

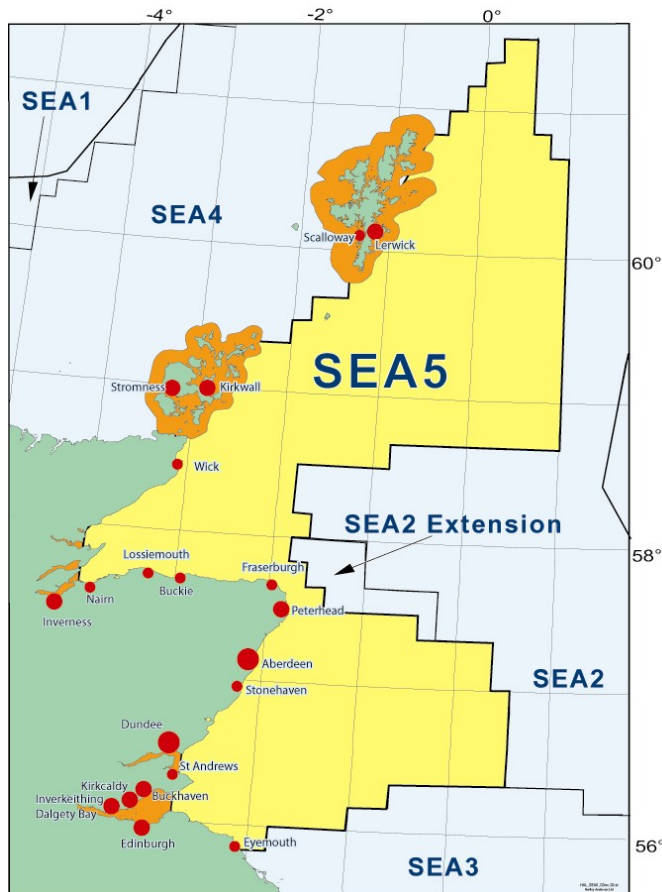
NON-TECHNICAL SUMMARY

Background

The UK Department of Trade and Industry (DTI) is conducting a Strategic Environmental Assessment (SEA) in order to integrate environmental considerations into the DTI's development of a draft plan to offer for offshore oil and gas licensing, areas to the east of the Scottish mainland, Orkney and Shetland (the SEA 5 area in the figure below).

The purpose of this Environmental Report is to document the assessment of the environmental implications of the proposed draft plan and its alternatives, together with the potential exploration, development and production activities which could result. The report provides a basis for formal consultation with the public and consultation bodies.

The SEA 5 area



The current SEA is the fifth in a series of oil and gas SEAs and blocks within the area would be offered in a 23rd round of offshore licensing.

The first of the DTI's offshore oil and gas SEAs (SEA 1) was conducted in 1999/2000 in preparation for the 19th offshore licensing round and addressed the deep water area along the boundary between UK and Faroese waters. Subsequent offshore oil and gas licensing SEAs have included: SEA 2 (2001), which covered the central spine of the North Sea where the majority of existing UK oil and gas fields are located (following an assessment, a minor extension was made to the SEA 2 area in 2002); SEA 3 which assessed the remaining parts of the southern North Sea (2002-2003) and SEA 4 (2003-2004) which addressed the area of the UKCS to the north and west of Orkney and Shetland

which abuts the SEA 1 area. During 2003, the DTI also conducted an SEA covering three strategic regions off the coasts of England and Wales in preparation for a second round of offshore wind licensing.

As well as a consideration of the offering for licence of areas within the SEA 5 area, this report also includes a consideration of the implications of re-offering for licence, in the 23rd round, unlicensed blocks within the areas covered by the earlier offshore oil and gas SEAs.

The SEA Directive (and its implementing legislation relevant to SEA 5 *The Environmental Assessment of Plans and Programmes Regulations 2004* and *The Environmental Assessment of Plans and Programmes (Scotland) Regulations 2004*) applies to plans and programmes whose first formal preparatory act is on or after 21 July 2004. It also applies, with retroactive effect, to those plans and programmes which have not been either adopted or submitted to a legislative procedure leading to adoption by 21 July 2006. The process for SEA 5 commenced in the spring of 2003.

For the purposes of oil and gas licensing, UK waters are divided into quadrants (1° of latitude by 1° longitude) with each quadrant further divided into 30 blocks, each of approximately 250km². Blocks within the SEA 5 area were first offered for licensing in 1964. The area comprises some 382 blocks of which 6 are currently wholly under licence, 8 are partly licensed and partly relinquished, 101 have been licensed but are now wholly relinquished, and 267 which have not previously been licensed.

The potential occurrence of hydrocarbon reserves is assessed through regional geological understanding and seismic survey. However, the location of commercial hydrocarbon reserves can only be confirmed by drilling a well. Consequently, there is uncertainty in predicting the scale and precise location of hydrocarbon related activities which could follow the proposed licensing. 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. These involve up to 16 seismic surveys, 20 exploration and appraisal wells, and the development of up to 3 new producing fields, with one potential pipeline to shore and the remaining developments tied into existing export infrastructure. The actual scale of activity is dependent on a variety of factors and in particular, oil/gas prices and tax regime.

To allow full consideration of the implications of licensing for oil and gas exploration, SEA 5 addresses the area up to the shoreline including areas within bay enclosure lines (coloured orange in Figure 1), although these areas are licensed under a different regime and would not form part of an offshore licensing round. 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. The current SEA also includes a consideration of the implications of re-offering for licence unlicensed blocks within the areas covered by the earlier offshore oil and gas SEAs. The likely uptake of these previously offered blocks is anticipated to be low, typically between 10 and 15%, with most applications not including a commitment to new seismic survey or exploratory well drilling.

A required part of 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 fed into the SEA 5 process from an early stage through scoping. To underpin and augment the environmental information base, the DTI commissioned geological and biological surveys of the seabed together with a number of desk-top studies covering a range of topics. 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. An independently facilitated stakeholder dialogue meeting was held in Aberdeen on 29 June 2004. A wide variety

of potential stakeholders, drawn from UK and other regulators, government advisers, local authorities, other industry representatives, academics and NGOs 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>) or contact Ms Christine Weare, Department of Trade and Industry, 86-88 Atholl House, Guild Street, Aberdeen, AB11 6AR. The formal public consultation phase extends for ninety days from the date of publication.

