

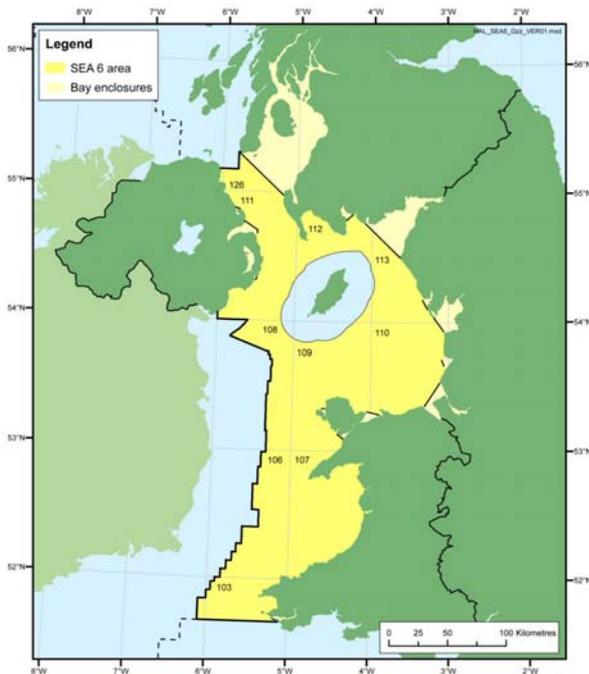
## NON-TECHNICAL SUMMARY

### Background

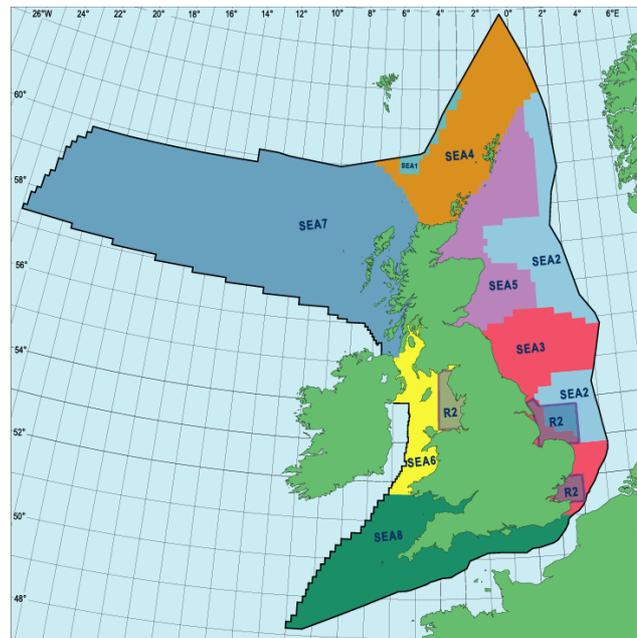
The main focus of this Strategic Environmental Assessment (SEA 6) is the consideration of the UK Department of Trade and Industry's (DTI) draft plan for a 24<sup>th</sup> offshore oil and gas licensing round to offer blocks for oil and gas licensing in parts of the Irish Sea (the SEA 6 area is highlighted in the figure below left). In addition, as part of SEA 6, an assessment is made of the implications of the proposed re-offer during the same licensing round, of currently unlicensed blocks in the areas covered by earlier offshore oil and gas SEAs.

This SEA considers the environmental implications of this proposed draft plan and the potential exploration, development and production activities which could result from its implementation. Although the DTI SEA programme covers offshore energy (oil & gas and renewables), there is currently only a draft plan for an oil and gas licensing round proposed for the SEA 6 area.

*The SEA 6 area*



*DTI SEA Sequence*



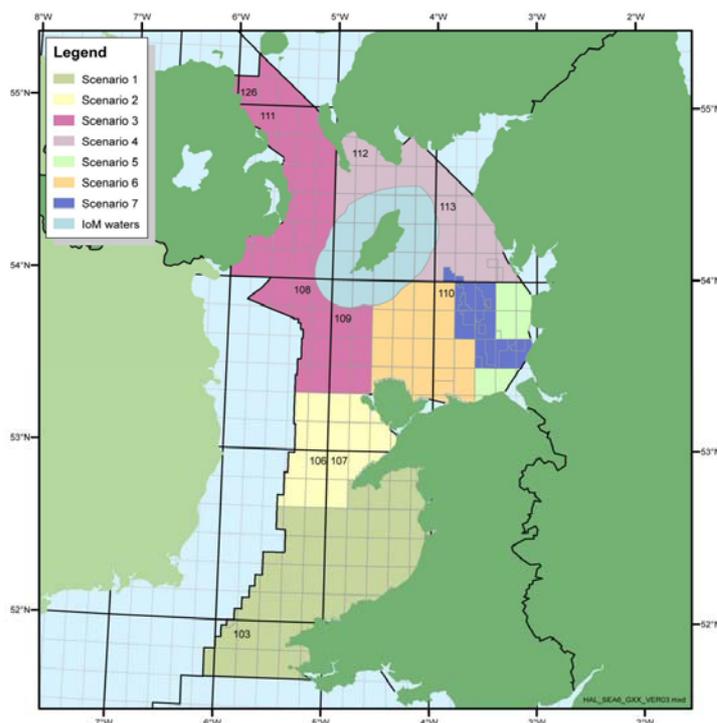
In 1999, the DTI began a sequence of sectoral SEAs considering the implications of further licensing of the United Kingdom Continental Shelf (UKCS) for oil and gas exploration and production. To date five offshore oil and gas licensing SEAs have been completed (see figure above right). SEA 1, in preparation for the 19<sup>th</sup> Seaward Licensing Round in 2001, addressed the deep water area along the boundary between UK and Faroese waters. SEA 2 covered the central spine of the North Sea with the majority of existing UK oil and gas fields and following an assessment, a minor extension was made to the SEA 2 area. SEA 3 assessed the remaining parts of the southern North Sea. SEA 4 addressed the UKCS area to the north and west of Orkney and Shetland, and SEA 5 covered the areas to the east of the Scottish coast. During 2003, in preparation for a second round of offshore wind leasing, the DTI also conducted an SEA covering three strategic regions off the coasts of England and Wales.

For oil and gas licensing purposes the UKCS is divided into quadrants of 1° of latitude by 1° of longitude with each quadrant further partitioned into 30 blocks, each of about 250km<sup>2</sup>. Blocks within the SEA 6 area were first offered for licensing in 1965. The area comprises some 180 blocks, including some currently wholly under licence, those partly licensed and partly relinquished, those that have been licensed but are now wholly relinquished, and those which have not previously been licensed.

SEA 6 will address all the blocks within the SEA 6 area in terms of the implications of licensing for oil and gas exploration and development. To allow full consideration of these implications, SEA 6 addresses the area up to the shoreline including areas within bay enclosure lines (marked on figure above), although these areas are licensed under a different regime and would not form part of the offshore licensing round proposed in the draft plan.

