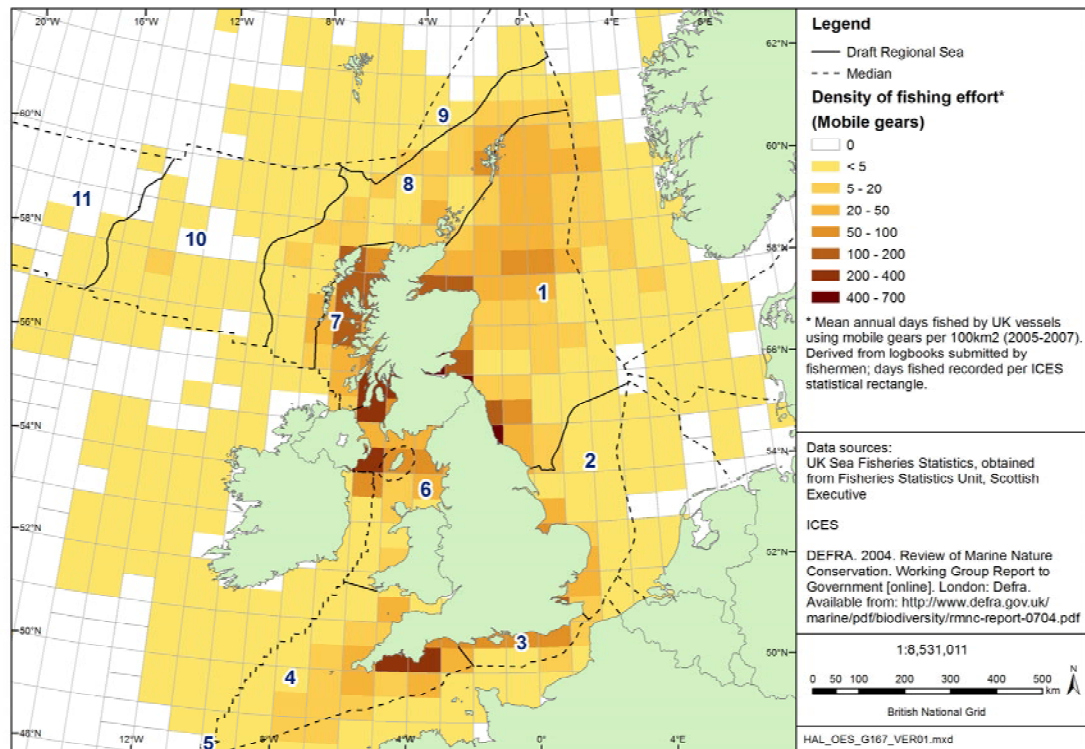


Figure A3h.31 – Density of fishing effort by UK vessels using static gears, 2005-2007, derived from logbook data

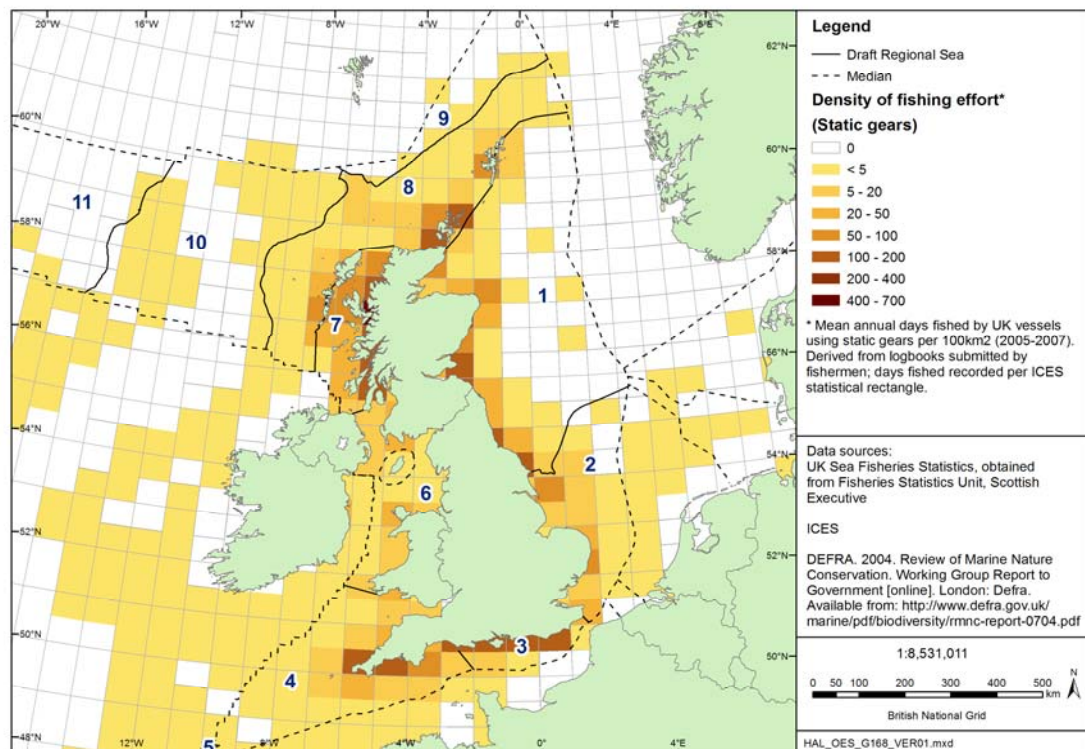
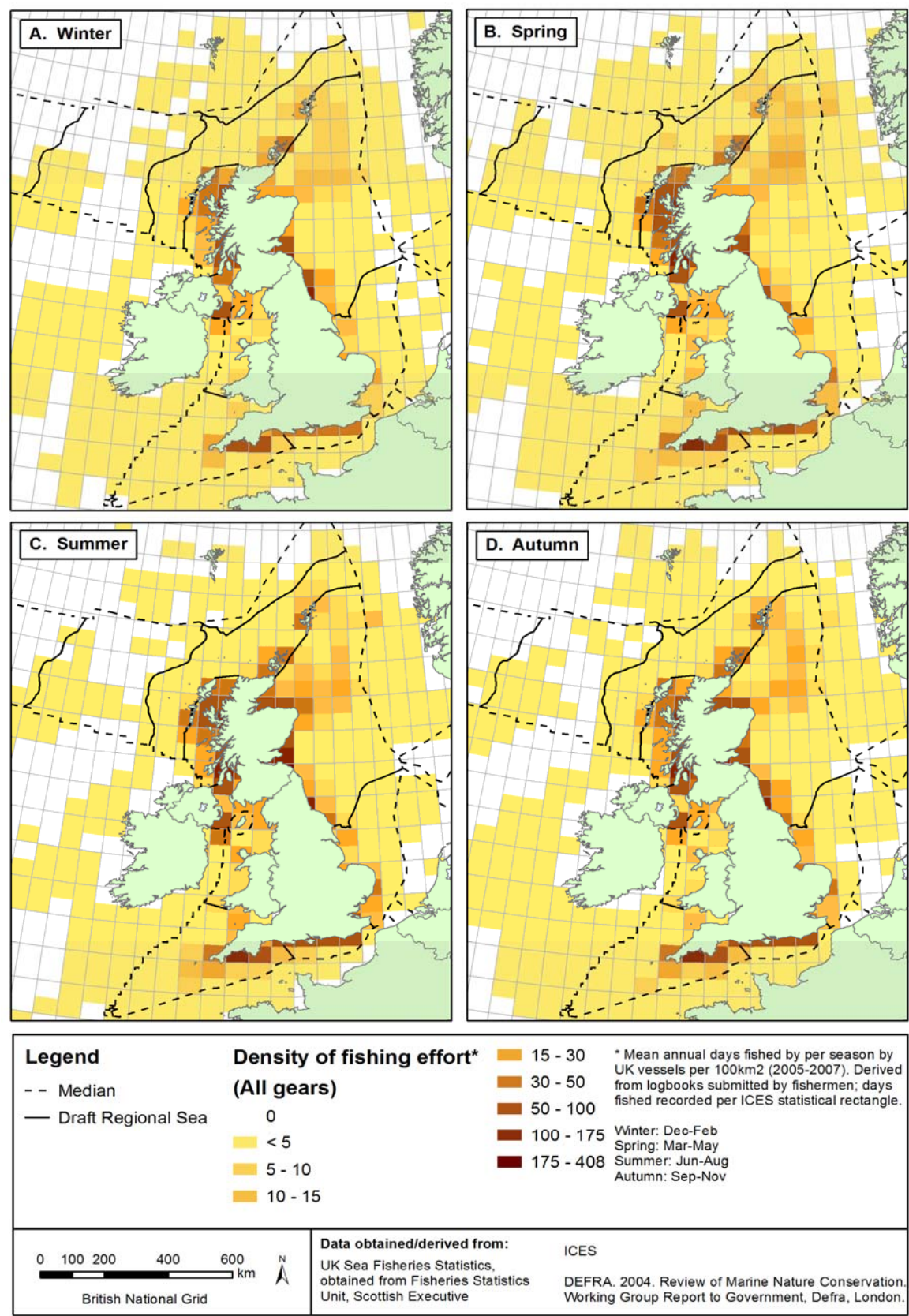


Figure A3h.32 – Density of fishing effort by UK vessels by season, 2005-2007, derived from logbook data



A3h.13.4.2 Aerial surveillance data

The MFA and SFPA carry out regular aerial surveys of all fishing activity in UK waters, including smaller vessels and foreign vessels, so is a useful source of data for mapping fishing effort. However, mistakes may be made in identifying vessels, fishing method and activity. Static gears, in which much of the “fishing” is carried out in the absence of a vessel, may also be under-represented. It should also be noted that surveillance effort is not uniformly distributed (Figure A3h.33), which will influence observed patterns of vessel density, as sightings have not been effort corrected.

Figure A3h.33 – The density of aerial surveillance in UK waters, 2005-2007

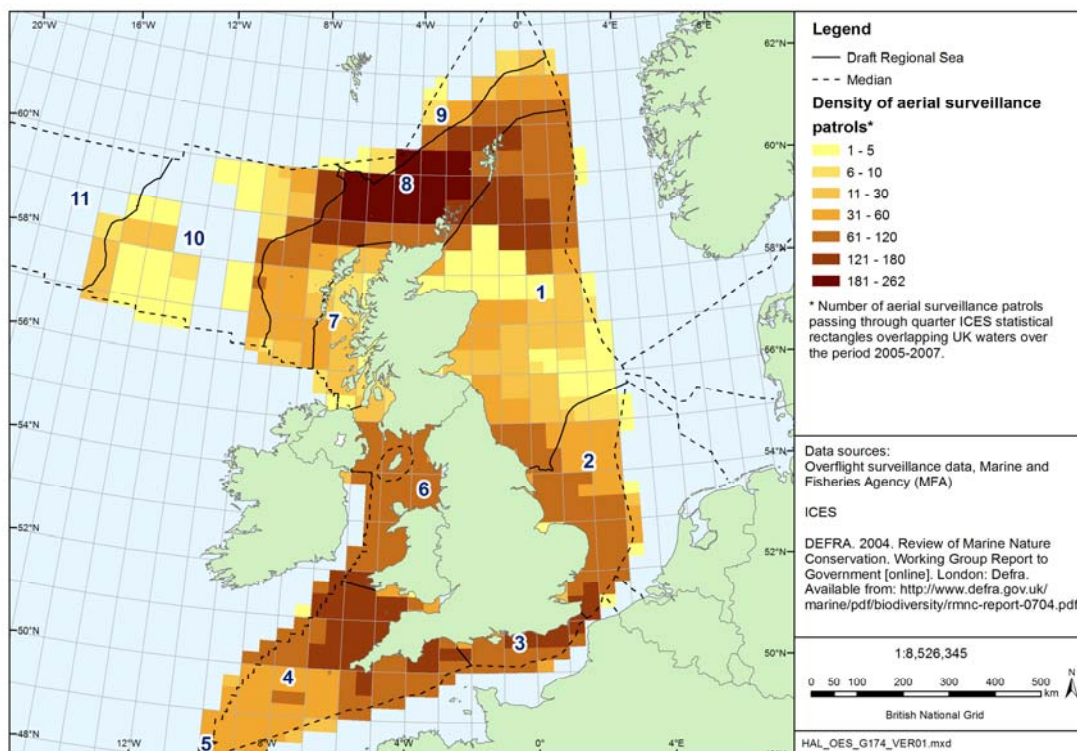


Figure A3h.34 shows the density of fishing vessels to be relatively widespread throughout UK waters, particularly in waters around the north and east of Scotland and the south and west of England. There are particularly high densities along the coasts of Devon, Sussex, Northumberland, waters around the Isle of Man and along the southern coast of the Moray Firth. This distribution includes vessels that were observed in transit as well as those actively fishing. The pattern is similar when sightings of vessels actively using mobile gears are considered separately (Figure A3h.35), indicating that vessels using these gears make up the majority of fishing effort. Static gears are mainly used in shallow, coastal waters, although there is also considerable use of them in shallow offshore areas of the southern North Sea and in the shelf waters to the north of Scotland (Figure A3h.36). The distribution of non-UK vessels (Figure A3h.37) is mainly in offshore waters, apart from in southern areas, where many foreign fleets (in particular French, Belgian, German and Dutch) hold historical rights to within 6nm of the shore and fishing grounds are shared.

Figure A3h.34 – Total density of fishing vessels in UK waters, 2005-2007, derived from aerial surveillance

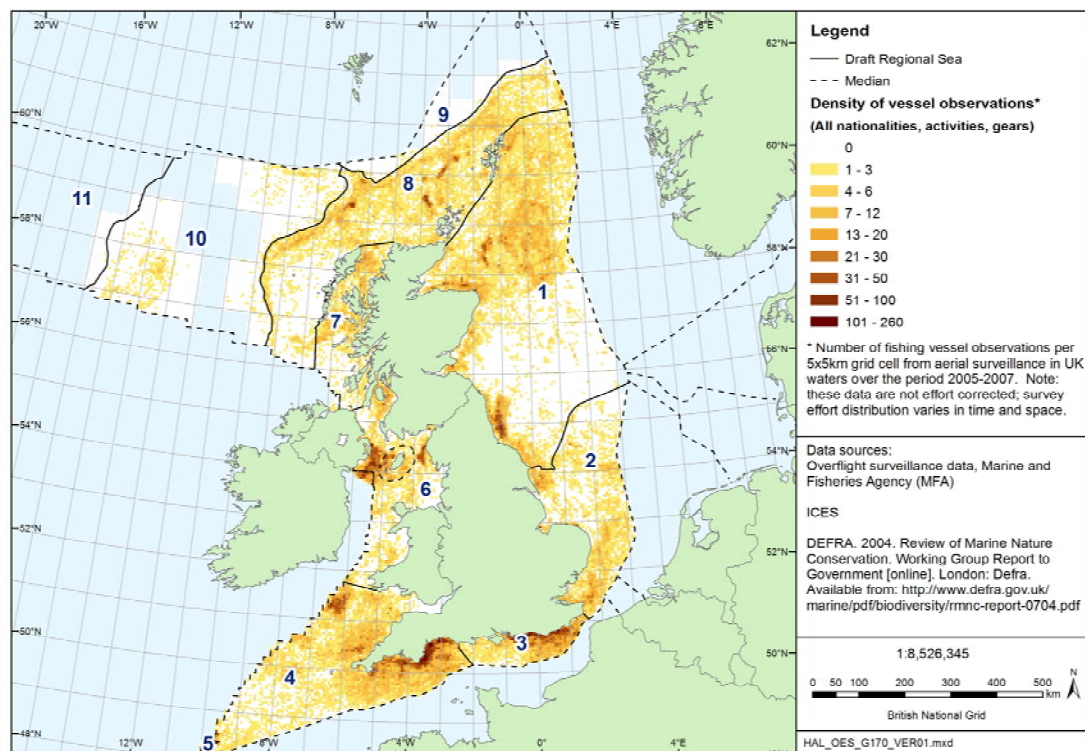


Figure A3h.35 – Density of vessels using mobile gear in UK waters, 2005-2007, derived from aerial surveillance