SEA is an evolving process and SEA 5 builds on the lessons learned in conducting previous SEAs together with input from stakeholders during the scoping and dialogue processes and guidance and practice from the UK and elsewhere.

Overview of the SEA 5 Environment

This section provides an overview of the SEA 5 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 the SEA, are described in more detail. These are:

- Fish and shellfish
- Seabirds & coastal waterbirds
- Seals & cetaceans
- Potential offshore conservation sites
- Existing human activities
- Coastal sensitivities

Geology & substrates

Sediments of the area consist predominantly of sands, sandy gravels and gravel. Gravel and sandy gravel occur in nearshore areas with very strong tidal and wave driven currents, particularly around Shetland and Orkney. Large mobile sandwaves and sandbanks are also present. Muddy sediments are restricted to deeper waters and very sheltered coastal areas.

Climate & meteorology

Meteorological patterns are typical for the UK with a predominantly south-westerly airflow, although strong winds and gales come from all directions and in all seasons. Predominant wind speeds throughout the year represent moderate to strong breezes, with the highest frequency of gales during winter months.

Oceanography & hydrography

Water depths generally deepen to the north and east although localised depressions are present throughout the area, including the Devil's Hole and Southern Trench. Significant topographic highs include Pobie Bank, the Sandy Riddle and Smith Bank.

Within the SEA 5 area significant inflow of Atlantic water through the Fair Isle Channel and to the east of Shetland mixes with coastal/mixed water. The movement and

composition of water masses in the area is determined largely by the extent of Atlantic inflow which varies seasonally and between years according to weather conditions. Density stratification of the water column is well developed over much of the area in the summer.

Currents in the region are complex and variable due to the dynamic nature of the Atlantic inflow into the area and coastal topography. Tidal streams which flow predominantly north-south with a maximum speed of 0.25 to 0.5m/s in offshore areas are strongest in shallow coastal areas and in excess of 1.0m/s on the Orkney-Shetland Platform. Considerably higher speeds (up to 4.5m/s) are reached around Shetland and Orkney. Mean significant wave heights for the area vary between 1-4.5m with the largest waves found to the north in winter.

In general, coastal and offshore waters of SEA 5 do not show significant anthropogenic contamination.

Plankton

The plankton community is influenced strongly by the inflow of Atlantic water into the region. In recent years, spring and autumn blooms have become more evident and primary production has increased throughout the year. Copepods are the dominant zooplankton species and constitute a major food resource for many commercial fish species. Recently, two key copepod species, *Calanus helgolandicus* and *C. finmarchicus*, have shown significant changes in abundance, related apparently to changes in sea surface temperatures with higher temperatures favouring the more southerly species *C. helgolandicus*.

Benthos

Rocky shore communities are generally less well developed than on the west coast of Scotland. Sheltered beaches are dominated by sedentary species with high abundance and biomass, whereas exposed beaches have lower diversity, abundance and biomass, few sedentary species and are dominated by mobile crustaceans. Dense populations of intertidal seabed animals and plants support important fish and bird populations. Offshore communities are spatially distributed over large scales, with distinctive species assemblages associated with particular substrate types. Benthic organisms of conservation significance in the SEA 5 area include the bivalve molluscs *Arctica islandica* and *Pinna (Atrina) fragilis*, and the reef forming horse mussel, *Modiolus modiolus*.

Cephalopods

A range of cephalopod species are found in the area with the squid *Loligo forbesii* supporting a locally important seasonal fishery. 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

Leatherback turtles *Dermochelys coriacea* move into British waters from the south and west and move northwards, with some entering the North Sea in late summer and

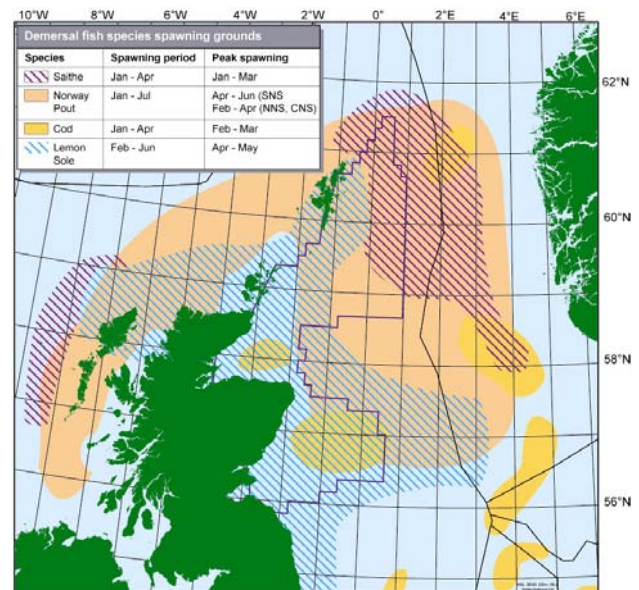
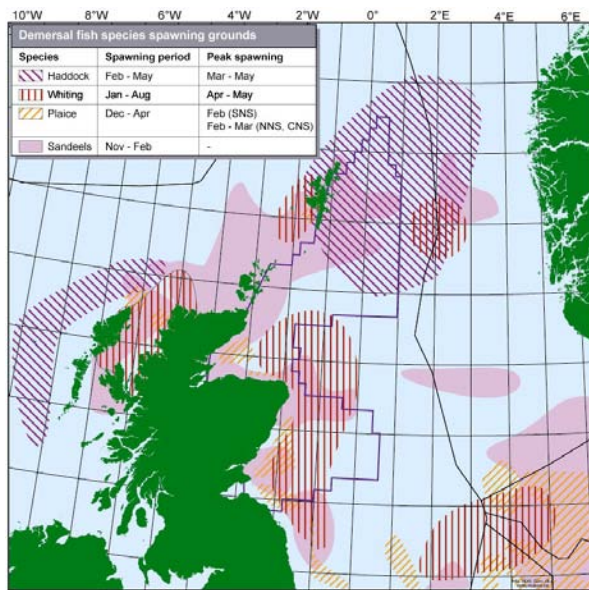
autumn. Sightings in Scottish waters are concentrated to the west and north of Scotland, with fewer recorded sightings from the North Sea.