The alternatives to the proposed licensing are not to offer any blocks, to license a restricted area, or stagger the timing of activity in the area. Depending on the outcome of the SEA process and other Government considerations, all or a proportion of the unlicensed blocks within the SEA 6 area may be offered for licensing in the 24<sup>th</sup> round.

### DTI Scenario areas



In order to conduct the SEA, possible development and activity scenarios have been prepared for consultation purposes by the DTI. Based on the geology and results of past exploration, the SEA 6 area has been divided into 7 Scenario areas. Commercial quantities of oil and gas are currently produced only from area 7 (Mature Irish Sea). In general, low levels of activity are predicted as a result of SEA 6 licensing and with only three firms wells anticipated. In addition, for assessment purposes, we have assumed one well and up to 500km<sup>2</sup> of seismic survey for each scenario area. The actual scale of activity is dependent on a variety of factors and in particular, oil/gas prices and tax regime.

A requirement under the SEA Directive is consultation with the public, environmental authorities and other bodies, together with such neighbouring states as may be potentially affected. Stakeholder input has been used within the SEA 6 process from an early stage through scoping. To underpin and augment the environmental information base, the DTI commissioned geological and biological surveys of targeted areas of the seabed, seal tracking research, together with a number of desk-top studies covering a range of topics identified as gaps in available data and/or understanding. An expert assessment workshop involving the authors of these reports, the SEA Steering Group and key stakeholder representatives identified which oil and gas industry activities might potentially result in significant effects. A stakeholder workshop was held in Manchester on 23<sup>rd</sup> August 2005. A wide variety of potential stakeholders, drawn from UK and other regulators, government

advisers, local authorities, other industry representatives, academics and non-governmental organisations were invited to the session.

To facilitate consultation, this Environmental Report is available in a number of different formats and media. For details see the SEA website (<http://www.offshore-sea.org.uk>). The formal public consultation phase extends for ninety days from the date of publication.

## Overview of the SEA 6 Environment

This section provides an overview of the SEA 6 environment, summarising the main physical and biological features of the area, as well as existing human activities and coastal sensitivities. A number of these features, of particular relevance to this SEA, are described later in greater detail.

These are:

- Fish and shellfish
- Seabirds and coastal waterbirds
- Marine mammals
- Potential offshore conservation sites
- Existing human activities
- Coastal sensitivities

## Geology and seabed sediments

A range of seabed sediments are present, including large areas of mud to the east and west of the Isle of Man where currents are weak; coarser sand and gravel in areas of stronger tidal and wave-driven currents, and rock and boulders in the most exposed areas. Large sandwaves and sandbanks are also present. Seabed surveys carried out as part of SEA 6 identified and described a number of seabed features of potential geomorphological and ecological conservation interest, including extensive reef areas.

## Climate and meteorology

The SEA 6 area has a mild maritime climate, but with periods of strong winds and rough seas. Gales are most frequent in winter months and the prevailing wind direction is from between south and north-west, especially in winter.

## Tides and currents

The region consists of a deeper channel in the west, with shallower embayments in the east. The deep channel is open-ended, connected at both ends to the Atlantic Ocean, in the south via St. George's Channel and in the north, via the North Channel. The extent of Atlantic inflow to the region varies with changes to large scale circulation patterns in the north-east Atlantic and weather, particularly the strength and direction of the prevailing winds. Freshwater run-off from coastal areas is important in determining the salinity of water masses particularly in coastal areas.

Throughout much of the region tidal mixing is sufficiently intense to ensure that the water column remains well mixed throughout the year. However, there are regions where temperature and/or salinity differences between water masses result in stratification. Frontal areas between these mixed and stratified regions are often areas of enhanced biological production attracting fish, seabirds and marine mammals.

## Existing contamination

River run-off and inputs from industrialised areas of the coast are responsible for the majority of contaminants in the SEA 6 area, with estuarine and coastal sites, such as the Mersey and Ribble estuaries, containing elevated concentrations of contaminants. In general, contaminant inputs have declined and elevated concentrations are often a legacy of former industrial discharges. Radionuclide discharges from Sellafield are much reduced with historically contaminated sediments the main source of radioactive contamination.

## Plankton

The plant plankton (phytoplankton) community present in the region varies in relation to water temperature, salinity and nutrient inputs. Throughout the 1980s and '90s, a trend of increasing phytoplankton abundance in both the Irish Sea and other UK waters has been linked to changes in sea surface temperature. This trend appears to have halted in recent years. Copepods (which are small crustaceans) are the dominant animal plankton (zooplankton) species.

## Seabed animals

Seabed sediment type and exposure to currents and waves are important in determining the benthic communities present. Coastal benthic communities are diverse with sheltered areas such as estuaries supporting an abundance of benthic organisms. Exposed areas such as those to the north of Anglesey are characterised by bedrock and boulders with diverse communities of encrusting animals in areas of reduced sand scour. Offshore areas are relatively well studied, although information on benthic communities is often of a broadscale nature. Benthic communities of potential conservation importance include reef systems associated with the horse mussel (*Modiolus modiolus*), the bivalve mollusc (*Limaria hians*), or the polychaete worm (*Sabellaria spinulosa*).

## Squids

A range of cephalopod (Squids and octopuses) species are found in the area with the squid *Loligo forbesii* the most frequently recorded, although in smaller numbers than from other parts of the UKCS (e.g. to the north and west of Scotland). Cephalopods play an important part in marine food webs, and are prey to whales, dolphins, seals, birds, some large fish species and other cephalopods.

## Marine reptiles

The SEA 6 area may be important seasonally for leatherback turtles which visit the region over the summer. Research is currently underway to better understand the distribution and abundance of leatherbacks and their jellyfish prey within the Irish Sea and adjacent areas.

## Fish and shellfish

The SEA 6 area supports a range of fish and shellfish species with more than 100 finfish species recorded during CEFAS surveys between 1993 and 2001. Sandy inshore areas support large numbers of juvenile flatfish and sand eels, with seasonal populations of sprat, herring and juvenile fish of the cod family. Rockier areas have fish assemblages dominated by wrasse, gobies and blennies, as well as juvenile pollock and saithe. Schooling pelagic fish such as mackerel and herring also range widely within the region. Muddy areas, particularly to the east and west of the Isle of Man, support important *Nephrops* (Dublin Bay prawns/scampi) fishing grounds with scallop and queen scallop found on gravelly substrates.