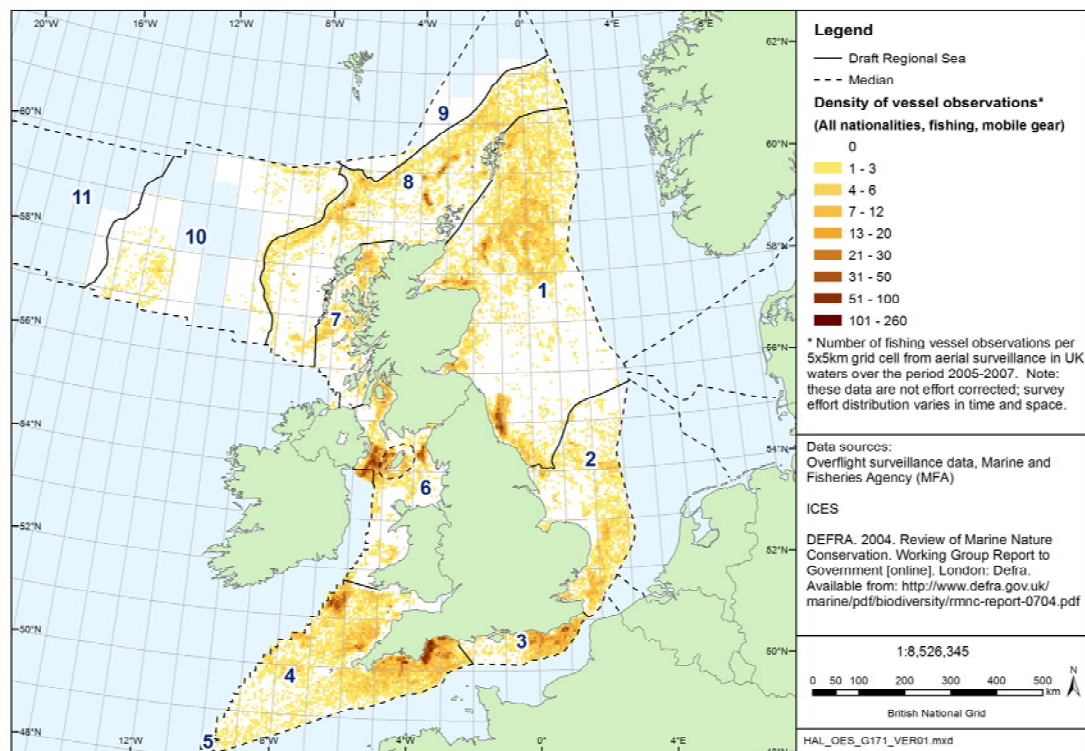


Figure A3h.36 – Density of vessels using static gear in UK waters, 2005-2007, derived from aerial surveillance

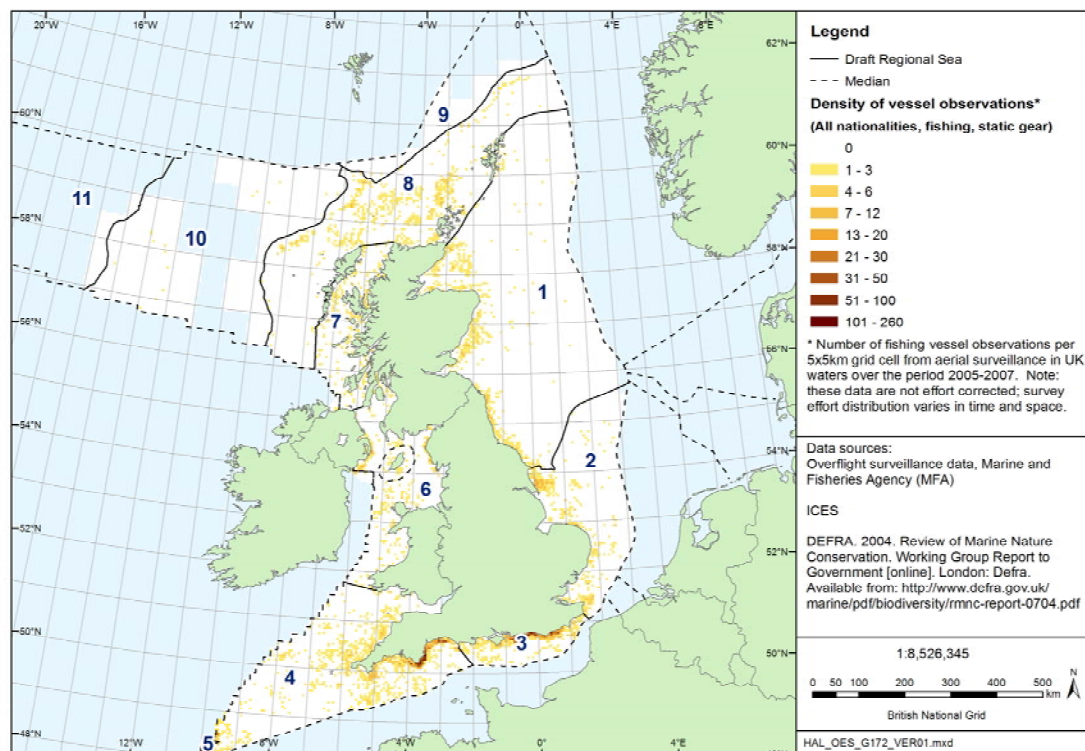
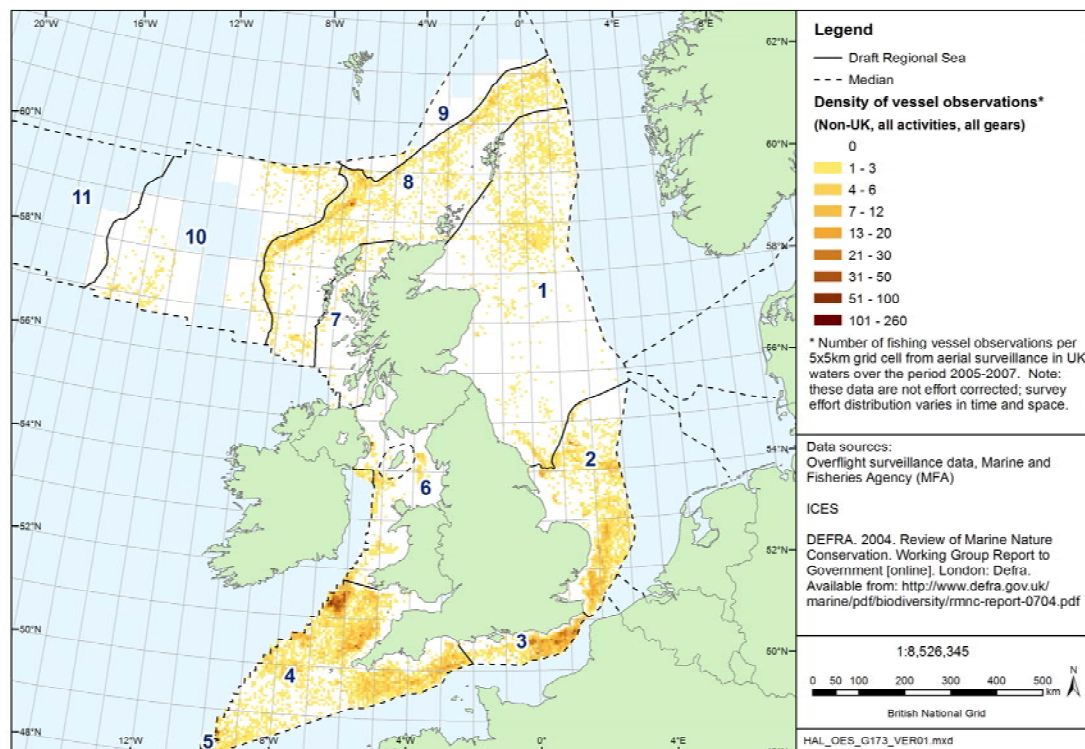


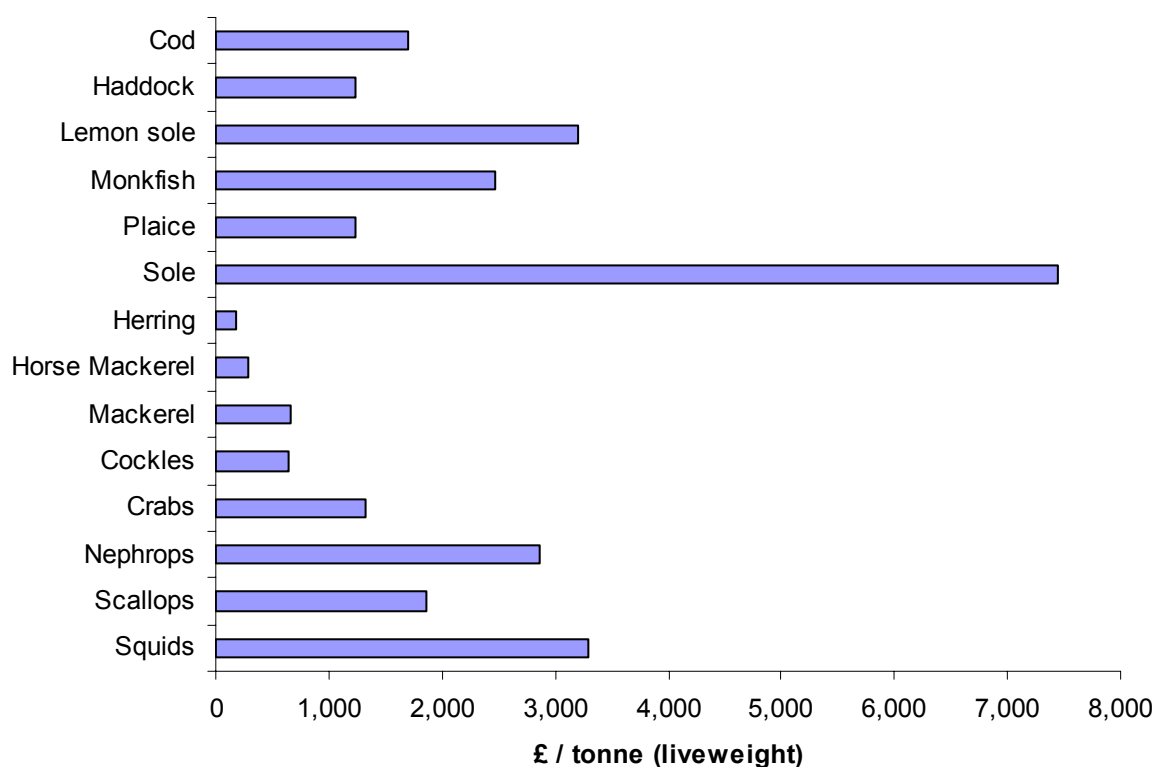
Figure A3h.37 – Density of foreign vessels fishing in UK waters, 2005-2007, derived from aerial surveillance



A3h.13.5 Gears and landings

Fisheries may be broken down simply into the following sectors: demersal, pelagic and shellfish. The shellfish sector is typically the most valuable in the UK, with crabs, lobsters, *Nephrops* and scallops all high value catch. Pelagic fish are usually caught in large numbers but at low values. The average annual price per tonne for shellfish species landed in the UK in 2007 was £1,931, compared with £1,354 for demersal species and £494 for pelagic species (MFA website). Figure A3h.38 shows the average value of selected species landed into the UK. Sole is the highest value catch (£7,450 per tonne), while lemon sole (£3,202/tonne), *Nephrops* (£2,865/tonne) and squid (£3,285/tonne) are also valuable species.

Figure A3h.38 – Average value per tonne of selected species landed into the UK in 2007



Source: Data provided by the MFA (MFA website)

A3h.13.5.1 Demersal fisheries

Demersal fish are those species living on or close to the seabed, such as gadoids and flatfish. They are usually caught with demersal trawls, most commonly otter trawls or beam trawls, although other methods such as gill netting or long-lining may be used. These are static methods of fishing in which a net or hooked line is laid, left and recovered following a set period of fishing. Demersal fisheries are generally mixed, with catch compositions varying considerably from haul to haul. Consequently, demersal stocks are difficult to manage as the target species may only make up a small percentage of total catch. The largest component of the UK demersal catch is haddock, with cod, monkfish, saithe and whiting also important (Table A3h.16). Haddock, cod and monkfish comprise over half the total landed value, although the most valuable species per tonne is the sole. Note, the

figures in Table A3h.16 are only UK landings by UK boats. Total catches of some species such as sandeels are much more important than the table suggests with most are caught by non-UK vessels. Annual North Sea landings of sandeels in recent years have been around 1 million tonnes and a good proportion of this is presumably from UK waters (http://www.marlab.ac.uk/FRS.Web/Delivery/display_standalone.aspx?contentid=657).

Table A3h.16 – Average annual demersal landings into the UK by UK vessels, 2003-2007

Species	Landed weight ('000 tonnes)	Landed value (£ million)
Brill	0.3	1.5
Catfish	0.4	0.6
Cod	14.0	21.9
Dogfish	3.5	3.2
Haddock	41.0	36.8
Hake	2.4	5.7
Lemon sole	2.1	6.3
Ling	3.7	4.0
Megrim	3.3	8.1
Monkfish	11.9	28.1
Plaice	3.4	4.2
Pollack	2.2	3.1
Saithe	10.2	4.7
Sandeels	0.2	-
Skates & rays	3.9	4.2
Sole	2.0	14.0
Turbot	0.4	2.6
Whiting	9.9	7.4
Witch	1.8	2.7
Other demersal	8.6	13.7
Total	125.2	172.9

Source: Data provided by the MFA (MFA website)

A3h.13.5.2 Pelagic fisheries

Pelagic fish such as herring and mackerel typically form large shoals in open water which can be targeted relatively easily by pelagic trawlers. Consequently, pelagic hauls are usually fairly “clean” with little bycatch. Pelagic fisheries may also include industrial fisheries which target low value, small pelagic species such as blue whiting and sprat for use in products such as fishmeal and fish oil. More mackerel is landed in the UK than any other species, and it comprises over half of all pelagic landings (Table A3h.17). It is also the most valuable pelagic stock, comprising about 80% of the total pelagic value. The smaller pelagic species are very low value and these are primarily targeted by industrial trawlers.

Table A3h.17 – Average annual pelagic landings into the UK by UK vessels, 2003-2007

Species	Landed weight ('000 tonnes)	Landed value (£ million)
Blue whiting	21.4	1.6
Herring	60.2	10.9
Horse mackerel	4.0	1.0
Mackerel	102.6	60.3
Sardines	2.4	0.8

Species	Landed weight ('000 tonnes)	Landed value (£ million)
Sprat	4.1	0.9
Other pelagic	0.5	0.4
Total	195.1	75.9

Source: Data provided by the MFA (MFA website)

A3h.13.5.3 Shellfish fisheries

Shellfish fisheries target a number of molluscs (bivalves and gastropods) and crustaceans (such as crabs or *Nephrops*). Shellfish are caught using a variety of methods including dredges, trawls, static gears and by hand picking – see Table A3h.20. The shellfish sector is the most valuable in the UK, with total landings worth over £200 million. *Nephrops*, crabs, scallops and cockles comprise the greatest proportion of the landed shellfish catch in the UK, with the most valuable being *Nephrops*, scallops and crabs (Table A3h.18). Squid and lobsters are also very valuable per tonne, but do not represent a large proportion of the shellfish catch.

Table A3h.18 – Average annual shellfish landings into the UK by UK vessels, 2003-2007

Species	Landed weight ('000 tonnes)	Landed value (£ million)
Cockles	16.0	10.0
Crabs	24.4	29.5
Lobsters	1.8	19.3
Mussels	8.3	1.4
<i>Nephrops</i>	35.4	91.9
Periwinkles	0.1	0.2
Queens	5.7	2.5
Scallops	20.2	33.3
Shrimps	0.7	1.4
Squid	2.3	6.1
Other shellfish	17.0	13.1
Total	132.0	208.7

Source: Data provided by the MFA (MFA website)

A3h.13.5.4 Regional distribution of fisheries

Data in Table A3h.19 and Figures A3h.39 and 40 show the landings from ICES areas relevant to each Regional Sea. This offers an indication of the main patterns in the breakdown of fisheries by species group. Landings are greater from Regional Seas with large offshore fisheries around the north of the UK (RS 1 and 8), with pelagic species important in these regions. In areas where fishing activity is generally coastal, such as Regional Seas 2 and 3, landings are lower and shellfish dominate. These figures are further discussed in later sections. It is important to note that these figures are estimates based on areas roughly corresponding with Regional Sea areas, and only include information on UK vessels.