Fish and shellfish

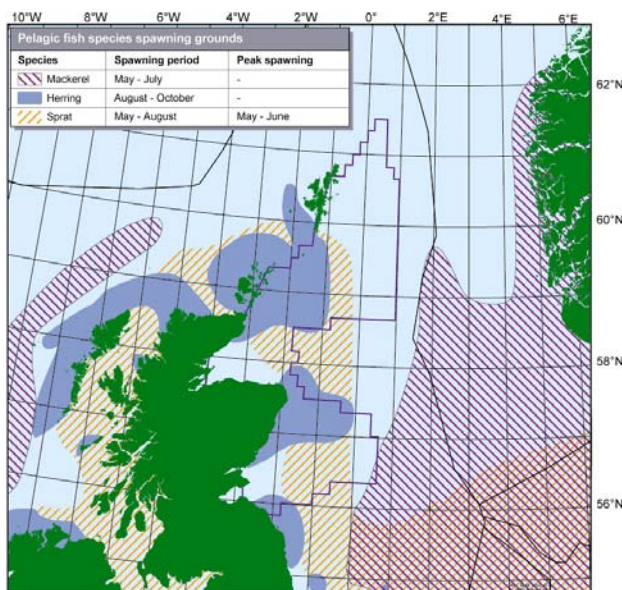
The SEA 5 area supports a range of fish and shellfish species. A number of species have spawning grounds in the area with sensitivity to seismic activity occurring throughout the year. Spawning grounds and the main spawning periods for important commercial species are illustrated overleaf.

Spawning grounds in SEA 5

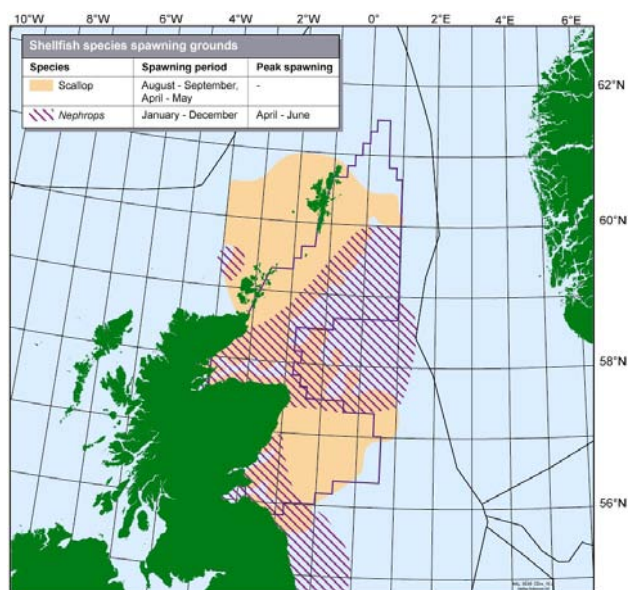
a) Haddock, whiting, plaice & sandeel b) Saithe, Norway pout, cod & lemon sole



c) Mackerel, herring & sprat



d) Nephrops & scallop



The juvenile stages of many commercial fish species remain within coastal nursery areas for a year or two before moving offshore. Offshore areas are characterised by fish communities dominated by haddock, whiting and cod. Saithe and Norway pout are associated with deeper areas. Herring and mackerel are migratory species and are found throughout the area although their distribution is seasonal. Sandeels are abundant and their distribution is closely associated with well-oxygenated, medium to coarse sand.

Important *Nephrops* stocks are found on muddy sand sediments within the Moray Firth, Firth of Forth and offshore on the Fladen Ground. Other commercially exploited crustacean species include pink shrimp, lobster, edible crab, velvet crab and shore crab. Exploited molluscan shellfish species include king scallop, cockles, mussels, whelk and periwinkles.

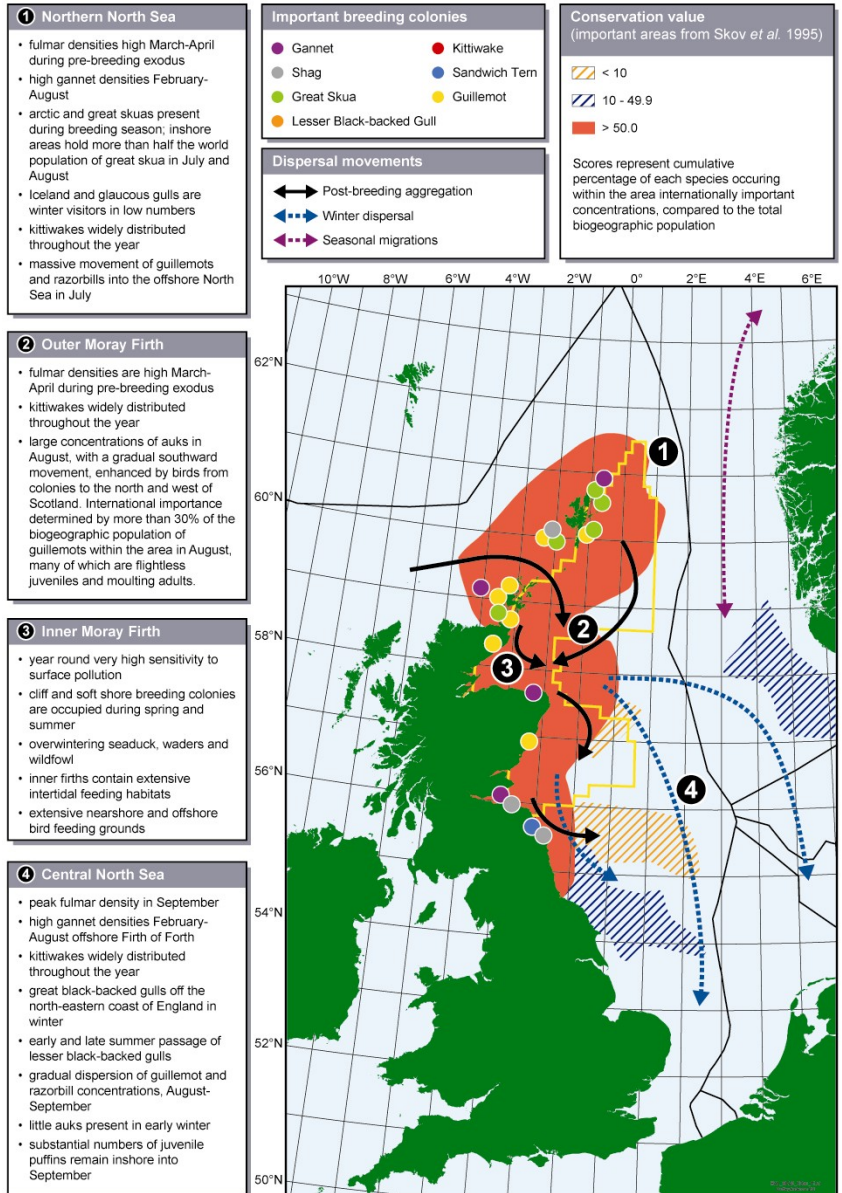
A number of fish species found in the SEA 5 area have been included on the OSPAR Initial List of Threatened and/or Declining Species, including cod, common skate, spotted ray, basking shark, common sturgeon, allis shad, sea lamprey and salmon. A number of rivers within the SEA 5 area support internationally important numbers of salmon and sea lamprey.