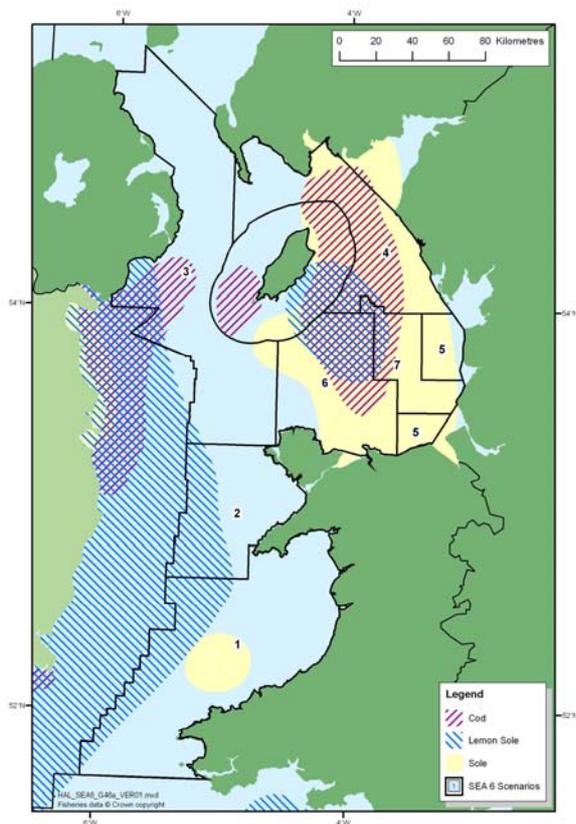
Five commercially exploited demersal fish species have spawning grounds within the SEA 6 area - cod (spawning period January-April), sole (March-May), lemon sole (April-September), whiting (February-June) and plaice (December-March) – see the figures below.

In general, the juvenile stages of many commercial fish species remain within coastal nursery areas for a year or two before moving offshore.

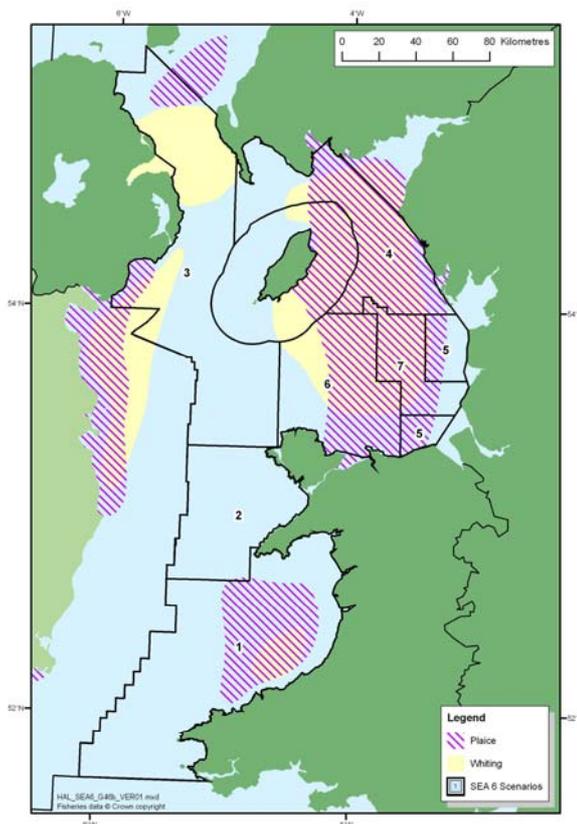
There are a number of important salmon and sea trout rivers along the Irish Sea coast, including the Rivers Lune, Teifi, Eden, Ribble, Derwent and Dee. Salmon are among a number of fish species including allis and twaite shads and basking shark that are protected at a national and international level.