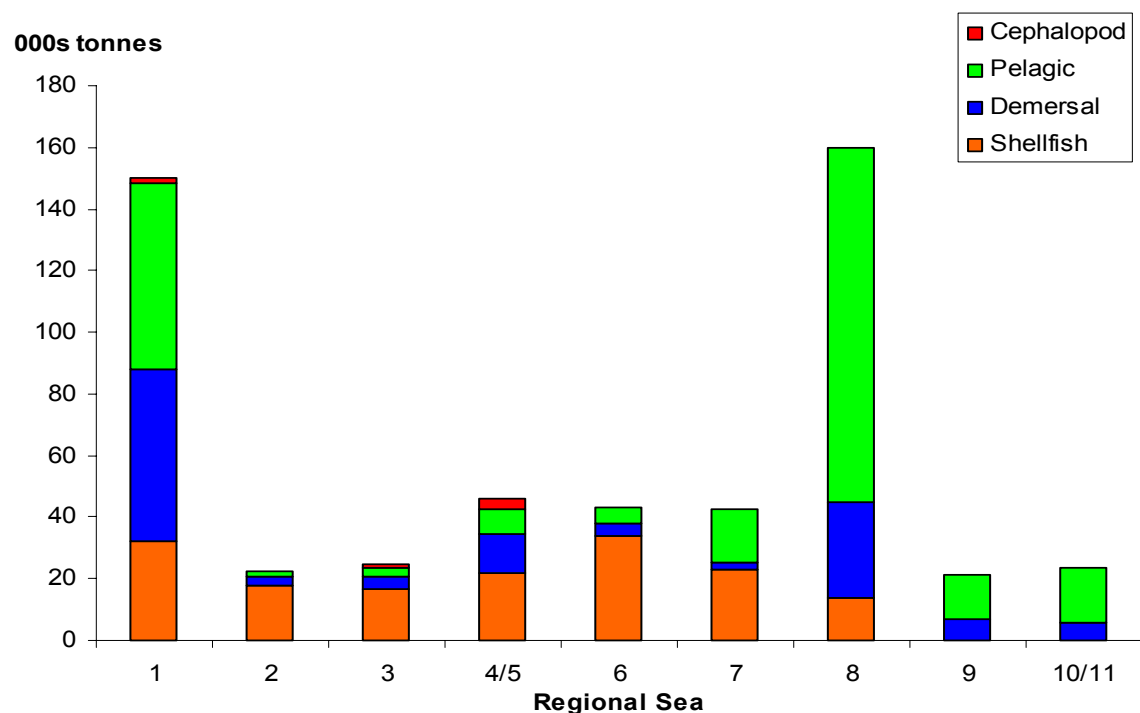
Table A3h.19 – Mean annual landings (2005-2007) from areas comprising ICES statistical rectangles overlapping with Regional Seas

RS	Area ¹	Total		Demersal		Pelagic		Cephalopods		Shellfish	
		Weight ²	Value ³	Weight	Value	Weight	Value	Weight	Value	Weight	Value
1	228.41	149.90	175.18	56.07	65.96	60.49	26.30	1.25	3.03	32.09	79.89
2	103.17	22.43	25.76	2.85	5.26	1.97	0.67	0.02	0.07	17.59	19.76
3	30.90	24.60	25.51	3.59	10.52	3.20	0.96	0.98	1.26	16.83	12.78
4/5	146.12	45.91	68.72	12.96	33.69	7.80	3.23	3.57	5.86	21.57	25.93
6	64.43	42.89	53.32	3.75	5.74	5.05	1.12	0.02	0.04	34.08	46.41
7	51.00	42.51	69.31	2.30	3.05	17.25	10.17	0.02	0.05	22.94	56.04
8	196.02	160.00	128.38	30.74	44.35	115.13	55.17	0.21	0.50	13.92	28.36
9	62.88	21.03	16.86	6.72	9.69	14.24	7.07	0.03	0.05	0.04	0.05
10/11	198.43	23.69	14.01	5.94	9.42	17.63	4.42	0.04	0.08	0.09	0.09
UK	888.06	403.75	458.28	100.58	151.92	169.74	77.27	5.57	9.85	127.85	219.24

Notes: RS = Regional Sea; ¹ area covered by ICES statistical rectangles overlapping with Regional Seas, 000s km²; ² weight in 000s tonnes; ³ value in millions GBP.

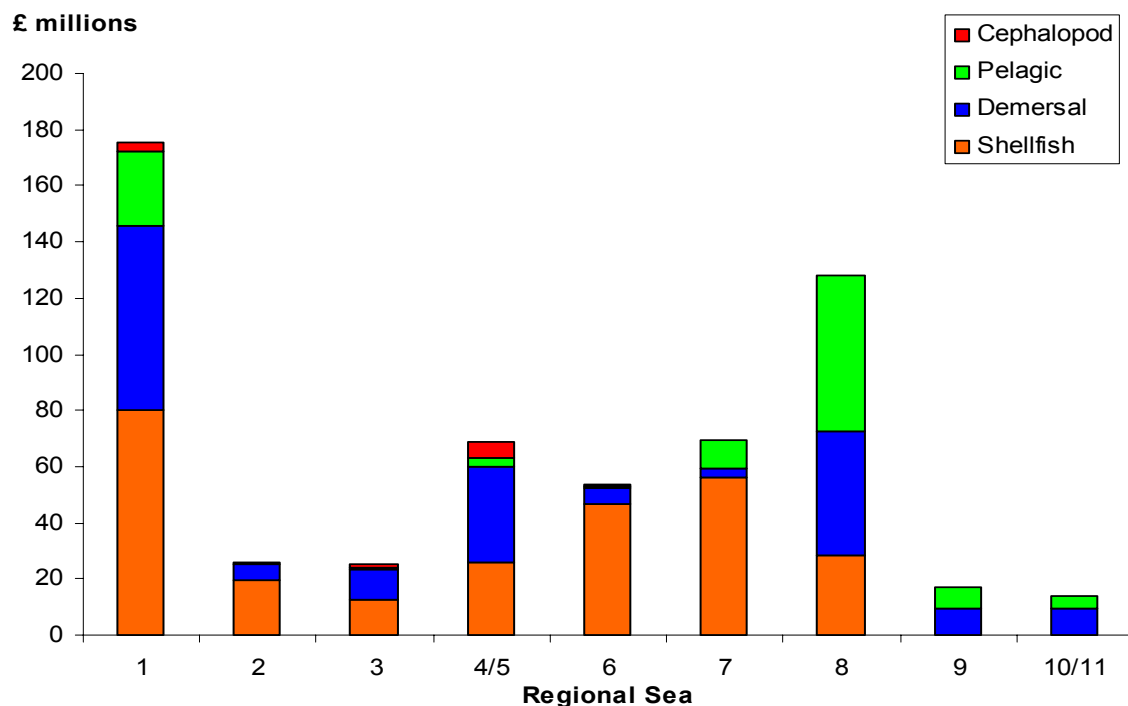
Source: Fisheries Statistics Unit, Scottish Executive

Figure A3h.39 – Mean annual landed weight (2005-2007) by UK vessels by species group



Source: Fisheries Statistics Unit, Scottish Executive

Figure A3h.40 – Mean annual landed value (2005-2007) by UK by species group



Source: Fisheries Statistics Unit, Scottish Executive

Figure A3h.41 shows the density of landings from waters around the UK. Landings density is generally highest around the coast in southern regions, while to the north, densities are greater further offshore, on the productive continental shelf. A similar pattern may be observed in the density of landings by value (Figure A3h.42). When the landings are divided by species group (Figure A3h.43), it can be seen that demersal landings follow the overall pattern, with particularly high densities around Cornwall and Shetland, while the greatest density of pelagic fishing takes place to the north of Scotland, where herring and mackerel are typically found migrating between spawning and feeding grounds. Shellfish fisheries have a strong coastal distribution, with particularly important areas including the West of Scotland, the Firth of Forth and along the south of England, while the seasonal fisheries for cuttlefish (Cornwall) and squid (Moray Firth) are clearly identified.

Figure A3h.41 – Density of landings (by weight) made by UK vessels, 2005-2007

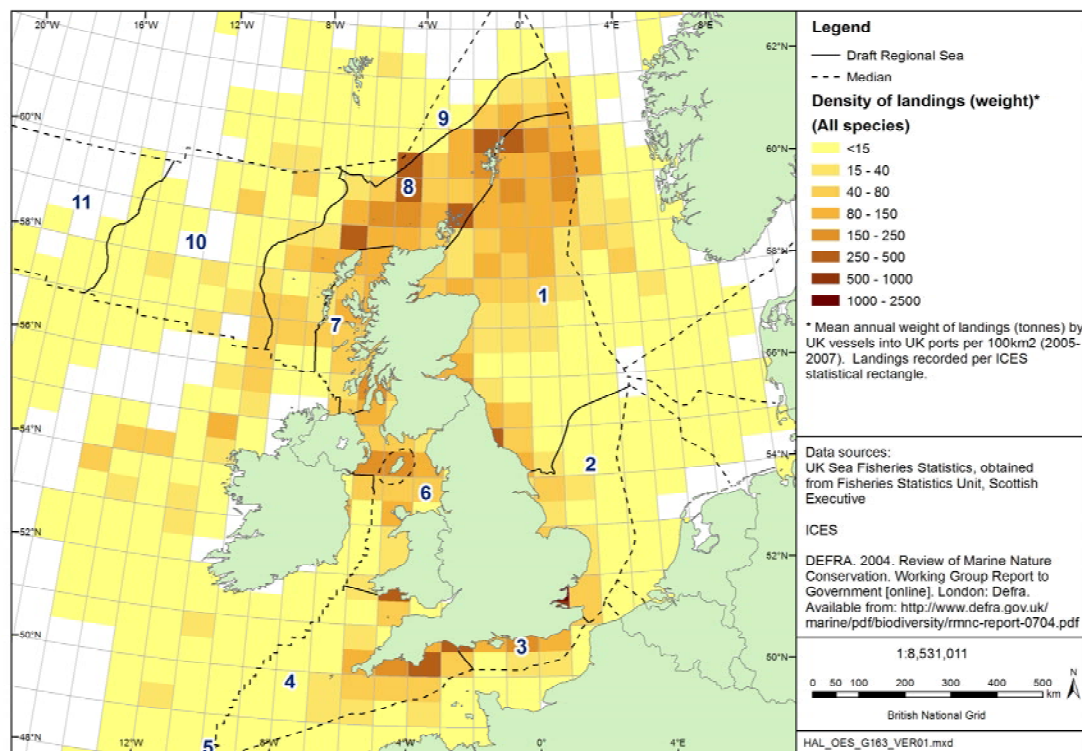


Figure A3h.42 – Density of landings (by value) made by UK vessels, 2005-2007

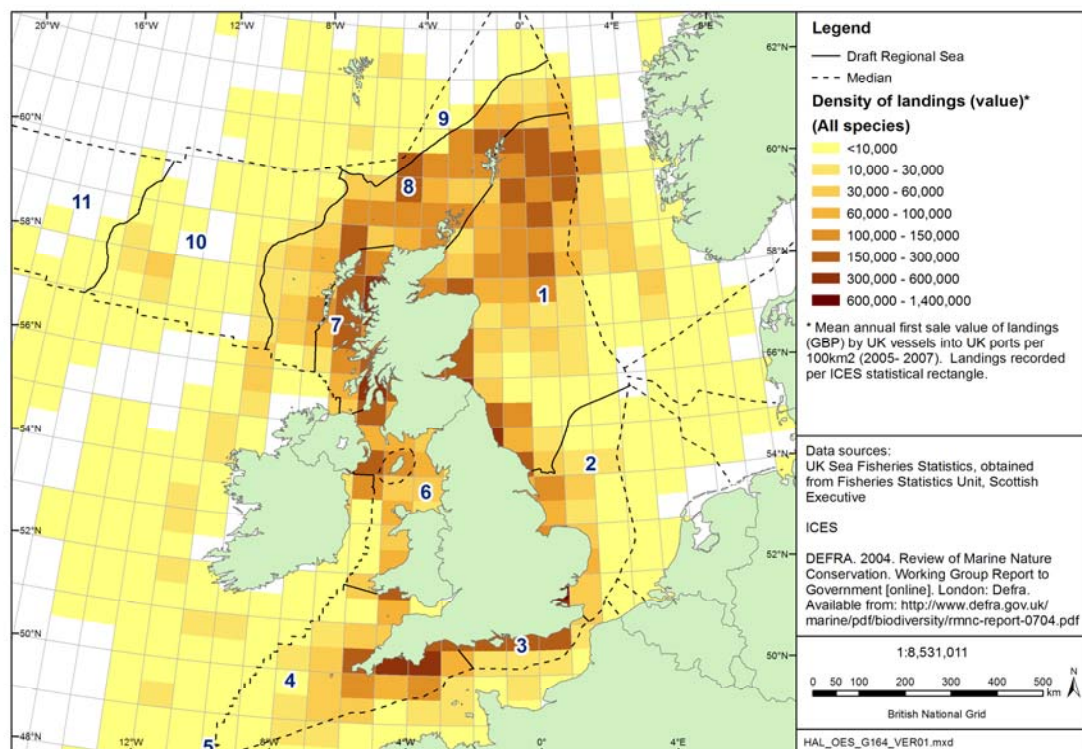


Figure A3h.43 – Density of UK landings (value) by species group, 2005-2007

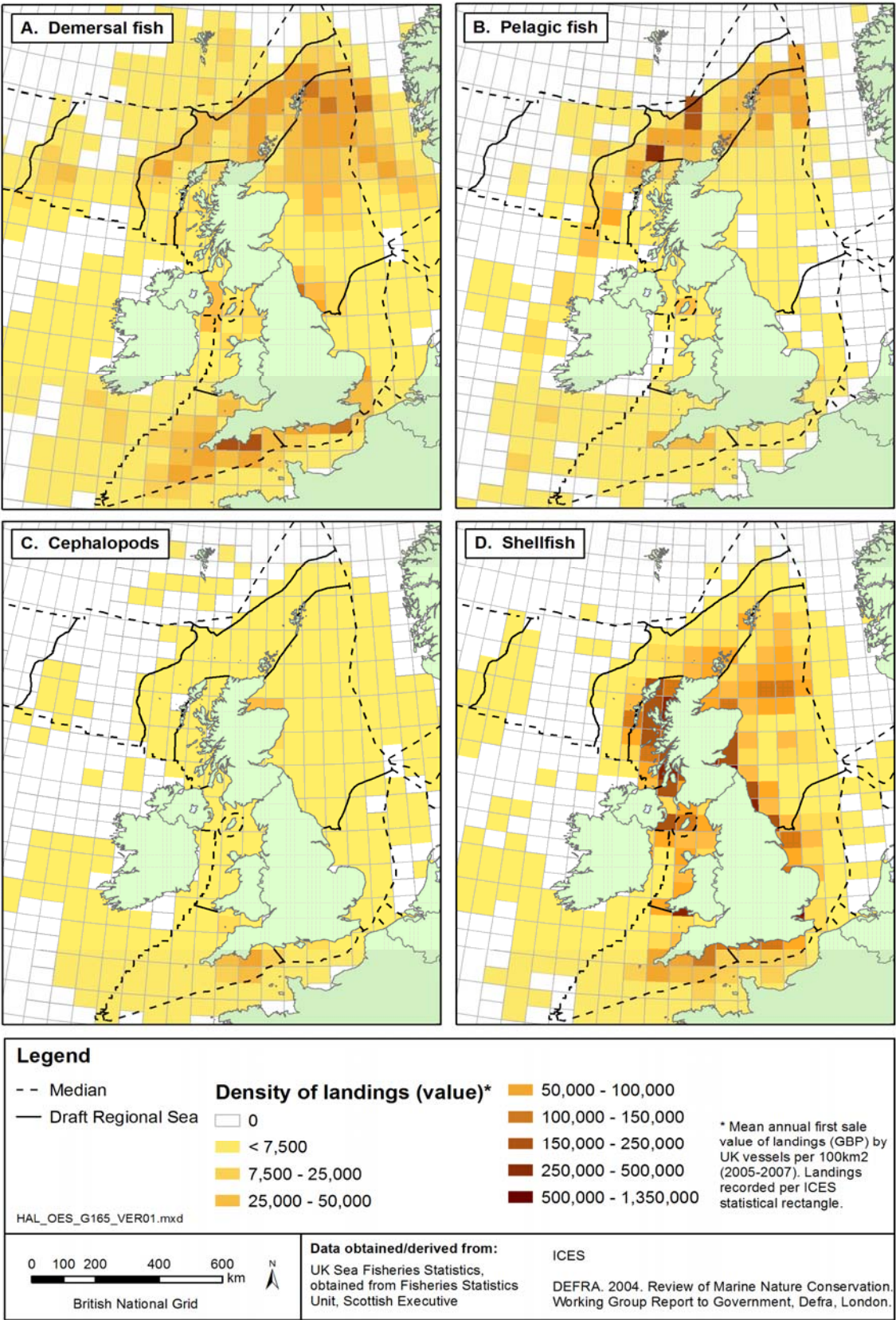


Table A3h.20 – Summary of the main fishing gear used around the UK

Category	Sub-category	Examples of species	Fishing gear
Demersal	Roundfish	Cod, whiting, haddock, saithe, pollack, dogfish.	Demersal otter trawl, pair trawl, seine net, gill net, trammel net, longline, handline.
	Flatfish	Sole, plaice, flounder, turbot, monkfish, rays.	Beam trawl, demersal otter trawl, seine net, tangle net, trammel net, longline.
Pelagic	Small pelagic	Mackerel, herring, sprat.	Gillnet, pelagic trawl, handline.
	Large pelagic	Bass, mullet.	Gillnet, pelagic trawl, demersal trawl, beach seine, handlines.
	Diadromous	Salmon, sea trout, eel.	Gillnet, beach seine (salmonids), trap, hand-held nets, fyke nets (eels).
Shellfish	Crustaceans	Lobsters, crabs, crawfish, <i>Nephrops</i> , shrimp.	Pot, tangle nets, beam trawl (shrimp), demersal otter trawl (<i>Nephrops</i>)
	Molluscs	Cockles, mussels, scallops, oysters, clams, whelks, periwinkles, cuttlefish, squid.	Dredges (bivalves), trawls (cephalopods and queen scallops), pots (whelks) hand-gathering (bivalves and gastropods), traps (cuttlefish), jigging (cephalopods).