Seabirds & coastal waterbirds

The SEA 5 coast provides important breeding and over-wintering areas for a wide variety of seabirds and coastal waterbirds. Cliffs throughout the area support internationally important numbers of breeding seabirds including auks, kittiwakes, fulmars and gannets with important feeding areas offshore. Sheltered inner firths and estuaries support important wintering and passage populations of waterbirds.

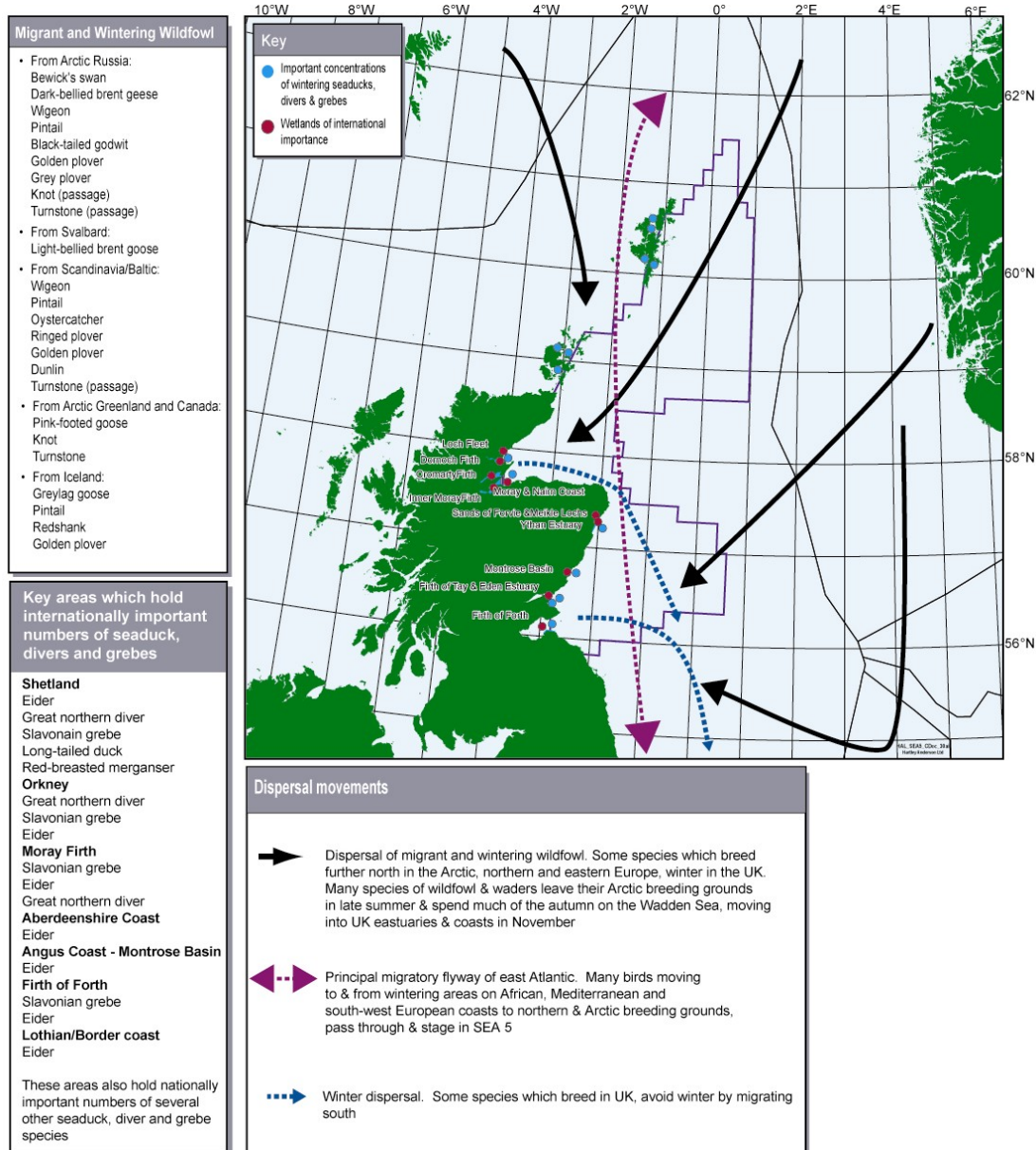
General seabird distribution and seasonal movements within and through the SEA 5 area are summarised below.

General seabird distribution and movement



Similarly, the distribution patterns and movements of migratory waterbirds in the SEA 5 area are summarised below.