### Spawning grounds in SEA 6

#### Cod, sole and lemon sole



#### Whiting and plaice

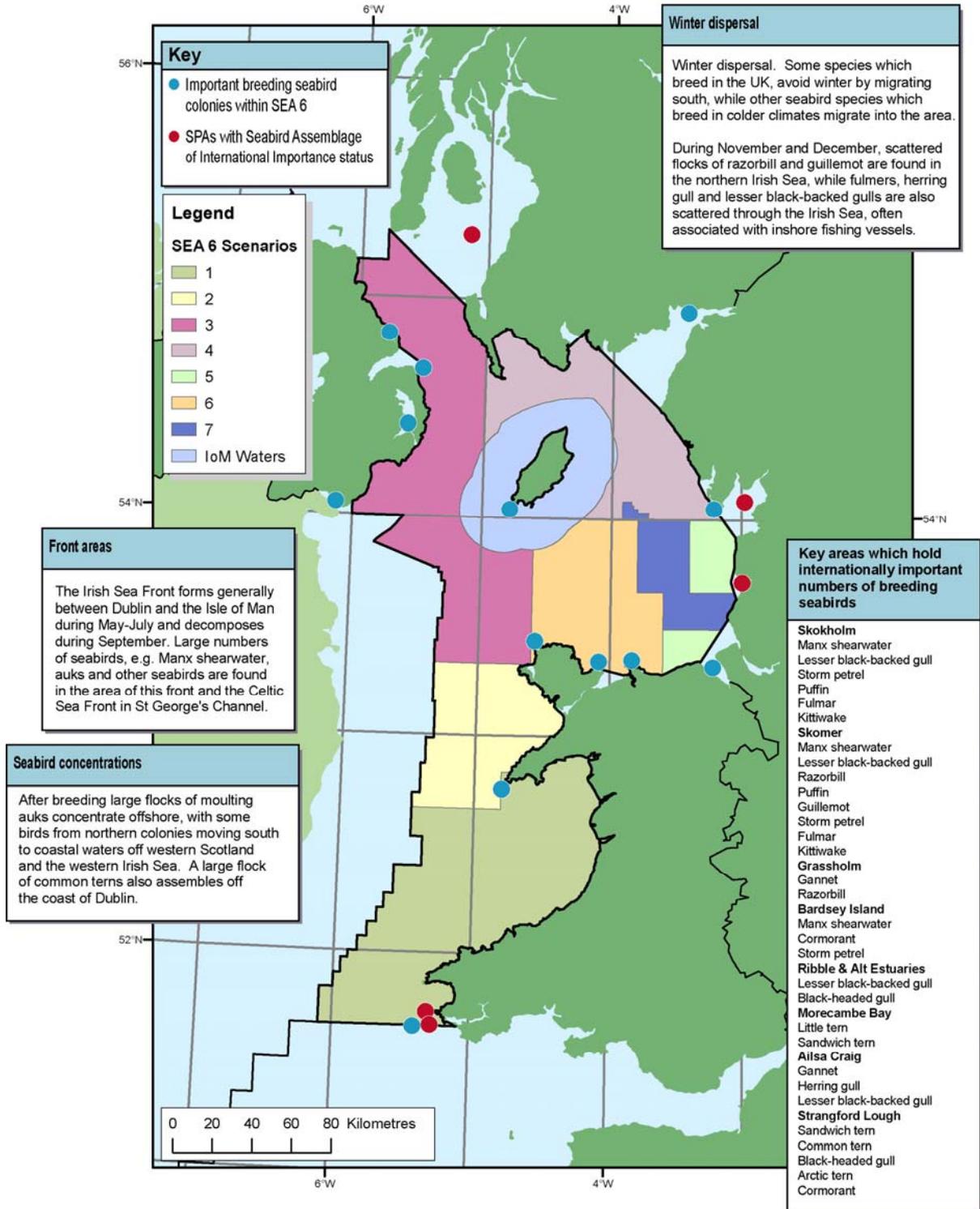


### Seabirds and coastal waterbirds

The SEA 6 area provides important breeding and over-wintering areas for a wide variety of seabirds and coastal waterbirds. During spring and summer months, almost half a million pairs of seabirds including Manx shearwater, gannet, lesser black-backed gull and guillemot breed at locations (primarily on cliffs and islands) throughout the region. Coastal and offshore waters are important for feeding and overwintering seabirds. The estuaries of the region hold internationally important numbers of breeding, wintering and migratory waterbirds, with shallow offshore waters of Liverpool and Cardigan Bays supporting large numbers of wintering common scoter and red-throated diver.

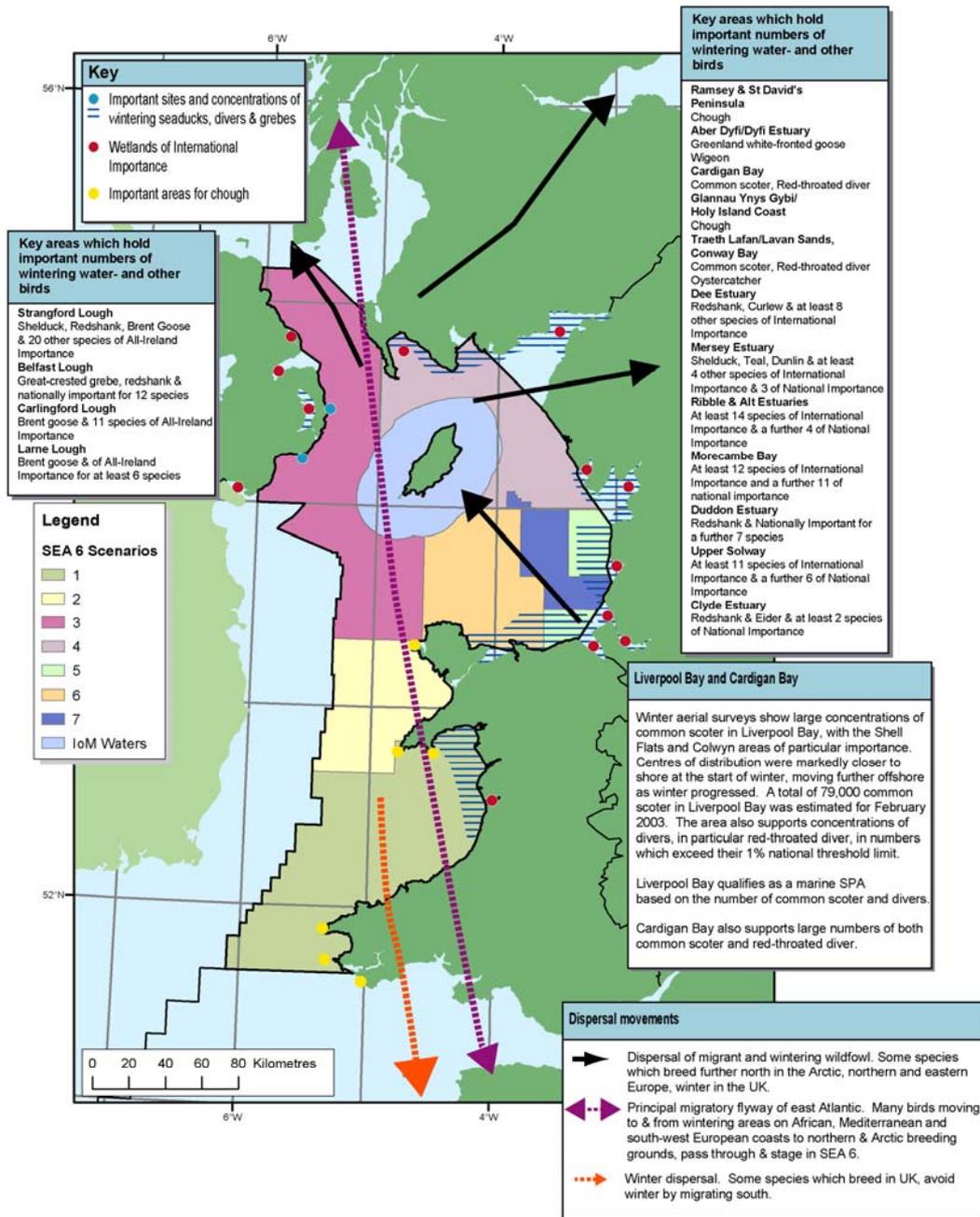
General seabird distribution and seasonal movements within and through the SEA 6 area are summarised below.

*General seabird distribution in SEA 6*



Similarly, the distribution patterns and movements of wintering and migratory waterbirds in the SEA 6 area are summarised below.