Source: Adapted from Walmsley & Pawson (2007)

The dominance of bottom trawls in UK fisheries can be seen in Table A3h.21 and Figure A3h.44, with traps and dredges (predominantly for shellfish) also important. These figures will be examined in greater detail in individual Regional Sea sections. It is important to note that these figures are estimates, based on areas roughly corresponding with Regional Sea areas and only include information on UK vessels.

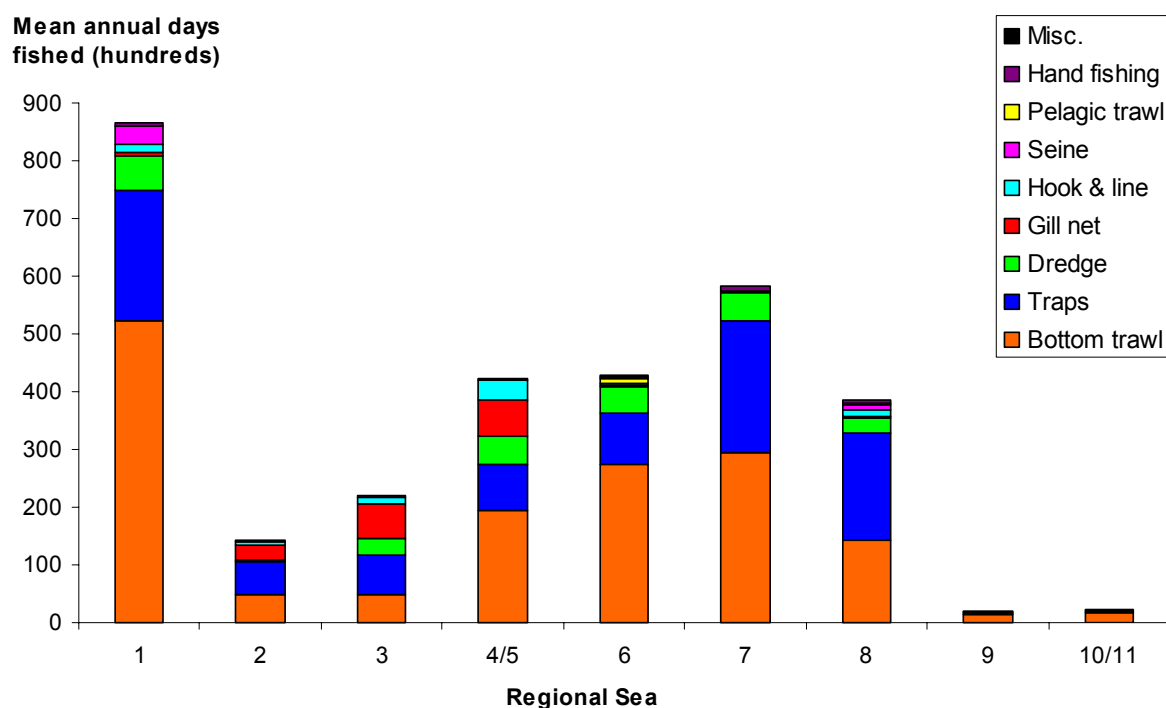
Table A3h.21 – Mean annual days fished (2005-2007) from areas comprising ICES statistical rectangles overlapping with Regional Seas

RS	Area ¹	Days fished (by gear category) ²									
		All	Bottom trawl ³	Traps	Dredges ⁴	Gill nets ⁵	Hooks & lines	Seine	Pelagic trawl	Hand fishing	Misc.
1	228.41	866.55	522.40	227.32	58.71	6.76	13.41	30.14	2.17	4.98	0.67
2	103.17	143.71	48.68	58.23	2.98	23.07	8.14	0.91	1.66	0.04	0.00
3	30.90	218.69	49.40	67.21	28.16	62.00	10.12	0.04	1.16	0.55	0.04
4/5	146.12	423.92	194.89	79.30	47.50	65.22	32.13	0.14	4.06	0.68	0.00
6	64.43	427.14	274.31	89.35	44.61	3.60	2.56	0.74	8.67	3.25	0.05
7	51.00	582.20	295.28	227.71	47.79	0.12	1.61	1.44	1.05	7.19	0.01
8	196.02	386.91	142.31	186.50	25.22	4.15	10.43	8.66	3.24	5.76	0.65
9	62.88	20.49	14.12	0.11	0.00	2.96	2.71	0.20	0.39	0.00	0.00
10/11	198.43	23.78	17.66	0.46	0.00	0.82	4.49	0.01	0.33	0.00	0.00
UK	888.06	2,491.13	1,297.13	696.76	204.69	154.05	70.47	34.24	19.38	13.50	0.91

Notes: RS = Regional Sea; ¹ area covered by ICES statistical rectangles overlapping with Regional Seas, 000s km²; ² hundreds days; ³ all specified bottom trawls, Nephrops trawls, unspecified trawls; ⁴ boat & mechanised dredges, pumps; ⁵ gill and entangle nets (fixed and drift).

Source: Fisheries Statistics Unit, Scottish Executive

Figure A3h.44 – Mean annual days fished (2005-2007) by UK vessels by gear type



Source: Fisheries Statistics Unit, Scottish Executive

A3h.13.6 Features of Regional Sea 1

A3h.13.6.1 Summary of fisheries

The northern North Sea comprises the largest of the Regional Seas and fishing effort in the area is dominated by demersal trawling for gadoids, plaice and monkfish as well as *Nephrops*. Thirteen percent of UK fishermen are based in Aberdeenshire, highlighting the importance of the industry to the region (PMSU 2004). The mixed demersal fishery targets cod, haddock, whiting, saithe and monkfish, while a shelf-edge fishery for saithe carried out by Norwegian, French and German vessels is also important. The Fladen Ground in the north of the region and the Farne Deep, a deep water trench 10-20 miles off the northeast coast of England, are particularly productive regions for demersal trawling (Walmsley & Pawson 2007). Inshore, gillnets and trammel nets are used to trap cod in winter and plaice (in the summer) and lemon sole are valuable catches. Licensed fisheries for salmon and sea trout exist in the region and drift nets may be used to capture these species (Walmsley & Pawson 2007). A fishery for the veined squid, *Loligo forbesii*, is developing in the Moray Firth, with fishermen taking advantage of the lack of quota restrictions on this species. The region supports important industrial fisheries for sandeels (central North Sea) carried out by UK and Danish vessels and for Norway pout (northern North Sea) carried out by Danish and Norwegian vessels (Rogers & Stocks 2001). The pelagic fleet targets herring at spawning grounds off Shetland in autumn and off the Farne Isles, using purse seiners and pelagic trawls. Extensive and directed mackerel fisheries operate in the north of the region as migrating mackerel return to feeding grounds.

The Fladen Ground is exploited for shellfish as it supports large and valuable populations of both pink shrimp and *Nephrops*. Demersal trawlers also catch *Nephrops* within the Moray Firth, Firth of Forth and the Farne Deep. In coastal regions, baited creels are set for lobsters, brown crabs, velvet crabs and green crabs (Chapman 2004). Scallops are exploited in the Moray Firth and to the east of Scotland, while queen scallops, mussels and cockles are also harvested in the region. The main mussel fishery is in the Dornoch Firth (Chapman 2004). Cockles are predominantly taken from Shetland and Orkney. Whelks and periwinkles are lower value species that are also taken.

A3h.13.6.2 Ports and vessels

The northern North Sea supports the largest proportion of vessels >10m (33%) of any UK region, suggesting that offshore fishing grounds are particularly important in the region. There is an average of 16 UK vessels registered at each port. Larger vessels tend to be based along the Aberdeenshire coast while vessels <10m are more abundant in the northeast of England. This region contains 14 of the top 50 UK fishing ports (by landed weight), including the biggest four, Peterhead, Lerwick, Fraserburgh and Aberdeen). Landings at these largest ports are dominated by pelagic and demersal catch, reflecting the larger vessels that operate from these fisheries (Table A3h.22). Shellfish landings increase in importance in smaller ports, where a greater proportion of smaller boats, working in inshore fisheries, will be found.

Table A3h.22 – Mean annual landings into key ports in Regional Sea 1, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Peterhead	34	52	35.69	37.41	70.47	30.58	2.52	7.08
Lerwick	38	19	19.22	10.08	65.22	28.81	0.47	1.27
Fraserburgh	58	67	10.90	11.22	16.76	7.45	9.99	25.65
Aberdeen	20	9	15.51	9.36	0.00	0.00	1.49	3.05
Eyemouth	23	11	1.52	1.58	0.00	0.00	0.94	2.41
North Shields	44	19	1.04	0.82	0.00	0.00	1.41	3.01
Buckie	31	32	0.72	0.88	0.00	0.00	1.30	2.58
Whitby	36	15	1.37	1.42	0.00	0.00	0.59	1.41
Blyth	24	4	0.79	0.60	0.00	0.00	0.97	2.51
Scarborough	40	15	0.95	1.02	0.00	0.00	0.36	0.96
Pittenweem	36	8	0.02	0.02	0.00	0.00	1.21	2.47
Yell & Fetlar	7	2	1.01	1.33	0.00	0.00	0.18	0.35
Portmahomack	3	1	0.00	0.00	0.00	0.00	1.14	0.36
Amble	31	8	0.57	0.46	0.00	0.00	0.40	1.09

Source: Data provided by the MFA (MFA website)

A3h.13.6.3 Distribution of fishing effort

VMS data shows that the majority of fishing effort carried out by larger vessels in the region takes place in offshore areas to the north of the region, particularly around the Fladen Ground. In inshore areas, the Firth of Forth, the Moray Firth and the Farne Deep off the northeast coast of England are sites of high densities of fishing effort, particularly of mobile gears, while static gear fisheries operate along the coastline of the region, particularly in the Firth of Forth. Inshore fisheries in the region show slight seasonal variation, with greater fishing effort in the summer and autumn, particularly in the Moray Firth and off the northeast of England. Similar distributions are shown by aerial surveillance, although it should be noted that surveillance effort is low within the Moray Firth. Aerial observations particularly highlight the disparity in fishing effort between the north of the region and the south.

A3h.13.6.4 Gears and landings

Shellfish, pelagic and demersal species are all caught in large numbers from the northern North Sea, making the region one of the most productive in UK waters. The value of landings from waters within and around this Regional Sea is higher (£175 / ‘000 tonnes) than in any other (Table 4). Catch from the region is dominated by high value whitefish, including cod and monkfish, as well as *Nephrops*. There are significant landings of pelagic species in the region, reflecting the important herring and mackerel stocks that are exploited in the area. Pelagic species make up 40% of the landed weight, but only 13% of the value. Eighty three percent of the landed value is of shellfish and demersal species. The fishing effort by days fished is dominated by demersal trawls (60%), traps (26%) and dredges (7%), reflecting the importance of demersal and shellfish stocks, although there is also significant use of seine nets in the region. The region is heavily fished by foreign vessels which will not be included in these figures.

A3h.13.7 Features of Regional Sea 2

A3h.13.7.1 Summary of fisheries

Fish communities within the southern North Sea are dominated by small benthic groups such as flatfish. Comparisons of catch rates have shown that in general the catchability of these smaller demersal species is greater using beam trawls than otter trawls (ICES-FishMap 2008). Consequently, beam trawling effort is greatest in the southern North Sea (Jennings *et al.* 1999), while otter trawling is less frequent in the region. Beam trawl activity is concentrated in the Southern Bight (Jennings *et al.* 2000) and the fleet mainly targets plaice and sole, with other species such as dab and grey gurnard forming a valuable bycatch. Over 70% of all beam trawling effort in the North Sea is carried out by Dutch vessels operating largely in the southern North Sea, including in UK waters (Piet *et al.* 2007). Cod catches are highest in the southern North Sea in the 1st and 2nd quarters of the year. Haddock is only rarely caught in the southern North Sea, during years of very strong recruitment. There are also significant seine and gillnet fisheries for plaice towards the north of the region. Industrial fisheries target the sandeel populations of the southern and central North Sea, with Danish and Norwegian fleets particularly important exploiters of this resource. The fishery is focused on the Dogger Bank and takes place mainly during the summer months (Rogers & Stocks 2001). Skates and rays are an important local fishery in the outer Thames estuary, and bass landings have increased in recent years. The proximity of the region to the continental coastline means that it is fished by an international fleet, with France and Belgium exercising some historical fishing rights between 6-12 nautical miles (Jones *et al.* 2004).

Pelagic fisheries in the southern North Sea mainly target herring, sprat and horse mackerel. Purse seiners and pelagic trawls are usually used in the herring fishery, with the greatest landings in the 3rd quarter. In spring, landings of herring are concentrated off the Lincolnshire and East Anglia coastline (ICES-FishMap 2008) and important feeding grounds for herring are found off Flamborough Head and in the Humber Estuary (Jones *et al.* 2004). Sprat and horse mackerel are also fished along the English coast. Targeted mackerel fishing is prohibited in the southern North Sea throughout the year (ICES-FishMap 2008). Licenses to catch salmon and sea trout may be obtained for the River Humber and around the coast of East Anglia. There is no licensed fishery for these species in the Thames Estuary. Fyke nets, eel criggs and pots are used to catch eels from spring to autumn in the Rivers Humber and Thames and in many of the smaller estuaries of East Anglia and Essex (Walmsley & Pawson 2007). Shellfish fisheries are important in the region, particularly in inshore waters where a number of species are harvested from estuaries and bays. In addition to these fisheries, *Nephrops* may be landed from the Dogger Bank, particularly during autumn and winter. Edible crabs and lobsters are also valuable species, typically caught with static gear such as pots or creels, while fisheries for pink and brown shrimps are also prosecuted. The Humber Estuary is an important site for shrimp trawling and crab and lobster potting, while the Wash is a prime habitat for mussels, cockles and brown shrimp. An important cockle fishery in the Thames supports both local and visiting vessels. There are also wild and cultivated oyster fisheries along the Essex and north Kent coast (Walmsley & Pawson 2007).

A3h.13.7.2 Ports and vessels

Seventy seven percent of vessels based at ports in the region were <10m, with ports in the region among the smallest supporting an average of 13 UK fishing vessels per port, reflecting the importance of inshore fisheries to the region. Ports in the region are concentrated along the Suffolk and Essex coasts, with few ports to the north of the Wash along the Lincolnshire coast. The region contains 5 of the top fifty UK ports by landed

weight: Leigh-on-Sea, Hull, Bridlington, Grimsby and King's Lynn. With the exception of Hull, at which a significant catch of demersal fish is landed, landings at the other ports are almost exclusively of shellfish (Table A3h.23).