General distribution patterns and movements of migratory waterbirds



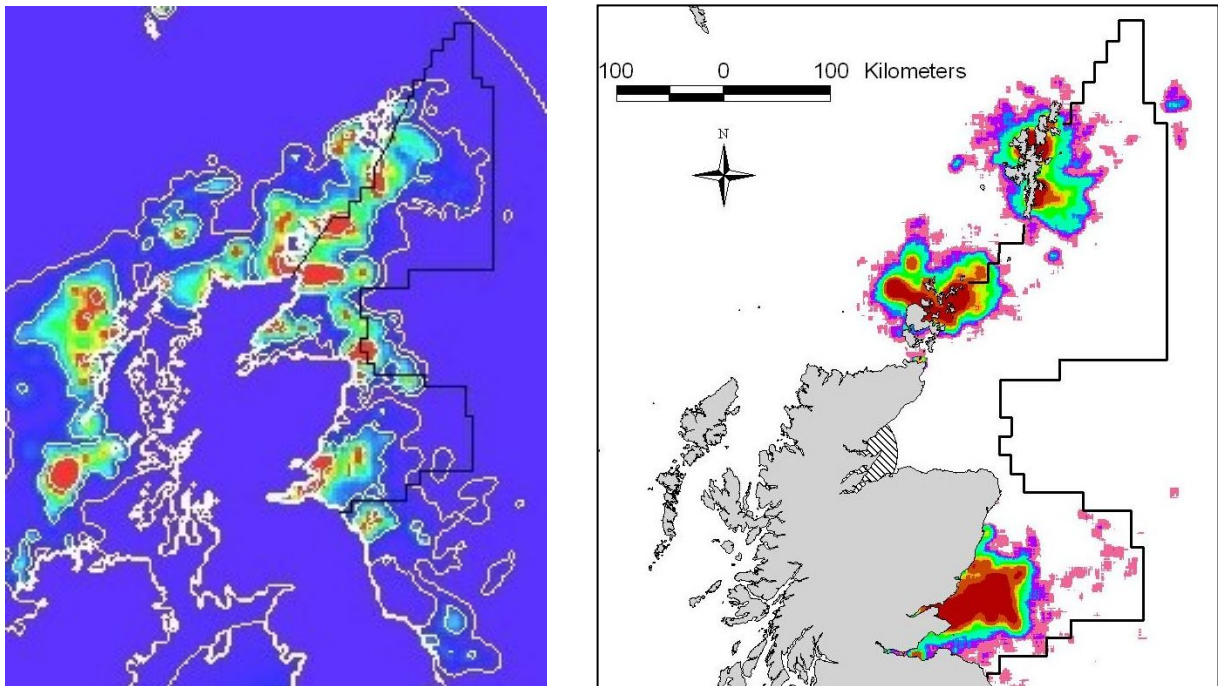
Seals and cetaceans

Seals

Seals are common within the SEA 5 area with important coastal breeding colonies for grey and common seals present. Common seals haul out during the pupping and moulting seasons in June to August. Similarly, grey seals haul out during the breeding season (October-November) and annual moult (January to March). Both species forage extensively within nearshore and offshore areas of SEA 5.

The current size of the British grey seal population is estimated at around 110,000 individuals, of which approximately 60,000 are associated with colonies in Orkney, Shetland, and the east coast of Scotland. The SEA 5 area is an important area for grey seal foraging with the majority of trips to localised areas with gravel/sand seabed, the preferred habitat of sandeels, an important prey species. Centres of activity include areas to the south and east of Shetland and Orkney, the Moray Firth, and off the Firths of Tay and Forth (a).

a) Grey sea density in SEA 5 area | b) Harbour seal density in SEA 5 area



Harbour seals are widely distributed on the coasts of Orkney and Shetland and along the east coast of Scotland, with approximately 15,000 harbour seals associated with the SEA 5 area, around 50% of the UK total. There is much harbour seal foraging activity in the southern SEA 5 area by seals which haul out in St. Andrews Bay and animals from Orkney and Shetland forage around the northwest boundary of the SEA 5 area (b). The Moray Firth is also an area of substantial foraging activity.

Cetaceans

The harbour porpoise is the most abundant cetacean species in the SEA 5 area, particularly in summer. Other cetacean species observed regularly during summer months include white-beaked dolphins and minke whales. A resident population of bottlenose dolphins also inhabits coastal waters of eastern Scotland.

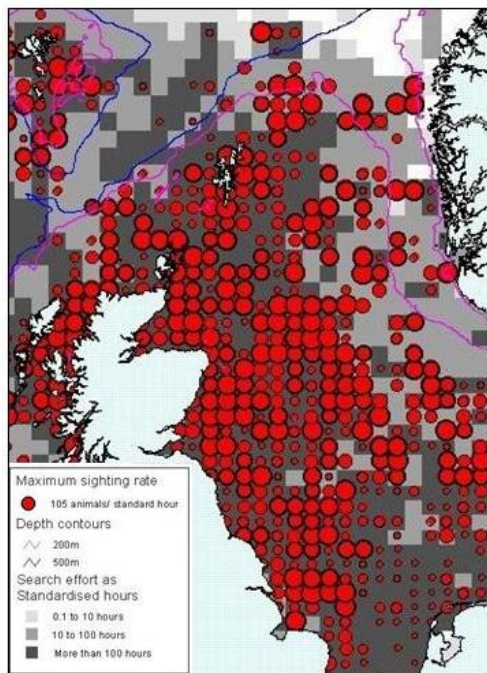
White-beaked dolphins are numerous within the SEA 5 area with North Sea numbers estimated at around 7,900 animals in summer of which 1,200 are present around Shetland and Orkney.

Minke whales are present in the SEA 5 area between May and October. Numbers are estimated at approximately 2,900 around the Northern Isles and 7,200 for the whole North Sea.

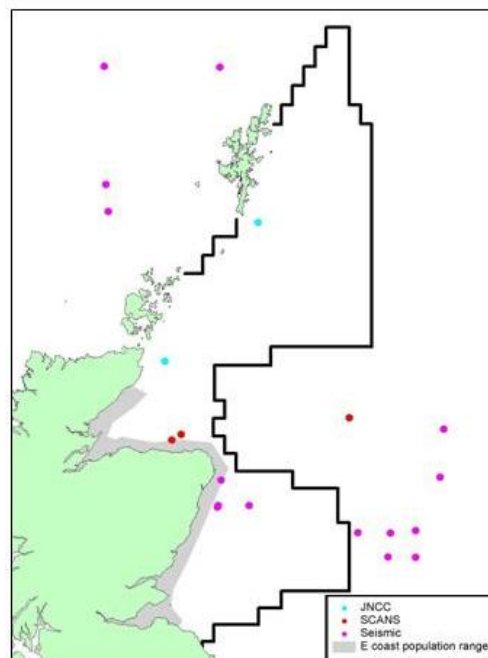
Around Shetland and Orkney, harbour porpoise numbers have been estimated at around 61,000, out of a North Sea population of around 268,500. However, due to significant levels of fisheries bycatch, the species has been included on the OSPAR Initial List of Threatened and/or Declining Species and Habitats.