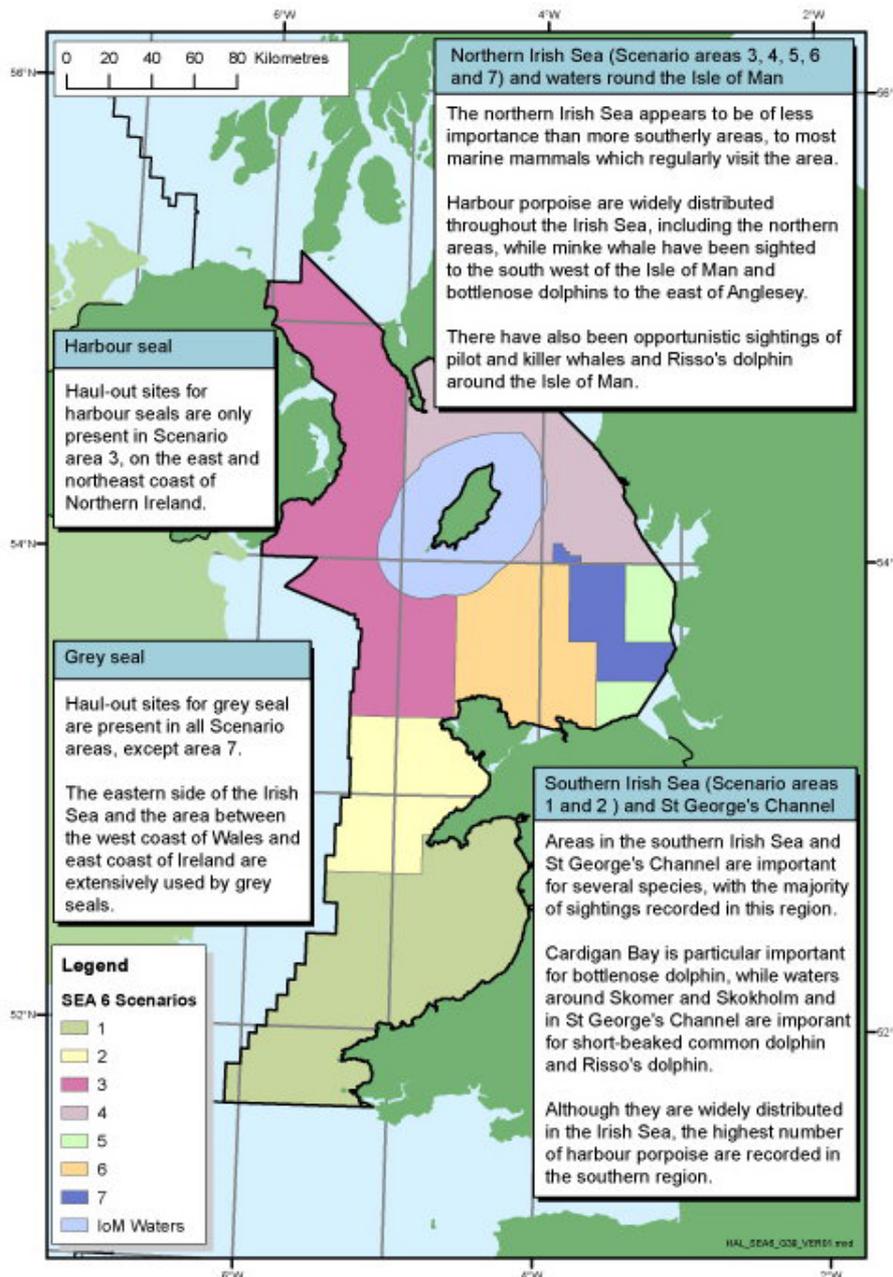
General distribution and movements of waterbirds



Marine mammals

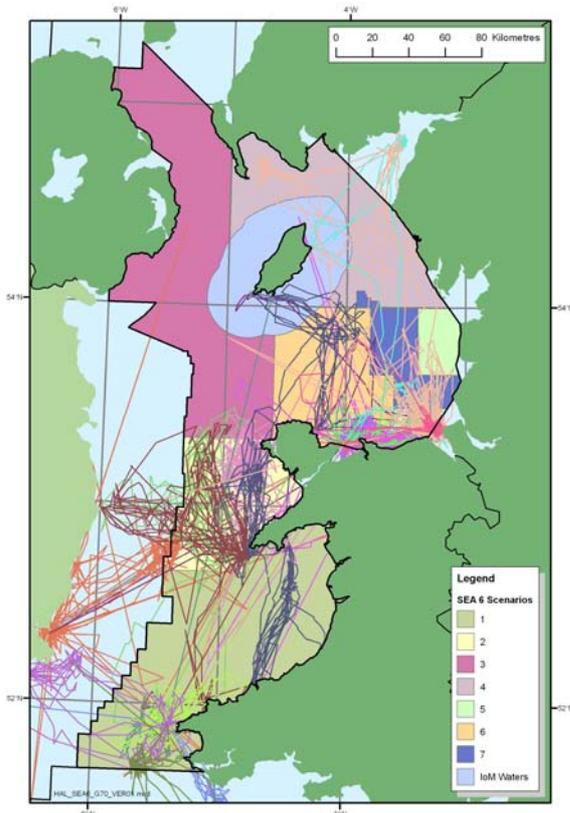
Marine mammals are important predators within the SEA 6 area and their general distribution and abundance is highlighted below.

Important areas for marine mammals



Harbour porpoise and bottlenose dolphin are present within the region throughout the year while others are more commonly seen in summer months (e.g. minke whale, Risso's dolphin and short-beaked common dolphin). In general, southern areas of the Irish Sea are more important for marine mammal species with coastal waters of Cardigan Bay supporting a protected bottlenose dolphin population of about 220 individuals and harbour porpoise also numerous along the Welsh coast.

### Tracks of satellite tagged grey seals



A relatively small population of grey seals (5,000-7,000 animals) utilise all but the north-west Irish Sea with satellite tracking highlighting potentially important areas for grey seals (see figure). There are few harbour seals around the Irish Sea (3,500-4,000) except along the coast of Northern Ireland and in the Firth of Clyde. Information on their foraging activity is more limited, although it is unlikely that they use southern parts of the Irish Sea and St. George's Channel.

### Offshore conservation sites

There are a number of existing marine Special Areas of Conservation (SACs - sites designated under the European Habitats & Species Directive) in the SEA 6 area, some of which extend beyond the territorial water limit, for example, the Pembrokeshire Marine SAC, the Cardigan Bay SAC and the Lleyn Peninsula and Sarnau SAC. There are a number of initiatives underway which may lead in the future to the marine extension of other coastal sites (particularly for birds) and the designation of offshore sites outside territorial waters. Relevant potential sites offshore include mounds in the north-west Irish Sea, an area of bedrock and stony ground lying at the southern end of the North Channel, King William Bank, a sandbank to the north-east of the Isle of Man, shallow sandbanks in Liverpool Bay, as well as a number of pockmark and reef habitats.

The JNCC Irish Sea Pilot was undertaken to help develop a strategy for marine nature conservation that could be applied to all UK waters and, with international collaboration, the adjacent waters of the north-east Atlantic. The UK Government is also working with OSPAR to identify the first set of Marine Protected Areas by 2006 which, together with sites designated under the European Habitats & Species and Birds Directives, will form an ecologically coherent network of protected areas.

### Human activities

The SEA 6 area supports a range of different industries and activities, with the coastal region a mixture of sparsely populated rural areas and centres of population such as Blackpool, Liverpool and Belfast. Tourism and leisure is one of the major industries in the SEA 6 area

drawing on the scenic value and quality of the natural environment. There are numerous designated bathing beaches and marinas with extensive yachting routes throughout coastal and offshore areas.

Oil and gas activity within SEA 6 has been chiefly centered on fields in Liverpool and Morecambe Bays. A number of pipelines connect these fields with onshore terminals and several gas interconnector pipelines link mainland Britain to Ireland.

Fishing remains an important industry in the region in terms of employment and the local economy. Important demersal fish landed include flatfish (e.g. plaice and sole), cod, whiting, skates and rays. The principal source of fishing effort derives from otter trawling, which predominantly targets *Nephrops*, with bycatches of cod, whiting and plaice. Most trawling activity is to the east and west of the Isle of Man and in the southern Irish Sea off the coast of south-west Wales, with a lesser amount of activity recorded in Cardigan Bay. Shellfish landings, particularly of *Nephrops* and scallops are of great importance. Other fishing effort includes beam trawling, scallop dredging and potting for lobster and crabs. The majority of vessels operating in the area are from Great Britain, Ireland, France and Belgium.