Table A3h.23 – Mean annual landings into key ports in Regional Sea 2, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Leigh-on-Sea	10	21	0.03	0.10	0.01	0.01	7.55	3.56
Hull	6	3	5.25	5.60	0.00	0.00	0.00	0.01
Bridlington	32	20	0.02	0.03	0.00	0.00	2.95	4.77
Grimsby	22	20	0.83	1.06	0.00	0.00	1.88	2.08
King's Lynn	10	28	0.00	0.01	0.00	0.00	1.06	1.19

Source: Data provided by the MFA (MFA website)

A3h.13.7.3 Distribution of fishing effort

There is relatively little fishing effort recorded by boats supplying VMS data, with the majority of effort concentrated in the north of the region on the Dogger Bank, within the Wash and along the Suffolk coast. Fishing effort is considerably lower in the region than in the northern North Sea and effort is predominantly coastal, both for mobile and static gears. Aerial surveillance reveals a far greater concentration of vessels, suggesting that the region is fished by a higher proportion of smaller vessels and by foreign fleets. The highest concentration of vessels using mobile gears are active on the Dogger Bank, south of Suffolk and in the Thames Estuary, while static gear activity is at its highest in waters to the north of the Humber Estuary. The high number of foreign vessels operating in the region can be seen in Figure A3h.37.

A3h.13.7.4 Gears and landings

UK vessels report a relatively low level of landings, both in weight and value from this Regional Sea (Table A3h.23). Shellfish dominate landings by weight (78%) and contribute approximately 76% of the total value landed. This is reflected in the largely coastal distribution of landings density in the region. High values of landings observed in the Thames estuary and to a lesser extent the Wash may be explained by the high amount of high value shellfish caught in these areas. The most common gear types observed in the region were bottom trawls and traps, although there are also a substantial number of dredgers. The region is heavily fished by foreign vessels which will not be included in these figures.

A3h.13.8 Features of Regional Sea 3

A3h.13.8.1 Summary of fisheries

The eastern English Channel represents the smallest of the Regional Seas and its coastal nature means that inshore fisheries are particularly important. Much fishing activity is undertaken by beach boats that set nets out to 6 miles offshore, with most vessels being day boats, particularly to the west of the region where waters are less sheltered (Walmsley & Pawson 2007).

The main demersal fisheries in the region use trammel and gill nets to catch plaice and sole (mainly a spring fishery) and rays, cod and bass (in cooler months) (Walmsley & Pawson

2007). The valuable sole fishery is subject to considerable international competition, particularly as Belgium and France have historical fishing rights around the southeast of England. Other demersal species that will be targeted in this way include the valuable turbot and brill, which are relatively abundant in the summer (Walmsley & Pawson 2007). Otter and beam trawls are also used in the region, primarily to target flatfish, although trawlers will also take advantage of high species diversity in the region to land cuttlefish, squid, black bream or red mullet, species which are not subject to quota restrictions and may still attract a high price (Walmsley & Pawson 2007). The cuttlefish fishery is highly seasonal, with cuttlefish moving close to the shore in the summer months.

The pelagic sector is small in the region. Herring, mackerel and sprat are all caught in small quantities, while a number of bays and estuaries act as nursery grounds for sandeel and bass, supporting small scale industrial and recreational fisheries (Walmsley & Pawson 2007). The Beaulieu River, Christchurch Harbour and Poole Harbour all support licensed salmon and sea trout seine net fisheries. Licensed fisheries for eels operate in the region, with fyke nets used to capture yellow eels in summer and silver eels in autumn (Walmsley & Pawson 2007).

The inshore fleet operating in this region is highly adaptable, and many trawlers that have targeted whitefish in the summer months will switch to scallop dredging in the winter. Scallop dredging is a highly opportunistic fishery as the scallop beds in the region are transient, but scallops fetch a high price. Clams, cockles and mussels, which may be harvested by dredging or hand-picking, are landed in the region, while the whelk fishery has increased in importance in recent years (Walmsley & Pawson 2007). Crabs and lobsters are important in the region, with lobsters typically found on rocky grounds inshore and brown crabs taken further offshore. Some fleets around the Isle of Wight depend on the lobster fishery, particularly in summer. The region is notable for its oyster fisheries. The Solent provides an example of one of the few healthy and self-regenerating native oyster fisheries, which may be harvested in beam trawls and scallop dredges. A small population of Manila clams in Poole Harbour supports a fleet of approximately 30 boats (Walmsley & Pawson 2007).

A3h.13.8.2 Ports and vessels

There is a very high density of small boats at ports along the coast of the region. Over 90% of fishing vessels registered at ports in the eastern Channel in 2007 were <10m with an average of approximately 22 vessels at each port, in both cases the largest figures of any Regional Sea. This reflects the inshore nature of many of the fisheries in the region. The region contains 5 of the top 50 UK ports by landed weight: Weymouth, Portsmouth, Shoreham, Eastbourne and Newhaven. Landings in these ports are largely of shellfish species (Table A3h.24).

Table A3h.24 – Mean annual landings into key ports in Regional Sea 3, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Weymouth	62	7	0.09	0.31	0.00	0.00	3.54	1.50
Portsmouth	57	13	0.15	0.41	0.00	0.00	2.36	1.47
Shoreham	32	5	0.62	1.56	0.02	0.01	1.45	2.37
Eastbourne	28	2	0.19	0.65	0.00	0.00	1.23	0.98
Newhaven	25	4	0.39	0.82	0.03	0.01	0.39	0.55

Source: Data provided by the MFA (MFA website)

A3h.13.8.3 Distribution of fishing effort

VMS data show the greatest fishing effort in the east of this region, with the greatest density of effort along the Sussex coast. Information extracted from logbooks and by aerial surveillance indicates significant effort occurs in the west of the region, reflecting the number of smaller vessels operating in these waters that would not contribute to VMS data. Comparison of gear types suggests that there is a greater total effort using static gears than mobile gears, with aerial observations indicating that use of static gears is very concentrated inshore, while mobile gears are in use throughout the region. A large number of foreign vessels operate in the region (Figure A3h.37).

A3h.13.8.4 Gears and landings

Landings by weight within the region are dominated by shellfish (68%), although there is a valuable demersal sector which contributes approximately 41% of the total landed value in the region. There is a notable cephalopod sector operating in the region which mainly targets cuttlefish. Static gears are particularly important in the region, with traps and gillnets accounting for over 60% of total days fished. Beam trawls, dredges and hook and lines are also well used in the region. The use of static gears in the region may account for the high value of demersal catch in the region, as methods such as gillnetting and long-lining tend to cause less damage to caught fish than trawling. The region is heavily fished by foreign vessels which will not be included in these figures.

A3h.13.9 Features of Regional Seas 4 and 5

A3h.13.9.1 Summary of fisheries

The southwest of England is one of the main fishing regions in the UK with approximately 20% of working fishermen based in the region (PMSU 2004). Landings are predominantly of shellfish species, although there is a high value demersal sector, operating particularly out of Brixham and Newlyn. The pelagic fishery in the region is smaller, but with important seasonal stocks of mackerel. Fishing effort and landings density are highest off the southwest peninsula. There is considerable flexibility displayed by the industry in this region. It is common for beam trawlers to switch between targeting whitefish and scallops, depending on demand, restrictions and season, while otter trawlers will switch between demersal and pelagic fishing to take advantage of migrating mackerel and herring (Walmsley & Pawson 2007). In the eastern waters of the region, otter and beam trawlers target sole, plaice, rays, turbot and monkfish in the winter months, while cuttlefish provide an important, non-quota restricted catch. Gill and tangle nets are set around the region to catch a variety of gadoids and flatfish. In Cornish waters, beam trawling for monkfish, megrim, lemon sole and sole represents an important sector and one which has been increasing since the 1980s (Walmsley & Pawson 2007). Otter trawls exploit seasonal fisheries, while gill nets are often set out around the reefs and wrecks of the region. Larger vessels may go out to deeper waters up to 70 miles offshore, to the southwest of Ireland to catch hake, an otherwise infrequent target in UK waters. There is a considerable amount of trawler activity in the Bristol Channel, with substantial international competition for the sole stock. Belgium and France exercise historical fishing rights in the waters of this region (Coates 2005).

Mackerel is an important stock in the region but, due to over-fishing, an extensive protected area around the coast of Cornwall, known as the “Mackerel Box” was set up in which trawling and seining for the species is prohibited (Walmsley & Pawson 2007). As a result, a traditional handline fishery flourishes on both coasts of the region and is one of seven UK

fisheries to have earned Marine Stewardship Council certification as a sustainable fishery (MSC website). The fishery is most active between autumn and spring along the south coast of the region, and over summer off the north coast. Drift nets may be deployed to capture herring and sprat, while sardines (or pilchard) and horse mackerel are targeted by industrial trawlers from as far afield as Scotland and Denmark. Bass is regularly caught in drift nets and gill nets in inshore waters, particularly in nursery areas off the Burry Inlet and Three Rivers off South Wales (Walmsley & Pawson 2007). Sardines are the target of a specialized Cornish fleet employing purpose built ring nets, typically operating at night.

Potting for lobster and crabs is important in the region. As well as brown crabs, new fisheries for velvet crabs, green crabs and spider crabs are developing in the region (Walmsley & Pawson 2007). Scallops are dredged off the coasts of Cornwall and Devon, but dredging is restricted around the south coast of Wales, by local byelaws. The Burry Inlet and Three Rivers area is the site of an important licensed hand-gathered cockle fishery, while whelk fishing has been growing in importance in Carmarthen Bay since the mid 1990s (Walmsley & Pawson 2007). The development of hydraulic dredging has led to a growing fishery for clams such as razorshells. Cuttlefish and squid are also frequently caught in the region, using pots and jigs in the spring and summer months.

Licensed salmon fisheries operate in the Rivers Exe, Teign, Dart, Taw, Torridge, Fowey, Camel, Tywi, Wye, Taf and Cleddau. Fyke nets are set in most of the large rivers in the region, and dip nets for elvers are used in winter and spring in some rivers on the north coast of Devon (Walmsley & Pawson 2007).

A3h.13.9.2 Ports and vessels

There are more vessels based in this region than in any other, and the area also has a high average number of vessels per port (20.2). Vessels <10m make up 83% of the fleet, reflecting the importance of inshore fisheries in the region, although offshore fishing grounds to the southwest of England and the south of Ireland mean that there is a higher proportion of larger vessels based in the west of the region than the east (Figures 1 and 2). There are relatively few large ports on the north Devon coast and in the Bristol Channel. The easy access to offshore fishing grounds also means a substantial number of large vessels are based in the region. The region contains 5 of the top 50 UK ports (by landed weight): Plymouth, Brixham, Newlyn, Looe and Exmouth (Table A3h.25).

Table A3h.25 – Mean annual landings into key ports in Regional Seas 4 and 5, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal ('000s tonnes)	Demersal (£ million)	Pelagic ('000s tonnes)	Pelagic (£ million)	Shellfish ('000s tonnes)	Shellfish (£ million)
Plymouth	70	13	1.32	3.72	7.81	2.84	2.42	3.25
Brixham	51	48	3.93	10.34	0.91	0.46	5.75	7.78
Newlyn	144	53	5.61	14.25	0.86	0.55	1.66	2.76
Looe	30	16	0.57	1.37	0.30	0.21	0.57	0.79
Exmouth	34	7	0.12	0.24	0.14	0.03	0.74	0.77

Source: Data provided by the MFA (MFA website)

A3h.13.9.3 Distribution of fishing effort

VMS records indicate a high density of vessels operating particularly around the south of Devon and Cornwall, as well as in offshore waters to the southwest. Inshore, effort is greatest along the south coast of the region, between the major ports of Exmouth, Plymouth

and Falmouth, with this pattern mirrored when mobile gears are considered separately. There is also substantial fishing effort using mobile gears in the mouth of the Bristol Channel. Fishing effort using static gears is most abundant in western areas of the peninsula. Aerial surveillance of vessel activity provides a similar picture of vessel distribution, with particularly high densities along the south coast of Devon, and with the density of sightings decreasing with distance offshore (although it should be noted that surveillance effort also decreases offshore in this region). There is also a high density of fishing effort in deeper waters to the southwest of Wales, particularly of vessels using mobile gears, while static gears are concentrated around the coast. Foreign vessels are widespread beyond territorial waters throughout the region.

A3h.13.9.4 Gears and landings

Landings from this Regional Sea are dominated by shellfish (47% by weight, 38% by value) and demersal species (38% by weight, 49% by value). There is also a substantial cephalopod fishery (largely for cuttlefish) making up 8.5% of the total value. Valuable shellfish landings in Carmarthen Bay are evident. A wide variety of gear types are used in the region, with mobile gears split between bottom trawls (46% days fishing) and dredges (11% days fishing) (Table A3h.25). There are also a number of traps and gillnets used, reflecting the large quantities of shellfish landed from the region and the high values of the demersal catch. There is considerable use of longlines and handlines in this region. The demersal catch in the region is of very high value, possible due to the high level of use of selective fishing methods such as line fishing and gillnetting in the region. The region is heavily fished by foreign vessels which will not be included in these figures.

A3h.13.10 Features of Regional Sea 6

A3h.13.10.1 Summary of fisheries

Fishing in the Irish Sea is dominated by otter trawlers, beam trawlers, scallop dredgers and potters. Otter trawlers in the region are primarily British (approximately 70%), with the remainder Irish, French and Belgian (Mills & Eastwood 2005). These fleets target cod, whiting, plaice and *Nephrops* at grounds to the east and west of the Isle of Man, southwest Wales, the Firth of Clyde and Liverpool Bay. There is a significant summer *Nephrops* fishery off the coast of Whitehaven and a rather larger one in the deeper water between the Isle of Man and Ireland. Beam trawlers in the region are predominantly Belgian, along with UK and French vessels. The fishery is mainly based southwest of the Isle of Man, in Liverpool Bay and Cardigan Bay. Static gears are also used to catch demersal species, and an increasing number of trawlers have switched to using gill, tangle and trammel nets (Walmsley & Pawson 2007). Static netting is mainly used to catch sole, plaice, flounder, rays, turbot and brill (Walmsley & Pawson 2007). There are licensed fisheries for salmon and sea trout in the region, with a key area for the fishery being the Solway Firth. Pelagic fisheries in the region are limited. Bass is caught with gill nets and handlines from spring to autumn, while some drift netting and pair trawling for herring takes place over autumn and winter, particularly at spawning grounds around the Isle of Man. A limited amount of netting for herring and mackerel takes place and there is an important charter fishery for mackerel.

Scallop dredging and potting, predominantly carried out by UK vessels, are key fisheries in the Irish Sea. Dredging for scallops takes place around Anglesey and the Isle of Man and to a lesser extent, Cardigan Bay. Scallop fisheries are closed in coastal areas of the Irish Sea between June and October or November although fishing for queen scallops may be carried out year round. Potting is a particular feature of Cardigan Bay, where lobsters, crabs and prawns are all important fisheries. The lobster fishery operates in the Bay, as well as around

the Llyn Peninsula from April to November. Brown crabs are also caught in pots around the Llyn Peninsula, while spider crabs and crawfish are developing fisheries in the south of Cardigan Bay (Walmsley & Pawson 2007). Morecambe Bay, the Solway Firth, and the Dee, Ribble and Duddon estuaries are sites of shrimp fishing, while potting for shrimps has increased in Cardigan Bay in recent years, particularly during winter, when it is a substitute for the summer peaking lobster fishery. Shoreline cultivation of mussels, Manila clams and oysters takes place in the region and Morecambe Bay and the Solway Firth support important hand-raked and mechanically dredged cockle fisheries (Mills & Eastwood 2005).

A3h.13.10.2 Ports and vessels

The coastline around Regional Sea 6 has more ports than any other Regional Sea area, even excluding Manx and Irish ports, although the average number of registered fishing vessels per port (11.5) is the lowest. Most of the vessels in these ports (70%) are of boats below 10m, although Northern Irish ports tend to have a greater number of larger vessels – Kilkeel has the largest >10m fleet in the UK. Eleven of the top 50 UK ports by landings are based in Regional Sea 6, with landings at these ports, in common with the rest of the region, dominated by shellfish (although there are significant pelagic landings at Ardglass) (Table A3h.26).