A resident population of bottlenose dolphins inhabits coastal waters of eastern Scotland from north of the Moray Firth to the Firth of Forth. The few observations offshore in the North Sea may indicate that these animals are also distributed offshore at least for part of the year. The east coast population is estimated to consist of approximately 130 individuals.

Harbour porpoise sighting rates



Bottlenose dolphin sightings



The bottlenose dolphins are seen year round off Aberdeen but the rate of sightings is highest in November-May. Peak sightings occur in June-August in St. Andrews Bay. Within the inner Moray Firth, there are three areas where sightings are concentrated; the Kessock Channel, Chanony Narrows and around the mouth of the Cromarty Firth.

Potential offshore conservation sites

There are currently no offshore (outside territorial waters) conservation sites designated under the European Habitats or Birds Directives within the SEA 5 area. The identification and selection of these Natura 2000 sites (Special Area of Conservation - SACs and Special Protection Area - SPAs) in UK offshore waters is currently underway and a number of potential areas where sites may be designated have been identified. These have been classified into Group 1 or Group 2 depending (respectively) on the confirmation/suspicion of the presence of Annex I habitat,

adequacy/inadequacy of biological information, and absence/presence of sites of such character in territorial waters (0-12nm). Sites will be selected from both Group 1 and Group 2.

In SEA 5, the East Shetland shelf and Pobie Bank have been classified in Group 2 for bedrock and stony reef habitats. The area is composed of bedrock often with a thin, patchy veneer of mainly gravelly sand. Geophysical survey and sediment analysis of the Pobie Bank undertaken for SEA 5 has added substantially to the knowledge base for this area.

Pockmarks with carbonate structures formed by leaking gases are the only features known to occur in UK offshore waters that may conform to the Annex I habitat 'submarine structures made by leaking gases'. Two potential sites, both outwith SEA 5, have been classified in Group 1 (the *Scanner* pockmark in Block 15/25 and pockmarks in Block 16/3). Information from British Geological Survey maps indicates there are potential areas of pockmark habitat within the SEA 5 area.

The SEA 5 area supports a number of Annex II species for which offshore SACs may be designated including grey seal, common seal, bottlenose dolphin and harbour porpoise. Further research is needed to clarify the offshore distributions of these species but it is likely, given the importance of the area for seal breeding and foraging and cetacean distribution, that offshore areas may be protected in the future. Existing colony SPAs at which guillemot, razorbill, puffin, fulmar, shag and kittiwake are qualifying species may be extended by 1km. SPAs at which gannet are a qualifying species may be extended by 2km. These changes could result in the extension of eight coastal SPAs in the SEA 5 area.

The UK Government is also working with OSPAR to identify the first set of Marine Protected Areas by 2006 which, together with offshore Natura 2000 sites, will form an ecologically coherent network of protected areas.

Existing human activities

The SEA 5 area supports a range of human activities including recreational, tourism and industrial uses. Coastal areas support significant oil and gas infrastructure with key distribution ports providing a focus for shipping in the area. In general, coastal development has centred upon the large firths with much of the rest of the coast rural in nature. The fishing industry, whilst generally in decline, remains a key industry for many communities in the area, as is aquaculture on Shetland and Orkney.

A number of key oil and gas receiving terminals are situated on the SEA 5 coast with associated pipeline networks crossing offshore areas. On Shetland and Orkney, Sullom Voe and Flotta receive oil from fields in the northern North Sea and to the north and west of Scotland. The Nigg terminal in the Cromarty Firth receives oil from the Beatrice field and on the northeast coast, the St. Fergus terminal is the largest gas importing facility in the UK.

Sullom Voe and Flotta handle much of the crude oil traffic in the northern North Sea, whilst the Firth of Forth supports container and general cargo traffic in addition to oil cargoes at Hound Point and gas cargoes at Braefoot Bay. In 2002, the Forth was the largest port for oil and gas traffic (38m tonnes) and the fourth largest in the UK in

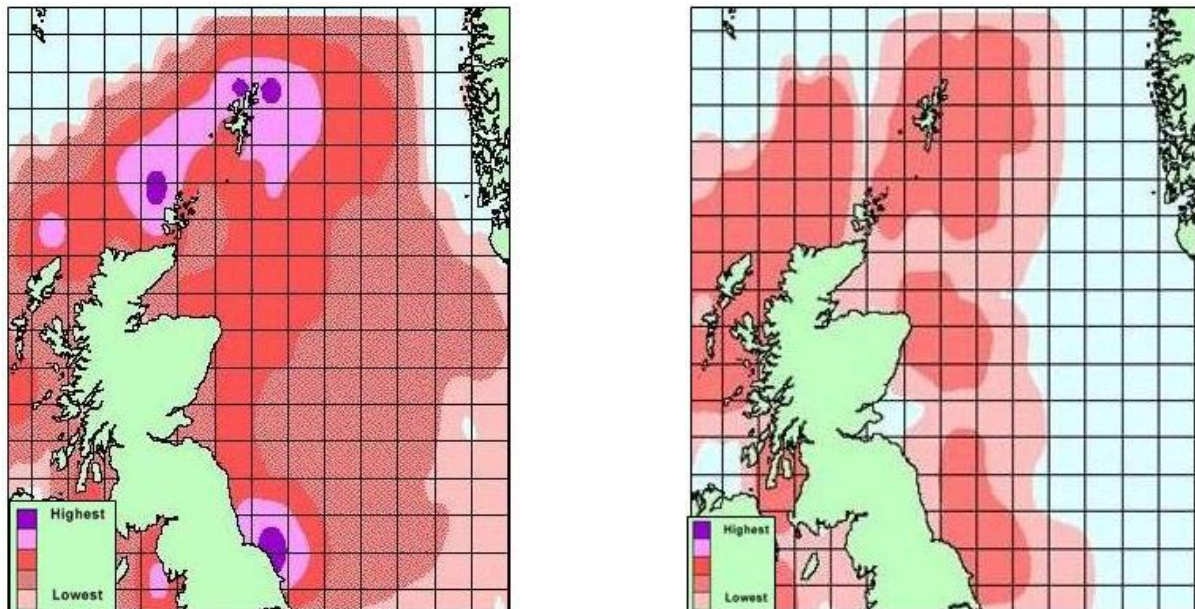
terms of traffic handled (42.2m tonnes). Key fishing ports include Lerwick, Peterhead, Fraserburgh and Aberdeen.