There are several important ports in the SEA 6 area notably Belfast, Liverpool and Milford Haven. Coastal areas of south Pembrokeshire, west Anglesey, Galloway and Northern Ireland, as well as offshore areas of SEA 6 experience moderate to high shipping densities (5,000-20,000 vessels per annum), primarily associated with the ferry traffic and the movement of cargo vessels to and from various ports.

Other important activities in the SEA 6 area include mariculture, military activities, telecommunication cabling, aggregate extraction and marine disposal. Currently, there are various initiatives, including the Defra Marine Spatial Planning Pilot, which are exploring options for strategic planning in the marine environment.

## Coastal sensitivities

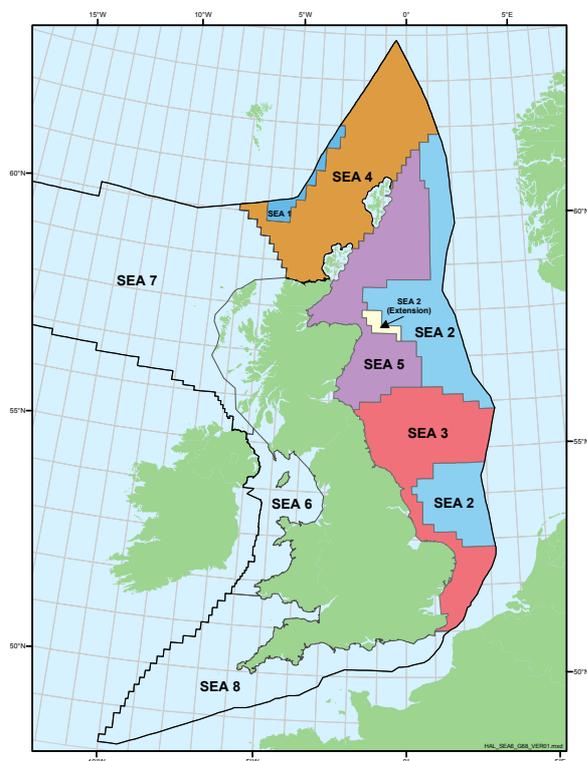
The SEA 6 area contains a wide variety of coastal habitats of conservation interest, including cliffs, rocky shores, sand beaches, sand dunes, mud flats, saltmarsh, lagoons and estuaries. Sub-tidal habitats include sand banks, rocky reefs, horse mussel beds, eelgrass beds and habitats associated with leaking gas. Some of these habitats are rare in a national and/or international context, and many support important numbers of breeding seabirds, wintering waders and wildfowl and marine mammals. Many of these habitats and species are protected by international and national conservation designations.

Coastal areas of SEA 6 contain important archaeological remains dating back to prehistoric times, although the possibility of such sites in offshore areas is very low. A large number of coastal archaeological sites have been identified and some are protected, although evidence also suggests that a large number of sites have yet to be discovered. A large number of maritime and wreck sites have been identified within both coastal and offshore areas, some of which have been protected.

## Re-offer of blocks in areas previously subject to SEA

Since the 21<sup>st</sup> licensing round, in addition to the blocks covered by the respective SEA, the DTI have offered for licensing unlicensed blocks in areas previously subject to SEA. These unlicensed blocks include those blocks for which licences were not applied for in previous rounds and those which had been recently relinquished. The 24<sup>th</sup> licensing round could include unlicensed blocks in the SEA areas 1 to 5 shown in the figure below.

## Previous SEA areas



Blocks within SEA 1 lie in deep water to the north and west of Scotland. The area is dominated by the deep Faroe-Shetland and Faroe Bank Channels and the Wyville Thomson Ridge which rises to within 400m of the water surface. These large scale features influence the water masses and movements as well as the ecological character of the area. The SEA 1 area is of importance for deep water marine mammals and also contains the Darwin Mounds which have been proposed as the UK's first offshore Special Area of Conservation.

The SEA 2 area contains the majority of the UK's oil and gas producing fields. Significant features of the area include the Dogger Bank in the south and the Fladen/Witch Ground in the central/northern North Sea. The inflow of Atlantic water from the north influences strongly the ecology of the area (particularly plankton, cephalopod and fish communities). A range of marine mammals are present and coastal areas support breeding seabirds and

seals which utilise offshore areas throughout the year. A number of habitats of conservation interest including sandbanks (e.g. the Dogger Bank) and pockmarks are also present. Fishing and shipping are important industries in the area.

SEA 3 covered much of the central and southern North Sea. Coastal sensitivities include numerous conservation sites supporting important numbers of seabirds, waterbirds and seals, and areas of significant industrial activity and development (large port facilities, commercial aggregate deposits, aquaculture sites and areas licensed for offshore wind farm development). Large sandbanks of potential conservation interest are present in both coastal and offshore areas. Oil and gas activity is limited to a few producing gas fields with fishing and shipping important in both coastal and offshore waters.

The SEA 4 area covered the continental shelf and deep water to the north and west of Orkney and Shetland. Shelf waters are relatively warm, of high energy and ecologically productive in contrast to the cold, deep waters of the Faroe-Shetland and Faroe Bank Channels. Coastal and offshore areas support important marine mammal populations and areas of reef habitat of potential conservation interest. Coastal habitats are of high conservation value, associated particularly with breeding seabird and seal colonies. Other sensitivities and users include a significant coastal archaeological resource; eco-tourism interests; fishing and aquaculture operations, and tanker traffic from the Sullom Voe and Flotta terminals. There are currently three oil producing fields in the area, Foinaven, Schiehallion and Clair, and a number of discoveries have yet to be developed.

SEA 5 considered the areas to the east of Scotland not covered by earlier SEAs. As with other SEA areas, there are extensive coastal conservation interests including internationally important seabird breeding colonies, and regionally important marine mammal populations. The area has commercially important fishing grounds, a number of producing oilfields and is

the supply centre for the central and northern North Sea industry. Interest in the potential hydrocarbon prospectivity of the Moray Firth has increased in recent years

## Review of previous SEAs

The environmental information used for previous SEAs was reviewed in the light of new data and it was concluded that whilst adding to the information base, the new information did not markedly change the perspectives originally provided. Similarly, new information on the effects of oil and gas activities did not show any new significant or unanticipated sources of significant effect that would alter the conclusions of the earlier SEAs.

A range of offshore areas have been proposed as potential conservation sites, including a number in previous SEA areas. It is concluded that these areas can be considered for licensing (but potentially with spatial or temporal controls) since existing activity consenting mechanisms are judged effective at ensuring adequate protection.