Table A3h.26 – Mean annual landings into key ports in Regional Sea 6, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Ardglass	23	26	0.23	0.27	4.72	1.46	1.39	2.27
Kilkeel	53	73	1.63	1.97	0.03	0.00	2.72	4.24
Portavogie	21	36	1.20	1.66	0.00	0.00	2.02	3.36
Kirkcudbright	4	17	0.01	0.01	0.00	0.00	3.14	2.30
Holyhead	35	3	0.23	0.34	0.00	0.00	2.84	1.87
Whitehaven	11	6	0.36	0.39	0.00	0.00	2.24	2.24
Milford Haven	54	10	1.83	3.62	0.00	0.00	0.60	1.32
Troon and Saltcoats	3	17	0.48	0.79	0.01	0.01	1.66	2.75
Campbeltown	27	23	0.08	0.07	0.00	0.00	1.76	2.78
Isle of Whithorn	3	0	0.02	0.02	0.00	0.00	0.59	0.70
Liverpool	5	1	0.04	0.15	0.00	0.00	0.35	0.54

Source: Data provided by the MFA (MFA website)

A3h.13.10.3 Distribution of fishing effort

The distribution of fishing effort in the Irish Sea, as depicted by VMS data, is particularly great in the north of the region with hotspots of fishing activity to the west of the Isle of Man and off the Cumbrian coast at Whitehaven. Significant activity can also be seen in Cardigan Bay and the Solway Firth. This pattern of distribution is mirrored by logbook data, both for all gears and mobile gears. Use of static gear is most frequent in waters around the northwest of Wales. Vessel distribution as observed by aerial surveillance also follows this pattern. There are relatively few foreign vessels operating in the region.

A3h.13.10.4 Gears and landings

Shellfish dominate landings in the region making up almost 80% of landings by weight and 87% by value. The most valuable landings are obtained from waters to the west of the Isle of Man, where important *Nephrops* and gadoid stocks are fished. A greater weight of shellfish is landed from the Irish Sea than from any other Regional Sea, but the value of this catch is not as great as in regions, such as the Minch and the northern North Sea, where high value *Nephrops* comprise a larger proportion of the catch. The dominant method fishing method in the Irish Sea is the bottom trawl (64% days fished), with traps, dredges and pelagic trawls also common.

A3h.13.11 Features of Regional Sea 7

A3h.13.11.1 Summary of fisheries

The sheltered, inshore waters of the Minch and adjacent sea lochs make Regional Sea 7 ideal for small day boats. Most fishing in the region is for shellfish, with crabs, lobsters and whelk caught alongside major fisheries for scallop and *Nephrops*. There is also a sizeable industrial fishery targeting sandeel, alongside small scale pelagic fisheries for herring and mackerel and demersal fisheries for small flatfish and gadoids, such as cod, haddock and saithe, which use the region as a nursery ground. Salmon and sea trout are also abundant in the rivers and lochs of the west of Scotland and licensed fisheries for these species exist.

A3h.13.11.2 Ports and vessels

In 2008, there were 55 active fishing ports in the region, supporting almost 700 vessels between them (approximately 12.5 vessels per port). Of these vessels, 38% are over 10m long, suggesting that although the region is ideal for small day boats, the proximity to the region of the shelf edge and offshore fishing grounds supports many larger vessels. Eight of the top fifty UK ports by landing weight are found within the region. These ports support a number of vessels longer than 10m and landings into these ports are dominated by demersal species (Table A3h.27).

Table A3h.27 – Mean annual landings into key ports in Regional Sea 7, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Ullapool	34	34	4.08	6.38	0.11	0.06	1.18	2.17
Kinlochbervie	8	5	4.92	6.81	0.01	0.00	0.43	0.88
Mallaig	16	27	1.29	1.35	0.99	0.12	2.87	6.37
Lochinver	8	3	3.16	5.65	0.00	0.00	0.89	2.34
Stornoway	39	26	0.12	0.14	0.00	0.00	1.67	3.44
Oban	32	17	0.17	0.20	0.00	0.00	1.60	3.36
Loch Scridain (Isle Mull)	11	4	0.00	0.00	0.00	0.00	0.94	1.63
Tarbert	11	8	0.02	0.02	0.09	0.01	0.81	1.98

Source: Data provided by the MFA (MFA website)

A3h.13.11.3 Distribution of fishing effort

The region is widely fished, with the greatest densities around the northern Hebrides. This distribution may be seen both using data derived from VMS (figure 5), logbooks and aerial

surveillance. Surveillance effort is not as great as in other areas, so fishing effort may be underestimated in the region using this method. Static gears are mainly set in sheltered bays and lochs. Very few foreign vessels operate in the region, as much of it is within UK territorial waters. Fishing in this region is slightly seasonal, with the greatest effort recorded in spring.

A3h.13.11.4 Gears and landings

Landings in the region are dominated by shellfish, which contribute 54% of the weight and 81% of the value of landings, and by pelagic species (41% by weight and 15% by value). Shellfish landings are predominantly of high value *Nephrops* and scallop. Important scallop grounds are found along the east coast of the Isle of Lewis, to the west of the Isle of Skye and along the coast to the south of the region (Mason 1983). The most frequently used gear types are bottom trawls and traps (for *Nephrops*, crabs, lobsters and sandeels), which comprise about 90% of days fished by UK vessels between them, while dredges are used to harvest scallop. Fishing effort (in terms of days at sea) within this region is greater than all other Regional Seas apart from Regional Sea 1, although the relatively low weight of landings is indicative of the small size of vessel fishing in the area.

A3h.13.12 Features of Regional Sea 8

A3h.13.12.1 Summary of fisheries

The seas of the Scottish continental shelf region are heavily fished by both the UK fleet and foreign vessels. There are four main demersal fleets in operation in the region (Gordon 2006):

- Mixed roundfish otter trawl – UK, Irish, French and German vessels target haddock, cod and other gadoids both on the shelf and along the shelf edge.
- *Nephrops* otter trawl – Irish and British vessels use fine mesh nets to target *Nephrops* in offshore areas, usually with a significant bycatch.
- Monkfish, megrim and hake otter trawl – these species are targeted on and around the shelf edge, mainly by UK and French trawlers.
- Saithe otter trawl – predominantly French vessels operating in shelf edge waters to the north of Scotland.

Large and important pelagic fisheries operate in this Regional Sea as both herring and mackerel migrate over the Scottish shelf between spawning and feeding grounds. The west of Scotland herring stock is targeted by UK, Dutch and German vessels, while higher value mackerel is the target of a substantial Irish fleet in the area. Norway pout is targeted by industrial fleets, primarily from Danish vessels (Gordon 2006).

A3h.13.12.2 Ports and vessels

The region does not have an extensive coastline, comprising mainly just the western fringes of the Hebrides, Orkney and Shetland and north of Scotland. Consequently there are relatively few ports and vessels based in the region. In 2008 there were 360 fishing vessels (averaging 13.3 per port). Approximately 84% of vessels were over 10m in length. Much of the fishing effort in the region is carried out from boats based elsewhere in the UK and abroad. Of the top 50 UK fishing ports, only two are based in this region, at Scalloway in Shetland and Scrabster (Figure 4). Landings at these ports comprise mainly demersal fish with very few pelagic landings (Table A3h.28).

Table A3h.28 – Mean annual landings into key ports in Regional Sea 8, 2003-2007

Port	Vessels <10m	Vessels >10m	Demersal (‘000s tonnes)	Demersal (£ million)	Pelagic (‘000s tonnes)	Pelagic (£ million)	Shellfish (‘000s tonnes)	Shellfish (£ million)
Scrabster	46	2	9.17	11.60	0.01	0.00	2.81	4.12
Scalloway and Isles	21	5	1.53	1.85	0.02	0.01	0.06	0.10

Source: Data provided by the MFA (MFA website)

A3h.13.12.3 Distribution of fishing effort

The VMS data indicates a high level of fishing effort throughout this region, although it is likely that distribution in the west of the region is under-estimated, as an artefact of the data extraction process. Logbook-derived data and observations from aerial surveillance both suggest a more uniform distribution across the shelf. Densities of vessels, particularly of foreign vessels, are highest along the shelf edge, with hotspots of activity to the north of the Hebrides and around Orkney and Shetland islands. Most of these vessels were using mobile gears, although a small amount of static gear usage was observed, particularly around the coast of Orkney.

A3h.13.12.4 Gears and landings

This is the most productive of the Regional Seas, with landings largely comprising pelagic fish (much of which is caught by industrial freeze trawlers) comprising over 70% of the landed weight, but only about 40% of the value. The importance of pelagic fisheries in this region, particularly off the north of Scotland, is clear in Figure A3h.43. The high efficiency of pelagic fishing means that these landings are achieved despite relatively little fishing effort (in terms of total days at sea) when compared to other Regional Seas, in particular, 1, 4/5, 6 and 7. Traps (48% days fished) and bottom trawls (37% days fished) are the dominant gear types used in the region, reflected in the high quantities of demersal and shellfish species caught around the shelf. The region is heavily fished by foreign vessels which will not be included in these figures.

A3h.13.13 Features of Regional Seas 9, 10 and 11

A3h.13.13.1 Summary of fisheries

These regions are entirely non-coastal and too far from shore for small day boats. The fisheries in the region are predominantly demersal, with the Rockall Bank, Hatton Bank and areas around the numerous sea mounts and ridges particularly suitable for large gadoids, monkfish and flatfish. Areas like the Rockall Trough and Faroe Shetland Channel support significant deep sea fisheries. The Rockall Bank is the site of a major targeted demersal trawl fishery for haddock, primarily pursued by Russian vessels operating outside of the European Exclusive Economic Zone (beyond 200 nautical miles from shore) (Gordon 2006). Vessels target deep water species such as blue ling, roundnose grenadier and black scabbardfish around the margins of the Rockall Trough, while French vessels operate a small fishery for deep water sharks (Gordon 2006). Over the Hatton Bank, roundnose grenadier and Baird's slickhead are fished, with many Spanish vessels working in the area. There are also mixed demersal trawls catching monkfish, saithe, cod and haddock within the region. A feature of the demersal fisheries of the region is the use of static methods such as longlines (used by Norwegian vessels targeting ling and tusk) and gill nets (a popular method among Spanish vessels targeting hake). There is concern about the sustainability of

deep sea stocks, due to the low fecundity and long life cycles of many of these species. Consequently, numerous closed areas have been set up. Trawling is banned in certain areas around the Rockall and Hatton Banks and at the Darwin Mounds (in part because of the presence of fragile coral habitats), directed fishing for orange roughy is not permitted along much of the shelf edge, while a “Haddock Box” where only longlining is permitted, exists near Rockall.

Pelagic fisheries in the region target herring and mackerel, but the most important pelagic fisheries in these waters are industrial fisheries for small, “low value” pelagics, particularly blue whiting (Gordon 2006). Shellfish fisheries in the region are limited, although a developing pot and tangle net fishery for deep water red crabs on the Hatton and Rosemary Banks and along the Wyville Thomson Ridge is developing.

The North East Atlantic Fisheries Commission (NEAFC) was formed to recommend measures to maintain the rational exploitation of fish stocks within a designated area of the Northeast Atlantic lying outside national jurisdiction. The Commission takes scientific advice from ICES when developing these recommendations. The eastern boundary of this area extends approximately along longitude 15°W, encompassing Regional Sea 11 and part of Regional Sea 10. Fishing effort in the region is concentrated around seamounts and banks, particularly on the southern parts of the Rockall Bank and on parts of the Hatton Bank. Contracting parties to the commission (the EU, Denmark, Iceland, Norway and the Russian Federation) are required to follow measures aimed at managing key stocks in the area including redfish (particularly *Sebastes* spp.), mackerel, herring, haddock, blue whiting and deep sea species (including Baird’s slickhead, blue ling, black scabbardfish, Greenland halibut and roundnose grenadier). The main fleets operating in these fishing areas are British, Norwegian, French, Spanish and Russian, with other European and international fleets also maintaining a presence. The Norwegian fleet targets pelagic stock, with large catches of herring and blue whiting reported. French and Spanish vessels target deep sea stocks and Russian trawlers, excluded from waters lying within the 200nm Economic Exclusion Zone, take advantage of haddock fisheries on the Rockall Bank. Management initiatives implemented in the area include fishery closures, such as the Haddock Box in an area of the Rockall Bank, which has been closed to all fishing except longlining since 2003, to protect haddock stocks. Also closed to demersal trawling are areas along the Hatton Bank, the West Rockall Mound and Northwest Rockall, as well as the Logachev Mound and Empress of Britain Bank where demersal fishing is prohibited.

A3h.13.13.2 Distribution of fishing effort

Fishing effort is sporadic in these Regional Seas, and is mainly concentrated around the Rockall Bank, Rosemary Bank, Wyville Thomson Ridge and shelf edges. The VMS data obtained for this baseline does not extend over much of these regions, while aerial surveillance is also patchy. Due to the distance offshore, a large number of foreign (non EU) vessels work in the region.

A3h.13.13.3 Gears and landings

There is relatively little fishing effort in the region and landings into UK ports from these Regional Seas are much lower than from other areas. Most of the landings (by weight) are of low value pelagic species (71% by weight, 37% by value). The main gear types used are bottom trawls, followed by gill nets and longlines. The regions are heavily fished primarily by foreign vessels which will not be included in these figures.

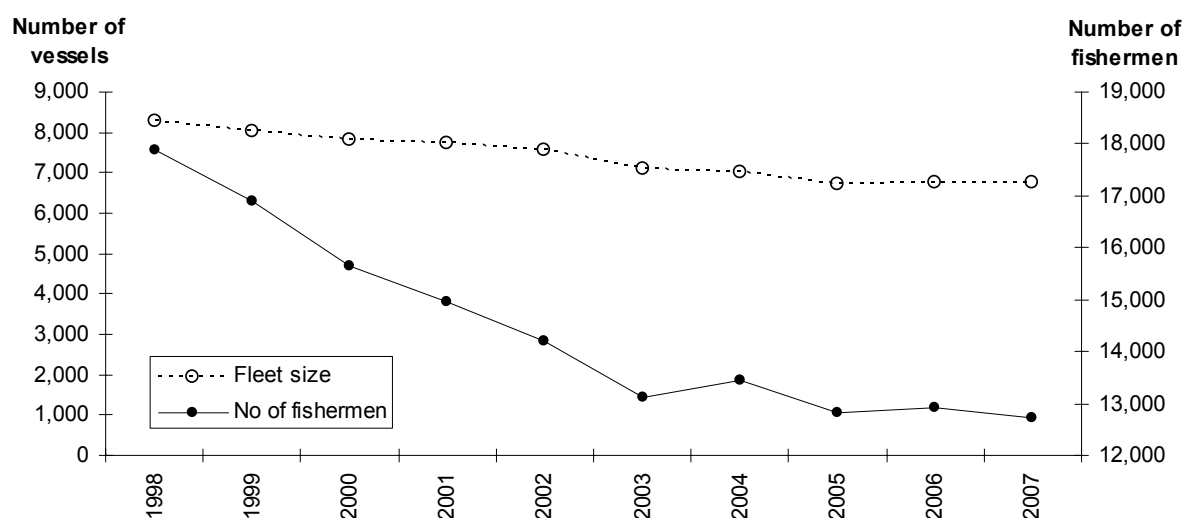
A3h.13.14 Evolution of the baseline

The fishing industry is dynamic with frequent and sometimes unpredictable changes in fish abundance and distribution, climatic conditions, management regulations and fuel costs all affecting activity. Consequently the baseline is rapidly evolving.

A3h.13.14.1 Trends in the fishing industry

Recent years have seen a decline in the UK fishing industry, with the number of active vessels having declined steadily from 8,271 in 1998 to 6,763 in 2007 (an 18% decrease). Over the same period, the number of working fishermen has decreased from 17,889 to 12,729 (a 29% decrease) – see Figure A3h.45. The rate of this decrease in working fishermen has slowed since 2003, although there remains evidence of a continued, slight downward trend. The decrease in the ratio of fishing vessels to fishermen (from 1: 2.16 in 1998 to 1: 1.88 in 2007) is suggestive of further mechanization and a relative increase in the use of small inshore vessels.