Shipping density is low to moderate (<5,000 vessels per annum) over much of the area. Coastal areas around Peterhead and Aberdeen experience relatively high shipping densities (5,000-20,000 vessels) associated with fishing and North Sea oil and gas support vessels. The Forth ports form a focus for shipping with high shipping densities extending from the Firth of Forth down the east coast.

Historically, one of the most important fisheries in the area was the mixed demersal fishery that targeted cod, haddock and whiting. However, a combination of poor recruitment and over exploitation has led to a significant decline in the fishery over recent years with landings of monkfish and *Nephrops* becoming increasingly important. The main fishing fleet is based in the North East and Shetland.

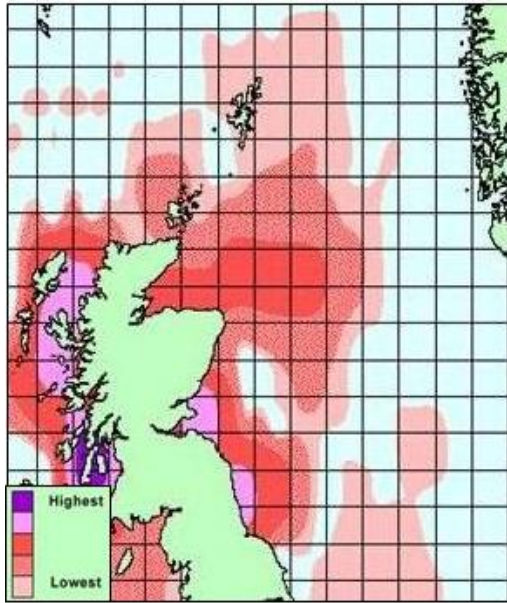
Fishing effort by UK vessels

a) Demersal (excluding beam trawl) b) Pelagic

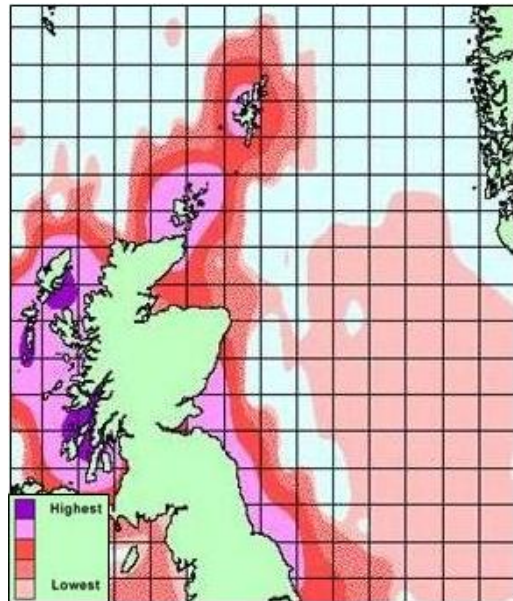


The Scottish pelagic fleet (consisting of approximately 27 vessels), is based mainly in Fraserburgh and Shetland and predominantly targets herring and mackerel (b). *Nephrops* is the most important shellfish species exploited in the area (c). The majority of trawl vessels directly target *Nephrops* but they are also taken as bycatch in the demersal fishery. Other crustacean species targeted primarily by static gear (creels, pots) include lobster, edible crab, velvet crab and shore crab (d).

c) Nephrops/shrimp



d) Static gear



Salmon and sea trout angling is of considerable economic importance to communities in the SEA 5 area associated with important salmon rivers. It is estimated that salmon and sea trout angling in Scotland supports 2,200 jobs and generates nearly £40 million in wages.

Shetland and Orkney support considerable mariculture operations, the principal species produced being salmon and mussels. However, with the exception of the Northern Isles, the SEA 5 area is relatively unimportant for mariculture.

Coastal sensitivities

Coastal sensitivities in the SEA 5 area include a large number of conservation sites protected by international, national and local designations. Of particular relevance are those habitats and species protected under the EC Habitats Directive (candidate Special Areas of Conservation) and Special Protection Areas, designated under the EC Birds Directive for the internationally important bird species they support.

Relevant coastal and marine habitats (listed under Annex I of the Habitats Directive) include large shallow inlets and bays (Sullom Voe, Berwickshire and North Northumberland Coast); reefs (Sanday, Berwickshire and North Northumberland Coast); estuaries (Dornoch Firth and Morrich More, Firth of Tay and Eden Estuary); mudflats (Dornoch Firth and Morrich More, Berwickshire and North Northumberland Coast), and submerged sea caves (Berwickshire and North Northumberland Coast). Other habitats protected by SACs include sea cliffs and a variety of dune habitats.

Relevant species (listed under Annex II of the Habitats Directive) include common seal (Yell Sound Coast, Mousa, Sanday, Dornoch Firth and Morrich More, Firth of Tay and Eden Estuary); grey seal (Faray and Holm of Faray, Isle of May, Berwickshire and North Northumberland Coast), and bottlenose dolphin (Moray Firth). Other species protected by SACs include salmon and sea lamprey.

The extensive cliffs of Shetland, Orkney, Caithness and the northeast coast support internationally important numbers of cliff-nesting seabirds including auks, kittiwakes, fulmars and gannets with many of the colonies designated SPAs. Further south, the islands of the Firth of Forth also provide important breeding areas for seabirds. Nearshore waters close to these breeding colonies provide important feeding grounds for the birds. Sheltered areas, particularly within inner firths and estuaries support internationally important numbers of breeding, over-wintering and migratory waterbirds which feed in the intertidal zone and coastal hinterland. Important areas which contain SPAs for waterbirds include the inner Moray Firth, Ythan Estuary, Montrose Basin, Firth of Tay, Eden Estuary and Forth Estuary.