Comparison of the levels of exploration, appraisal and development activity predicted in previous SEAs with work programmes committed to and actual activity to date indicates that original predictions have not yet been exceeded, although activity levels have increased markedly in recent months, in part due to high oil prices. The summaries of hydrocarbon prospectivity provided in SEAs 1 to 5 also remain valid. However, it seems likely that the rate of applications for reoffered blocks will decline over time as prospective areas are licensed.

## Consideration of potential effects of 24<sup>th</sup> Round licensing

An assessment of the possible implications of oil and gas activity in SEA 6 and areas previously subject to SEA was conducted and the findings are discussed in detail in Sections 9 and 10 of the Environmental Report. While all sources of emissions, discharges and disturbance could potentially contribute to local, regional and global effects, the following were identified as key issues requiring further consideration in the SEA.

### Noise

Potential effects of underwater noise are associated principally with seismic reflection surveys, which use low frequency, high intensity airgun sources to map subsurface geological structures. The key receptors are marine mammals, due to their sensitive hearing and use of acoustic communication and echo-location, and fish.

Marine mammal populations, which dominate noise sensitivity in offshore habitats north and west of Britain, have fewer species and lower abundance in the SEA 6 area with relatively well-understood “hotspots” of distribution. The areas of SEA 6 with most marine mammal sensitivity (St. George’s Channel and Cardigan Bay; scenario areas 1 and 2) do not coincide with the areas of greatest anticipated seismic activity, and are at sufficient distance (>100km) that most of the predicted surveys will have no effect.

The balance of evidence suggests that effects of seismic activities are limited to behavioural disturbance of species with the numbers of individuals likely to be influenced representing a small proportion of regional populations. Existing control and mitigation methods are generally effective in preventing physical damage. There is limited seasonality to overall sensitivity of marine mammals in offshore areas, although there are increased sensitivities associated with the summer distribution of short-beaked common and Risso’s dolphin in the St. George’s Channel area.

## Physical damage to seabed habitats and archaeological features

Activities which may result in damage to seabed habitats and communities include anchoring during rig positioning, the installation of platforms, subsea wellheads and other infrastructure, such as pipelines. Herring spawning areas are potentially sensitive features of considerable ecological and commercial importance, but these are uncommon in the SEA 6 area and primarily located in Manx waters which are not covered by the DTI's draft plan. Archaeological remains, including prehistoric sites as yet undiscovered, are also considered to be sensitive. Physical disturbance resulting from proposed SEA 6 activities will be small in scale and duration, in comparison to natural disturbance and the effects of demersal fishing, and will be mitigated to acceptable levels by existing controls.

The broad distribution of features of conservation importance is relatively well mapped, including work undertaken to support the SEA; and sufficient information is available to assess the probability of sensitive habitats in proximity of proposed activities. In the ecological and archaeological context, detailed site surveys (which are routinely acquired prior to drilling or development operations) would typically be evaluated to identify environmental and cultural sensitivities.

## Physical presence

Exclusion of fishing from large areas of sea by the presence of rigs or installations could result in effects on commercial fishing, as could the presence of snagging hazards associated with pipelines or subsea wellheads. However, the scale of such effects based on the predicted number of wells in the SEA 6 area is not likely to have significant economic effect. The established oil industry and UK fishing industry consultation, liaison and compensation mechanisms, should serve to mitigate any conflicts.

In light of the Defra marine spatial planning pilot study being carried out in the Liverpool Bay area, the potential interactions of activities that could follow a 24<sup>th</sup> Round were considered by the SEA. There is the potential for overlap in the areas of interest for hydrocarbon and windfarm (and other renewable energy) developments. However, since the regulator for both industries is the DTI, such potential conflicts can be expected to be resolved at the licensing/leasing and project approvals stages. In advance of any potential future marine spatial plan, there are already a number of areas (such as shipping traffic separation schemes and air exclusion zones) where other potential activities may be curtailed in the interests of navigation safety. Such areas are already considered by the DTI in consultation with other government departments/agencies during the licensing process. As a result, certain blocks (or parts of blocks) in the SEA 6 area may be excluded from licensing or have stringent activity restrictions placed on them.

The potential for visual intrusion was raised in scoping feedback. Development of known small "stranded" reservoirs and potential new discoveries could extend the production life of some nearshore facilities, although new developments are likely to be as subsea tiebacks to existing platforms (and hence have no above surface structures). In the event of new field developments, there would be temporary vessel presence during construction and maintenance but given the scale of existing commercial and recreational vessel traffic in the area, this is not viewed as significant additional visual intrusion.

Large numbers of seaduck and in particular common scoter occur in the shallow waters of Liverpool Bay and these appear to be susceptible to disturbance e.g. dispersal of feeding or roosting flocks by surface vessel passage in proximity or aircraft low overflight. If substantial, such disturbance could become locally significant and require mitigation, for example through tightly defined vessel traffic routes or timings. Parts of inner Liverpool Bay

are being considered as a potential offshore Special Protection Area (for birds) and if so designated, Appropriate Assessments would be required for permitting of existing and new hydrocarbon developments and associated activities in the area.

## Discharges

Marine discharges from exploration and production activities include produced water (water produced from the reservoir along with the oil and gas), sewage, cooling water, drainage, drilling wastes and surplus drilling fluids (water-based), which in turn may contain a range of hydrocarbons in dissolved and suspended droplet form, various production and utility chemicals, and metals (including Low Specific Activity (LSA) radionuclides). In addition to these mainly platform-derived discharges, a range of discharges are associated with operation of subsea infrastructure (hydraulic fluids), pipeline testing and commissioning (treated seawater), and support vessels (sewage, cooling and drainage waters). The effects of the majority of these are judged to be negligible and are not considered further by the SEA.

Discharges from offshore oil and gas facilities have been subject to increasingly stringent regulatory controls over recent decades, and oil concentrations in the major streams (drilling wastes and produced water) have been substantially reduced.

The environmental effects of the major discharges from oil and gas activities have been extensively studied, and are considered to be relatively well understood. Discharge of produced water will be limited primarily by a presumption against discharges from new developments in favour of subsurface reinjection; with effects of residual discharges reduced by treatment and dispersion. Discharges of organic phase drilling fluids and contaminated cuttings are effectively prohibited (having been replaced by reinjection and onshore disposal, or by use of water-based muds). Discharged water-based mud and cuttings in the Irish and North Seas and other dispersive environments have been shown to have minimal ecological effects.

Some benthic habitats and species within the SEA 6 area are both of conservation interest, and likely to be sensitive to the effects of particulate discharges. These include biogenic “reef” communities dominated by *Modiolus*, *Sabellaria* (and possibly *Limaria*). Existing regulatory mechanisms provide a high degree of protection to *Modiolus* and other sensitive species and habitats where these are known to occur (regardless of whether statutory conservation designations have been applied).