Figure A3h.45 – UK fleet size and numbers of working fishermen, 1998-2007

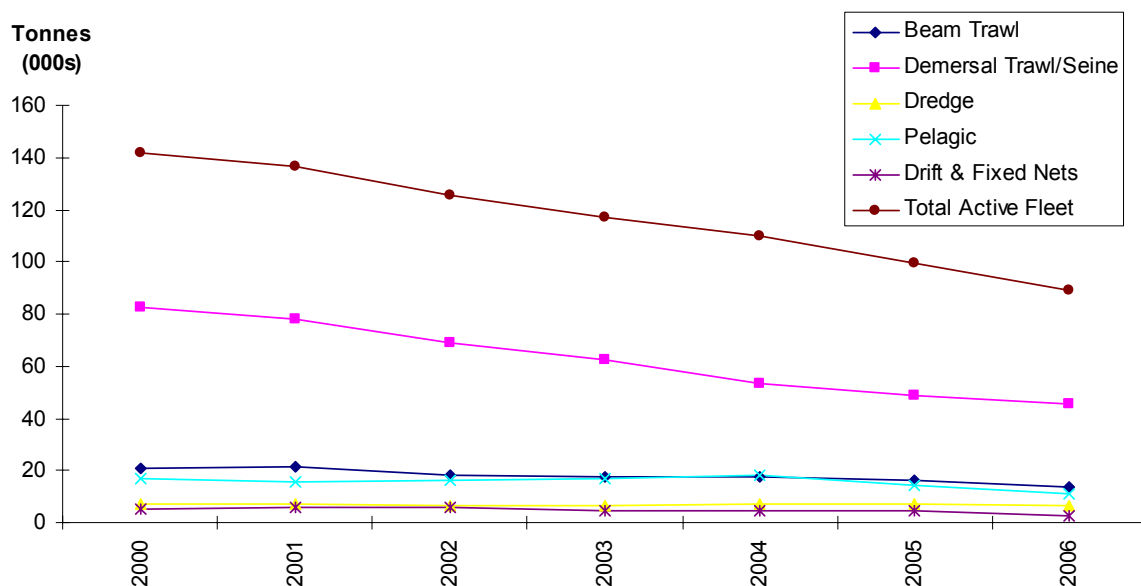


Source: Data provided by the MFA (MFA website)

A3h.13.14.2 Trends in gears and landings

The total weight of the UK fleet declined by 37% between 2000 and 2006 (Figure A3h.46). This is a decrease almost three times as great as the decrease observed in total number of vessels between these years (13% - see Figure A3h.45). This again suggests that the trend in recent years has been towards smaller vessels. The decrease in tonnage in the UK fleet is largely accounted for by a significant decline in the number of vessels employing demersal trawls or seines, which will typically target commercially valuable quota species. As well as the implementation of tighter quotas in many stocks over recent years, the shrinkage in the UK fleet may be due to rising fuel costs, which are limiting profit margins and making the continued running of many boats - particularly older, less efficient models - less viable, and government led decommissioning schemes.

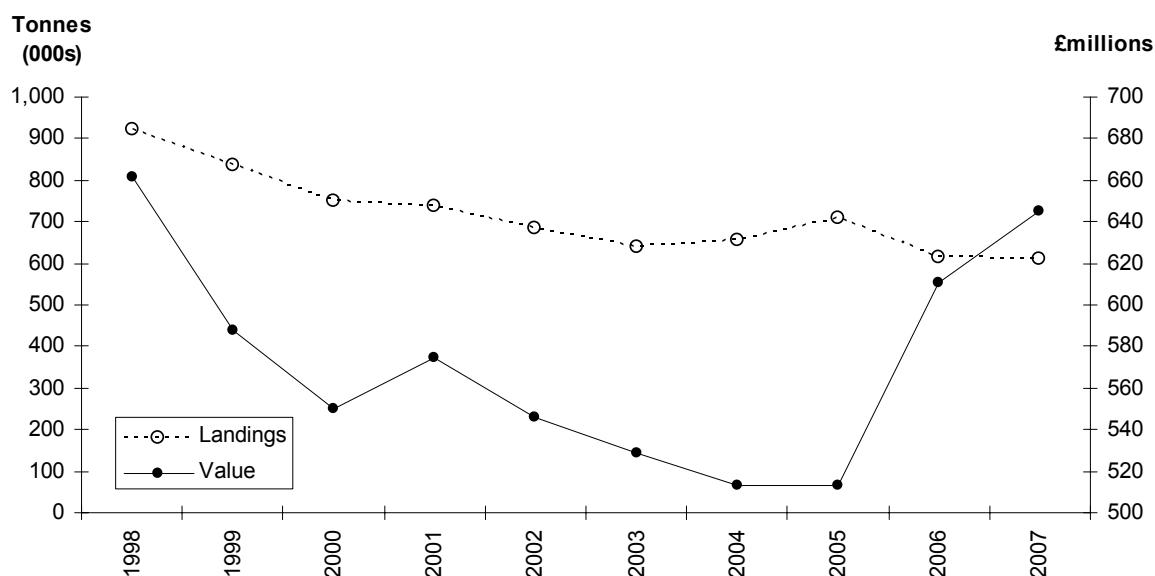
Figure A3h.46 – Weight of UK fishing fleet by gear type, 2000-2006



Source: Data provided by the MFA (MFA website)

Between 1998 and 2007, the total weight of landings by UK vessels decreased by approximately a third. The value of this catch, however, having dipped considerably between 2000 and 2005, has recovered in 2006 and 2007 (Figure A3h.47).

Figure A3h.47– Total UK landings by weight and value, 1998-2007

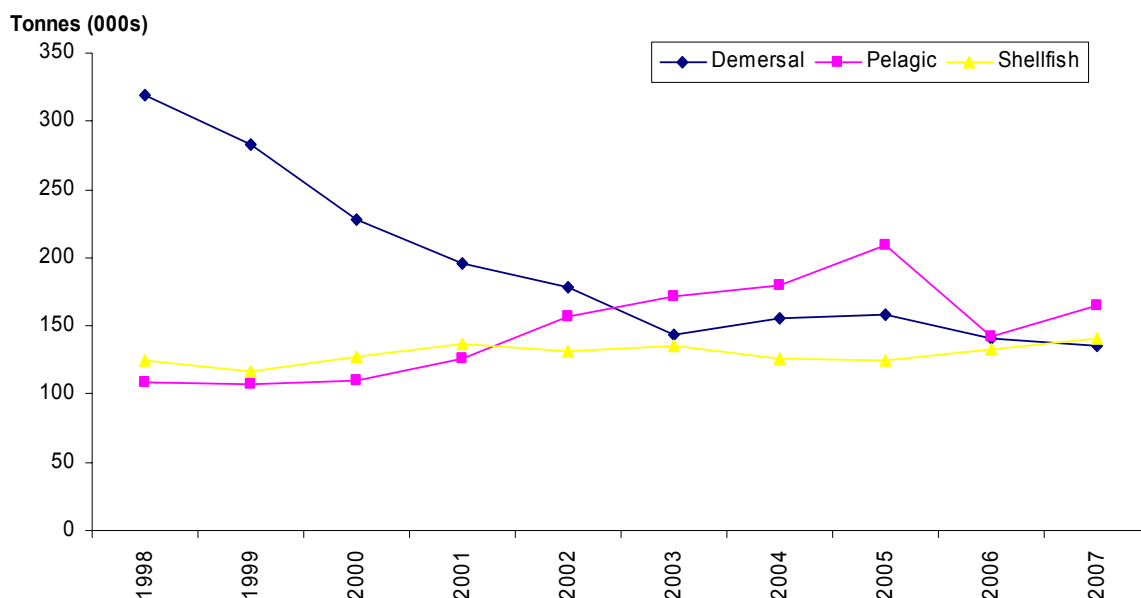


Source: Data provided by the MFA (MFA website)

The decrease in weight of landings over the period is due largely to a decrease in landings of demersal species. Pelagic landings have increased over this period, while landings of shellfish have remained stable (Figure A3h.48). This reflects the decline in demersal trawlers, and is probably due to a combination of declines in the abundance (and therefore catchability) of key demersal stocks and the introduction of more stringent quotas and technical measures imposed on the demersal fleet. Although only 36% of stocks (by value)

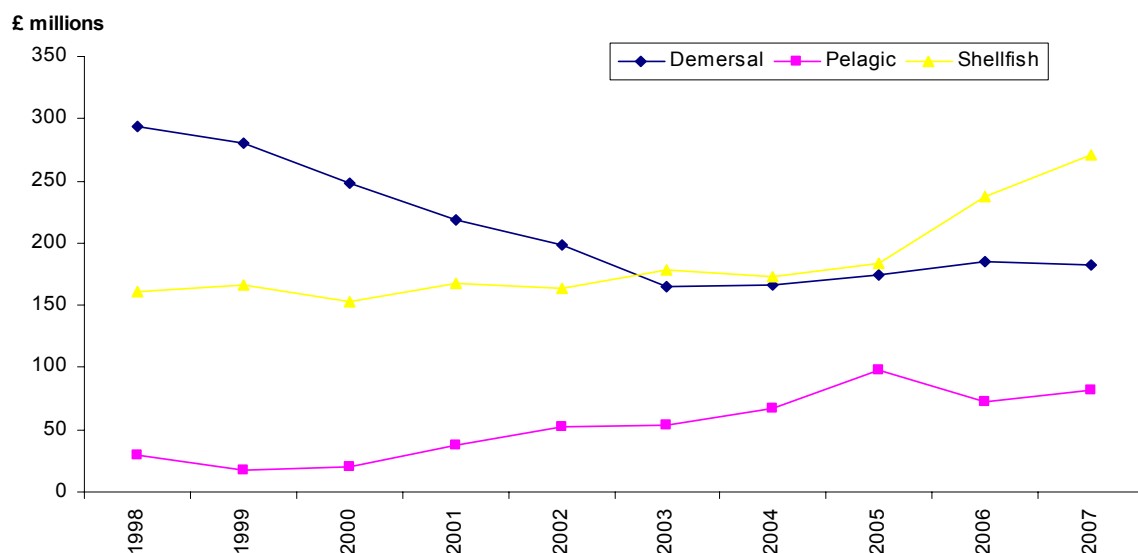
targeted by UK vessels in EU waters are considered in danger or at risk, these species are predominantly in the demersal whitefish sector (PMSU 2004). While the total value of demersal and pelagic catch over the past decade reflects the landed weight, the value of shellfish has increased over this period, to the extent that it has overtaken the demersal sector as the most valuable sector in the UK fleet (Figure A3h.49).

Figure A3h.48 – Total UK landings by species type and weight, 1998-2007



Source: Data provided by the MFA (MFA website)

Figure A3h.49 – Total UK landings by species type and value, 1998-2007



Source: Data provided by the MFA (MFA website)

Recently, a number of new fisheries have developed for less traditional food species, particularly for shellfish (whelks and razor clams in the Irish Sea) and cephalopods (squid in the Moray Firth), but also for finfish. This is particularly the case in the southern regions, where species diversity is higher and the abundances of many warm water species are increasing.

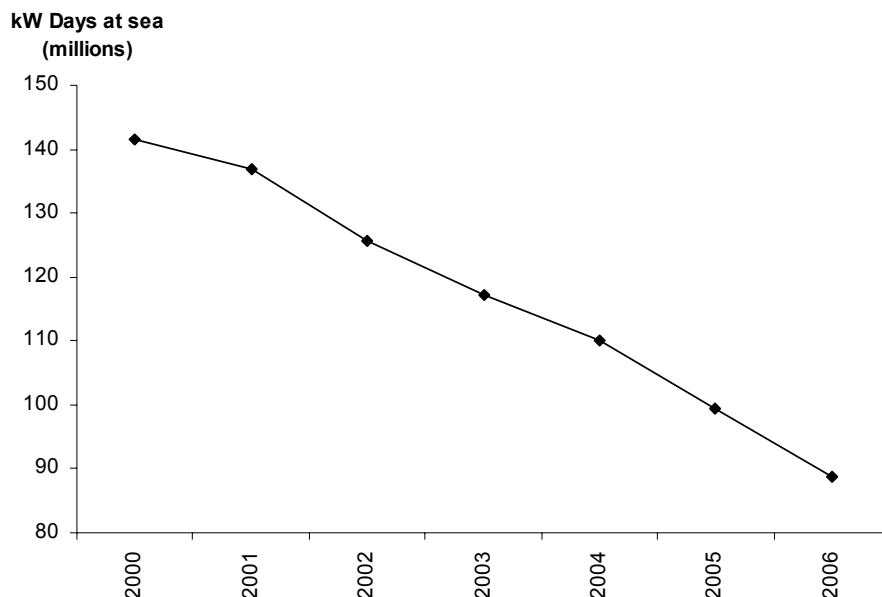
A3h.13.14.3 Advances in management

UK fisheries are likely to be subject to substantial changes in coming years as a result of technical developments, economics and changes in management strategy as well as changes in target species abundance, composition and distribution. Over the course of the past century, fishing efficiency has increased with technological advances, increasing the pressure on marine ecosystems as a wider range of environments and species become exploitable. There are two ways of managing fisheries: managing catch or managing effort. Currently, management is focused on catch and is based largely on TACs and national fleet quotas. However, the demersal trawls dominating UK fisheries are characterised by yielding a very mixed catch, so single species quotas do not reflect the true impact of fishing. There is currently a drive to move towards effort management, which will not only limit over-fishing, but also limit some of the negative impacts fishing activity has on the wider environment. Methods of protecting the whole ecosystem in management (the Ecosystem Approach) are increasingly being developed, while discussions between managers and stakeholders (including fishermen) about designing a functional system of Marine Spatial Planning are ongoing.

As part of this, measures such as establishing closed areas (including Marine Protected Areas), days at sea limits, reducing vessel power (Figure A3h.50) and limiting capacity through decommissioning of vessels are becoming increasingly popular. A £5 million decommissioning scheme aiming to reduce the <10m sector in England, by paying skippers of high capacity vessels to stop fishing, has recently been announced (MFA website (b)). In addition, there have been a number of technical developments in recent years to decrease levels of bycatch by allowing the escape of non-target, under-sized or juvenile fish and to prevent the entanglement of cetaceans, seals and turtles in gear. These developments include separator panels, escape panels and square meshed panels in trawl nets to allow non-target and under-sized fish to escape, and acoustic “pingers” to deter predatory marine mammals. A decrease in bycatch will increase the efficiency of fishing, resulting in fewer discards and allowing a reduction in fishing effort. This in turn, is likely to lead to more generous quotas being awarded.

Much work is currently being carried out to improve the effectiveness of strategies used in fisheries management. A number of methods of managing fisheries based on “métiers”, (hierarchical stratification of fleets based on fishing gear, composition of catch and selectivity of gear) are being explored (Tidd *et al.* 2007), although there are currently a number of complexities associated with these approaches. One of the consequences of this approach is a drive to involve stakeholders (fishermen) in the decision making process, to make use of their experience and expertise and to improve compliance with regulatory measures. This drive has led to such innovations as the voluntary closed area scheme in Scotland, where fishermen report areas of high abundances of juvenile fish for temporary closure.

Figure A3h.50 – UK fishing fleet effort in kW days at sea from 2000-2006



Source: Data provided by the MFA (MFA website)

Pressure may also be put on the fishing industry by non-governmental organisations such as the Marine Stewardship Council (MSC) who assess fisheries and certify those that are sustainable and with low environmental impact. There are currently seven MSC certified fisheries in UK waters:

- Handline mackerel in Cornwall.
- Hand gathered cockles in the Burry Inlet.
- Loch Torridon *Nephrops* creel fishery.
- North Sea herring by Scottish fleet.
- North eastern SFC sea bass.
- Drift-netting for Thames Blackwater herring.
- Hastings pelagic fleet (herring and mackerel).

Encouraging these sustainable fisheries in this way, as well as encouraging the public to embrace less traditional food species, will also ease the pressure on key species.

A3h.13.15 Environmental issues

A3h.13.15.1 Environmental effects of fishing

Fishing has a number of direct effects on the marine environment. The most obvious of these is the problem of over-exploiting a fish stock, leading to declines in abundance to the level at which the population becomes unsustainable. Overfishing can lead to problems other than a simple decline in abundance. The act of selectively removing large, predatory species from the community, as commercial fisheries tend to, can lead to marine ecosystems becoming dominated by short-lived organisms from lower trophic levels such as small, planktivorous fish and invertebrates. This phenomenon is known as fishing down the food web (Pauly *et al.* 1998). Data indicate that the biomass of fish from high trophic levels has declined by two thirds over the past 50 years in the North Atlantic (Christensen *et al.* 2003).

The mixed nature of the demersal trawl fisheries also leads to high numbers of unwanted, low-value or immature fish being caught. These fish will be discarded – it has been estimated that for every kilogram of sole caught by beam trawls in the North Sea, up to 14kg of other animals will also be killed (Covey & Laffoley 2002, cited in RCEP 2004). Much unwanted bycatch will be of immature, undersized animals, the landing of which would be illegal. In the North Sea, typically half of the plaice caught in beam trawls, along with approximately half of cod and haddock will be discarded (SNH 2004). This represents both a biological and an economic loss. As well as this, trawl nets catch and drown cetaceans and seals which are attracted by the shoaling fish, and baited long-lines are known to catch and drown diving seabirds (Løkkeborg 1998). Lost fishing gear can continue to act as a source of animal mortality for many years, a process known as “ghost fishing.”