The introduction of non-native species through vessel ballast water discharges can have a number of negative effects including algal blooms and ecological impacts through predation, resource competition or habitat exclusion of native species. The introduction of non-native species from fouling growths on vessels and rigs has received less attention than those from ballast water but are also potentially ecologically and economically significant (e.g. the introduction of the zebra mussel to the North American Great Lakes). Shipping is the most important source of introductions from fouling growths, with mitigation dependant mainly on the use of antifouling coatings and hull cleaning. In the case of potential activities resulting from a 24<sup>th</sup> licensing round, the vast majority of rigs and vessels likely to be used will already be operating in NW Europe and hence not a potential source of exotic species introductions (although they could facilitate the spread of species).

## Atmospheric emissions

Atmospheric emissions from the potential activities following implementation of the DTI’s draft plan will contribute to local, regional and global concentrations of CO<sub>2</sub> and other gases.

There are growing concerns about the effects of fossil fuel combustion in terms of climate change and ocean acidification. However, the projected contributions if the draft plan were implemented would be extremely small, with local effects adequately controlled by existing mechanisms. This is not to downplay the potential importance of climate change effects, rather a recognition that any appreciable difference to the global situation can only come from supranational action and be linked to energy demand reduction and/or carbon neutral energy production. In the near term, UK energy demand not met from indigenous sources will be supplied by imported fossil fuels – with little distinction in terms of resultant atmospheric emissions.

### Wastes to shore

Oil-based muds may be needed to drill through some of the rock types found in the SEA 6 area. Rock cuttings contaminated with oil-based mud are no longer discharged to sea and are either reinjected into underground rock formations or shipped to land for treatment and onshore disposal. The environmental management of treatment and disposal of such cuttings, both onshore and offshore, is strictly controlled.

### Accidental events

Oil spills are probably the issue of greatest public concern in relation to the offshore oil industry. The risks of large oil spills resulting from exploration and production are potentially associated with major incidents on production platforms, export pipelines and tankers, with an additional potential for loss of well control and subsequent oil blowout. The historical frequency of such events in the UK and Norwegian continental shelves has been very low. Most large oil spills are associated with tanker-based transport of crude oil and refined products. Within the SEA 6 area, the *Sea Empress* spill (1996) resulted in significant bird kill and effects on benthic organisms; although without apparent major long-term effects.

Specific SEA 6 issues include the proximity of sensitive coastlines, with numerous breeding bird colonies of international importance, the presence of significant concentrations of wintering seabirds and coastal waterbirds, the importance of coastal tourism and recreation and fisheries generally within the area. Impact on the tourism and amenity “appeal” of coastal areas in the event of a major oil spill would be influenced primarily by the extent, duration and tone of media reporting, and by public perception of the severity of the event. These factors cannot be reliably predicted. Although the *Sea Empress* spill was more severe than any conceivable incident associated with the proposed SEA 6 activities, the economic impact on tourism was relatively minor.

Chemicals used in the offshore oil and gas industry are generally in low risk categories, and the effects of spillages are generally of lower severity to oil spill. Potential safety issues of gas releases include explosion and (for subsea releases) loss of buoyancy for vessels and floating installations. Odour associated with gas releases has been an issue in the past for the Liverpool Bay development and improvements to the system have been made in response.

There are regulations in place which require operators to develop effective oil spill plans and mitigation measures, covering the organisation of response and the provision of physical and human resources. For some potential locations, estimated times within which oil might beach, under worst case trajectory modelling conditions, are very short. Effective contingency planning and local resources will therefore be necessary to allow the deployment of response measures where appropriate.

The majority of the anticipated reservoir hydrocarbons in the SEA 6 area are gas, with a limited content of condensate, although in Liverpool Bay there are a number of oilfields. A dry gas blowout or release would not result in significant deposition of liquid hydrocarbons to the sea surface.

In some cases, there is strong seasonality in specific sensitivities – in particular in relation to bird populations. Existing regulatory controls emphasise the risk management and contingency planning aspects of environmental management, including the timing of operations.

The SEA therefore concludes that, subject to regulatory controls outlined above, there are no areas within the SEA 6 scope which should be excluded from licensing, and no general timing constraints which can be justified. Risk assessment for specific activities should take particular note of seasonal variations in seabird vulnerability, marine mammal distributions and seal moulting/pupping periods.

### **Cumulative effects**

Cumulative effects from activities resulting from the proposed 24<sup>th</sup> round licensing have the potential to act incrementally with those from other oil and gas activity, including both existing activities and new activities in existing licensed areas, or to act cumulatively with those of other human activities (e.g. fishing and shipping). Secondary effects comprise indirect effects which do not occur as a direct result of the proposed activities, while synergistic effects are considered to be potential effects of E&P activities where the joint result of two or more effects is greater than the sum of individual effects. Cumulative effects in the sense of overlapping "footprints" of detectable contamination or biological effect were considered to be either limited (noise, physical presence, physical damage, emissions, discharges), or unlikely (accidental events). No secondary or synergistic effects were identified that were considered to be potentially significant, although the effects of multiple noise sources, including the interaction of seismic survey and military sonars, were identified as areas requiring better understanding.

### **Wider policy objectives**

The SEA Directive requires that, in considering the likely significance of effects, the degree to which the plan or programme influences other plans and programmes should be addressed, together with the promotion of sustainable development. Activities which may follow licensing in a proposed 24<sup>th</sup> Seaward Licensing Round are subject to regulatory control and are not predicted to have a significant negative impact on UK Government or other wider policy and commitments. The outcome of the 24<sup>th</sup> Licensing Round has the potential to contribute positively to UK energy supply and policy.

### **Transboundary effects**

The SEA 6 area is contiguous with waters under the jurisdiction of the Republic of Ireland and with the territorial seas of the Isle of Man (Crown Dependency), although prevailing wind and residual water circulation will predominantly result in the transport of atmospheric emissions, marine discharges and spills towards the west coast of Britain. However, SEA 6 activities may occur adjacent to the median line and sources of potentially significant environmental effects, with the additional potential for transboundary effects, therefore include:

- Underwater noise
- Marine discharges

- Atmospheric emissions
- Accidental events – oil spills

All of the four aspects above may be able to be detected physically or chemically in Irish or Manx waters. The scale and consequences of environmental effects in adjacent state territories due to activities resulting from the proposed 24<sup>th</sup> Round licensing will be less than those in UK waters and are unlikely to be significant.

### **Overall conclusion**

The overall conclusion of SEA 6 is that there are no overriding reasons why the DTI should not adopt the draft plan to hold a 24<sup>th</sup> round of offshore oil and gas licensing, subject to effective mitigation being implemented for blocks or parts of blocks containing sensitive habitats (including those of geomorphological importance identified during the SEA 6 survey) or species. Previous SEAs had identified a few blocks recommended for exclusion from licensing on environmental grounds or until better information becomes available. These recommended exclusions remain valid for the consideration of the blocks to be included in the 24<sup>th</sup> licensing round.

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