Fishing can also cause considerable damage to the wider marine environment. Bottom trawling is a destructive method, destroying fragile habitats and organisms and crushing benthic invertebrates such as crustaceans, molluscs and echinoderms. In 1989, it was estimated that trawling affected 323,000km² of the seabed of the southern and central North Sea (RCEP 2004). Beam trawling is a particularly destructive method, using tickler chains that penetrate up to 8cm into the sediment (RCEP 2004). Rumohr & Kujawski (2000) found a significant change in epifaunal community between 1912 and 1986 that they linked to trawling activity. They found that between these dates, bivalve abundance had declined, while more motile scavengers, such as crustaceans and gastropods, had increased in abundance, possibly in response to high levels of discards and injured invertebrates. Trawling not only modifies the diversity and structure of benthic communities, but is also likely to affect the productivity of the ecosystem by re-suspending nutrients into the water column in a pulse, which may increase pelagic productivity (RCEP 2004). Scallop dredges are similarly damaging, being of a heavy metal construction, and usually with large teeth or a cutting bar designed to dig scallops out from the sediment, and have been linked to a number of detrimental effects including long term changes in seabed community structure (Bradshaw *et al.* 2002).

The fishing industry is potentially affected by a number of environmental issues, such as contamination of fish through riverine discharges, algal blooms, pollution originating from shipping or hydrocarbon production, and the effects of climate change on fish distributions

There is the potential for disruption of spawning aggregations through unmitigated (timing) seismic surveying or piling activities associated with installation of wind farm foundations and other installations.

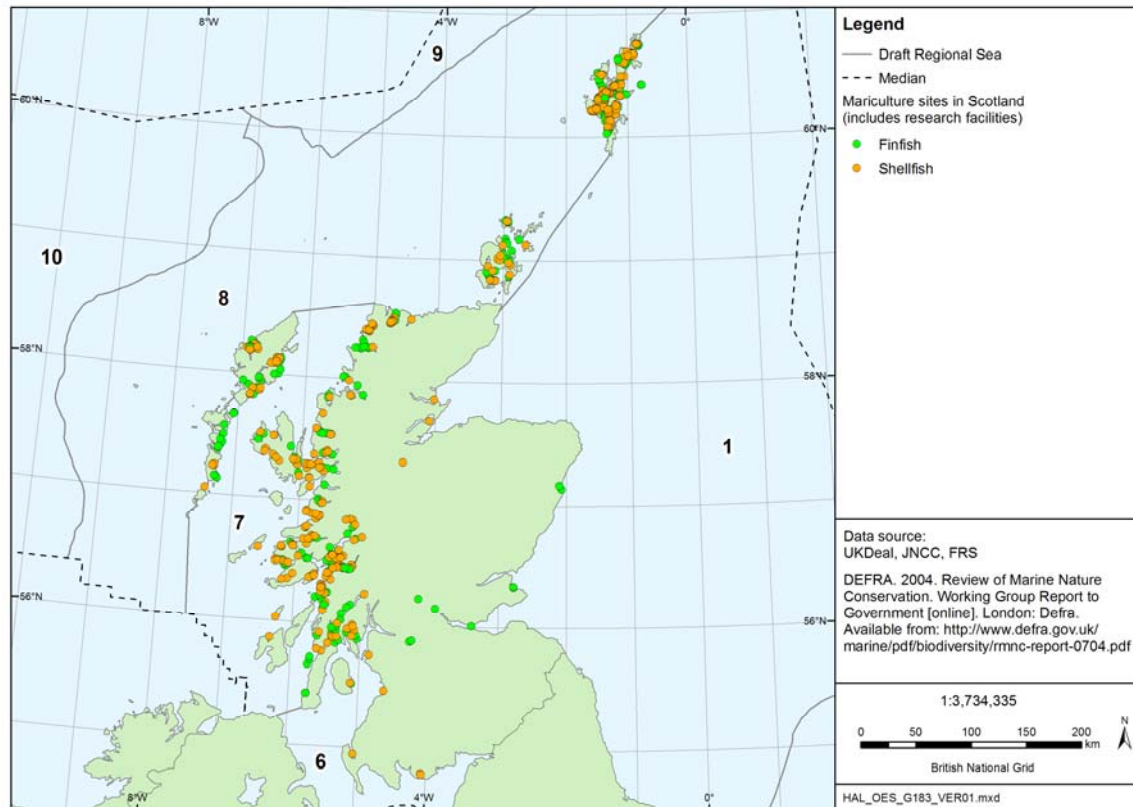
The potential exclusion of fishing activity within wind farms is of concern to the industry. It may be particularly problematic for inshore fisheries as day boats may be unable to move further afield to fish new grounds. There is evidence that wind farms may act as artificial reefs, encouraging the abundance of fish and shellfish (Wilhelmson *et al.* 2006). Due to the difficulties and risks of navigating and operating fishing gear within wind farms, however, fishermen may be unable to take advantage of this, although static gear fisheries in the area may be enhanced.

A3h.14 MARICULTURE

Mariculture is the cultivation of marine species such as shellfish, finfish and seaweed within coastal waters. Shellfish and finfish cultivation principally takes place along the west coast of Scotland, the Inner and Outer Hebrides and the Northern Isles (Regional Sea 1, northern

section of Regional Sea 6, and Regional Sea 7 and 8 – Figure A3h.51) and it can play an important role in the economy of rural communities.

Figure A3h.51 – Location of finfish and shellfish farms in Scotland



Note: Research facilities may not carry out commercial farming activities

In Scotland, which is the second-biggest producer of farmed Atlantic salmon, the industry has a farm gate value of almost £380 million. Scotland also has a successful shellfish farming industry worth in excess of £5 million per annum (Scottish Executive website). In England and Wales there are approximately 411 fish and shellfish farming business operating on 524 sites (DEFRA website).

The aquaculture sector in Northern Ireland is predominately based on shellfish: at present there are 103 licensed aquaculture sites, 66 of which are licensed for shellfish cultivation (64 marine and 2 land based sites) and 37 for the cultivation of finfish (35 inland and 2 marine). Main species cultivated are mussels and pacific oysters, with a small quantity of native oysters and clams also grown. Salmon, rainbow trout and brown trout are the main finfish species cultivated (DARDNI website). The aquaculture industry in 2006 produced nearly 10,000 tonnes of shellfish valued at £3 million and in excess of 600 tonnes of finfish valued at £1.5 million and employs some 145 full-time and 72 part-time people.

The UK industry as a whole directly employs 979 people (2005 figure) with an estimated 8,500 indirectly dependant on production from the industry.

A3h.14.1 Fish

The principal species cultivated are salmon and rainbow trout, with smaller numbers of other species such as Arctic char, brown trout, halibut, cod, sea trout, turbot and lemon sole also farmed.

From sites in Scotland, (principally located in Regional Sea 7, 8, and the northern sections of 1 and 6), overall salmon production decreased by 1.4% in 2007 (129,930 tonnes) compared to that in 2006 (131,847 tonnes) (FRS 2008a). Of the 2007 total, 69,000 tonnes was produced salmon, with the rest being made up of 0-year fish (40 tonnes), grilse (15,811 tonnes) and pre-salmon (45,079 tonnes). Rainbow trout production also decreased in 2007, by 78 tonnes: 2006 production was 1,047 tonnes and 2007 production was 1,388 tonnes. The 2007 total was made up of 6,569 tonnes produced for the table and 845 tonnes for re-stocking of angling waters. For other species, total production increased on the 2006 figure by 341 tonnes.

The main types of facility for salmon smolt production in fresh water are cages or tanks and raceways. In 2007, tank and raceway capacity increased by 24,000m³ and cage volume decreased by 38,000m³ resulting in a net decrease in volume of 14,000m³ available for the production of smolts in Scotland during 2007. Since 2006, there has been a decrease in the number of sites producing smolts.

The salmon farm industry can be an important employer in rural communities and farms can specialize in ova and smolt production and in 2007 the northwest, west and the western Isles of Scotland were the main ova and smolt producing areas and employed the greatest number of staff (Table A3h.29).

Table A3h.29 – Summary of salmon farming by production area

Region	Staff employed 2007		Ova laid down to hatch (000s)		Smolt production (000s)		Grilse	Pre-salmon	Salmon
	F/T	P/T	2006	2007	2006	2007	Tonnes	Tonnes	Tonnes
North west	110	43	32,020	38,981	21,825	20,155	6,674	13,212	13,615
Orkney	2	0	110	150	95	156	196	1,657	2,579
Shetland	9	6	140	1921	647	1294	2,663	17,838	20,294
West	43	5	14,623	18,227	10,043	9,448	4,309	7,069	19,975
Western Isles	39	6	15,384	12,917	6,629	6,023	1,969	5,303	12,537
East + South	14	2	1,774	3,107	1,588	1,049	-	-	-
All Scotland	217	62	64,051	75,303	40,827	38,125	15,811	45,079	69,000

Source: FRS (2008a)

The vast majority of fish are produced in seawater cages (129,916 tonnes) and a much smaller amount from seawater tanks (14 tonnes) (there are high installation and running costs associated with operating seawater tank systems). Eleven active seawater tank sites were registered in Scotland in 2007 and only one was actively producing salmon: with most seawater tank capacity now being re-deployed for the production of other species or salmon broodstock. In 2007, there were 38 companies registered for producing farmed salmon, of these, 10 remained active and registered but did not produce salmon for harvest. Overall production was dominated by 10 companies, which between them accounted for over 93% of the salmon production in Scotland.

There are no sites along the east or west coasts of England cultivating salmonids. Sea trout were cultivated in cages under one of the English China Clay ports Jetties in the Fowey Estuary (Regional Sea 4) (Robson 1996), however no up-to-date information is available on this.

Within Regional Sea 6 there were two land based units rearing turbot, lemon sole and sea bass on Anglesey and the Llyn Peninsula. On the Isle of Man, sea trout and salmon were reared at Cornaa and Laxey respectively, both government based fish hatcheries. Juvenile turbot were also reared in nurseries on the Isle of Man by Mannin Seafarms for export abroad. However, again, no recent information regarding these operations is available.

For many years, brown trout has also been farmed however there has been an increasing interest in the farming of marine species. As well as allowing bigger companies to expand their production base, the diversification that farming marine species provides, and the growth of established markets for these species enables smaller companies to remain within the aquaculture sector.

A3h.14.2 Shellfish

In 2007, shellfish production in Scotland was dominated by the common mussel (*Mytilus edulis*) and Pacific oyster (*Crassostrea gigas*), with smaller quantities of king scallop (*Pecten maximus*), queen scallop (*Aequipecten opercularis*), native oyster (*Ostrea edulis*), razor clams (*Ensis* spp.), surf clam (*Spisula solida*) and common cockle (*Cerastoderma edule*). These are also the species predominantly cultivated at sites in England, Wales and Northern Ireland.

The Food Standards Agency has classified shellfish production areas in England, Wales, Scotland and Northern Ireland. The areas described for England and Wales are designated from 1st September 2008 and the areas for Northern Ireland from August 2008. Areas for Scotland are for 2007-2008. Table A3h.30 summarises the shellfish production areas, approximate number of beds and species most commonly cultivated there according to the Local Authorities areas within Scotland.

Table A3h.30 – Summary of shellfish farming by production area

Local Authority Area	Number of production areas	Number of beds	Species cultivated ¹
Regional Sea 1			
City of Edinburgh	1	1	mussel
Fife Council	2	2	razors, surf clam
Ross + Cromarty	7	8	mussel, pacific oyster, king scallop
Shetland Islands Council	47	69	mussel, pacific oyster
Regional Sea 6			
Dumfries + Galloway	4	7	cockles, mussel, native oyster
North Ayrshire Council	4	4	razors, pacific oyster, mussel
South Ayrshire Council	1	1	razors
Regional Sea 7			
Argyll + Bute	50	70	mussel, pacific oyster, razors, queen scallop, common cockles, king scallop, otter shell
Lewis + Harris	16	21	mussel, cockles, pacific oyster

Local Authority Area	Number of production areas	Number of beds	Species cultivated ¹
Uist + Barra	3	4	mussel, cockles
Highland Council – Lochaber	18	19	mussel, pacific oyster, king scallop, native oyster
Skye + Lochalsh	15	16	mussel, pacific oyster, cockles, king scallop, queen scallop
Sutherland	9	21	mussel, pacific oyster, razors
Regional Sea 8			
Orkney Islands Council	3	3	mussel, pacific oyster, razor

Notes: ¹ species cultivated at majority of the beds listed first

Source: Food Standards Agency website

Regional Sea 7 has the greatest number of production areas and beds in Scotland, and this area also cultivates a diverse range of species.

Between 2006 and 2007, mussel production increased by 14%, following a general trend of increasing production from previous years. The greatest contribution in regional mussel production was from Shetland, accounting for 2,605 tonnes, while some 1,288 tonnes was produced in Strathclyde which, combined with that produced in Shetland, accounted for 81% of the total mussel production in Scotland. Over the same period, Pacific oyster production decreased by 17%. Ninety-three percent of Pacific oyster was produced in the Strathclyde region (FRS 2008b).

In 2007, the total value at first sale for the main shellfish species cultivated in Scotland was estimated to be over £5 million (FRS 2008b).

For England and Wales, production areas are scattered throughout Regional Seas 1, 2, 3, 4 and 6. Only one production area at Holy Island is present in Regional Sea 1. Regional Sea 4 contains the most production areas (22), with over 113 beds. The production areas at Exe (11 beds) and Fal (18 beds) have the majority of beds in this region. Principal species cultivated within Regional Sea 4 include mussel and Pacific oyster, with smaller numbers of native oyster also grown.

From the Food Standards Agency classification of areas for England and Wales, some 16 production areas with over 70 beds are found in Regional Sea 6, with mussel being the most common species cultivated. Morecambe Bay and Lune are the most important production areas in the region, each supporting 9 beds. Northern Ireland also has a healthy shellfish industry and beds are located at Belfast Lough (15 beds), Carlingford Lough (6), Dundrum Bay (3), Killough (2), Larne Lough (7), Lough Foyle (2) and Strangford Lough (5). Principal species cultivated at these sites are mussels, oysters, scallops and cockles.

Only 13 production areas are located in Regional Seas 2 and 3, though they support 90 and 89 beds respectively, making them regionally very important. In terms of number of beds, the Wash (17) and Thames Estuary (12) are the most important areas within Regional Sea 2, and the North Kent Coast (24) and the Solent (35) the most important within Regional Sea 3 (Food Standards Agency website).

Within the FSA classification, there are also beds for the cultivation of other species including Manila clam (*Tapes philippinarum*) (North Kent Coast, Exe), hard clam (*Mercenaria mercenaria*) (Colne, Roach, Langstone Harbour, Southampton Water and Solent) and surf clam (*Spisula solida*) (Start Bay) (Food Standards Agency website).

A3h.15 SEAWEED HARVESTING ETC

In recent years the seaweed industry in Scotland has virtually collapsed. Despite this, seaweed remains an abundant plant resource in Scotland and has the potential to provide small scale employment in coastal areas through the establishment of small or medium size enterprises producing fertilisers, animal feeds, seaweed-based foods, medicines and cosmetic products (Scottish Executive Central Research Unit 2001).

Small scale seaweed harvesting is found in Orkney, and the Orkney Seaweed Company utilises locally harvested seaweed for a range of products.

There are currently a small number of local companies operating in Northern Ireland which harvest living seaweed and driftwood for a variety of uses, including food, cosmetics, horticulture and seaweed baths. Table A3h.31 summarises the seaweed species currently commercially harvested in Northern Ireland.

Table A3h.31 – Seaweed species commercially harvested in Northern Ireland

Phylum	Species harvested in Northern Ireland
Green algae	<i>Ulva</i> spp.
Brown algae	<i>Fucus serratus</i> , <i>F. vesiculosus</i> , <i>Ascophyllum nodosum</i> , <i>Himanthalia elongata</i> , <i>Laminaria digitata</i> , <i>L. hyperborea</i> , <i>L. saccharina</i> , <i>Alaria esculenta</i>
Red algae	<i>Mastocarpus stellatus</i> , <i>Chondrus crispus</i> , <i>Palmaria palmata</i> , <i>Porphyra</i> spp., <i>Corallina officinalis</i>

Source: Environment & Heritage Service (2007)

There is limited information on the total tonnage harvested in Northern Ireland, but current production is thought to be sustainable (Environment & Heritage Service 2007).