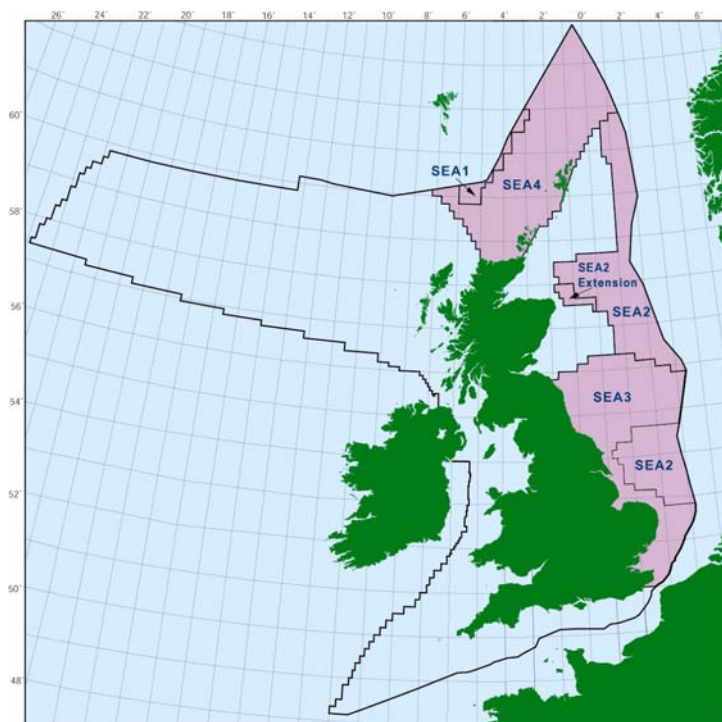
Coastal and offshore areas of SEA 5 contain important archaeological remains dating back to prehistoric times. A large number of archaeological sites have been identified and some protected, although evidence suggests that a large number of sites in both the coastal and marine environment have yet to be discovered.

Re-offer of areas previously subject to SEA

Overview

In the licence rounds that followed SEA 3 and SEA 4, in addition to the blocks covered by the respective SEA, the DTI offered for licensing unlicensed blocks in previously SEAed areas. These unlicensed blocks included those blocks for which licences were not applied for in the previous round and those which had been relinquished in the intervening period. The 23rd licensing round could include unlicensed blocks within the SEA 1, SEA 2, SEA 3 and SEA 4 areas (highlighted pink in the figure below).

Previously SEAed 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. SEA 1 is of importance for deep water cetaceans 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 cetacean species 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 and pockmarks are also present. Fishing and shipping are important industries in the area.

SEA 3 covers 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 covers 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 cetacean populations and areas of potential Annex I reef habitat have been identified. 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 Sullom Voe and Flotta. There are currently two oil producing fields, Foinaven and Schiehallion, and the development of the Clair Field has been consented.

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.

Equally however, significant new information has not appeared on areas or features identified during previous SEAs either for exclusion from licensing or if licensed to have additional controls put in place to mitigate potential effects. The exceptions to this are the Darwin Mounds and the potential Annex I reef areas on the Wyville Thomson Ridge where DTI SEA, AFEN, EU and NERC funded studies have provided new insights and understanding of these features.

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. The summaries of hydrocarbon prospectivity provided in SEAs 1 to 4 also remain valid as there have not been any recent shifts in perspectives for any of the previously SEAed areas.

Uptake of re-offered blocks

Changes in block licensing status since the time of the relevant SEA give an indication of perceived prospectivity. The SEA 2 area has seen the greatest change, with a large number of blocks relinquished and also licensed (primarily under promote licences) throughout the area since the 20th round. Promote licences also account for the majority of licences issued in the SEA 3 area (mainly in the central part of the SEA 3 area) since the 21st round. A number of blocks (approximately 30%) have been licensed in the SEA 1 area since the 19th round. Licence offers for the SEA 4 area were announced in mid-September although licences awards have yet to be confirmed.

Take-up of relinquished blocks in the SEA 2 area is anticipated to be around 50%, and in the SEA 3 area about 10 - 15%. The likely continued uptake of blocks reoffered in the SEA 1 and 4 areas is difficult to predict. The offer of frontier licences may result in more acreage being taken-up, but these licences would only have a term of two years. Oil company interest will depend on drilling results and uptake of blocks may receive a boost if current drilling in the area results in discoveries.

Consideration of potential effects of 23rd round licensing

An assessment of the possible implications of oil and gas activity in the SEA 5 and areas previously subject to SEA was conducted and the findings are discussed in detail in Sections 10 and 11 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

As with previous SEAs, it is considered that there is an acceptably low risk of potential effects of underwater noise resulting from forecast activity in the SEA 5 area. Potential effects of underwater noise are associated principally with seismic reflection surveys, which use low frequency, high intensity airgun sources. The key receptors are marine mammals, due to their sensitive hearing and use of acoustic communication and echo-location, and fish. However, the proposed level of activity does not represent a significant increment to recent seismic survey effort in UK waters which does not appear to have resulted in significant changes in sightings frequency or behavioural responses of marine mammals. Mitigation measures already implemented, together with planned modifications, appear to provide some degree of protection from acute effects and are required as a condition of survey consent. There is no obvious possibility of further mitigation through seasonal timing of seismic operations, and no localised areas which would justify exclusion from licensing.

The potential effects of seismic noise remain a significant area of uncertainty and conflicting information. A general international trend towards a precautionary approach to this issue is noted. However, a 2004 US Minerals Management Service assessment of the potential impacts of seismic and other acoustic surveys in the Gulf of Mexico concluded with a "Finding of No Significant Impact". This SEA (and previous SEAs) have identified data gaps and made recommendations for research and mitigative measures, including acoustic research on cetacean distribution and passive acoustic monitoring, prior to and during surveys. It has also been recommended that consideration should be given to establishment of criteria for

determining limits of acceptable cumulative impact and for subsequent regulation of cumulative impact.

Physical damage

Activities which may result in damage to the seabed include anchor and rig positioning, the construction of platform jackets, subsea wellheads and other infrastructure, such as pipelines. In addition to habitats and communities (collectively termed "biotopes") of conservation value, the SEA identifies herring spawning areas as potentially sensitive features of considerable ecological and commercial importance. Archaeological remains, including prehistoric sites which may as yet be undiscovered, are also considered to be sensitive.

However, the spatial scale of physical disturbance of the seabed, predicted from activity scenarios for potential licensed areas, is very small in comparison to the extent of physical disturbance from trawling. Recovery of seabed affected by oil and gas activities is expected to be rapid where the source of effects is transient (e.g. anchoring); less than five years in most cases, although some sources (e.g. presence of trenched pipelines) may be effectively permanent. Mitigation measures, principally the identification and avoidance of habitats and populations of particular sensitivity, would be implemented through established project assessment and planning controls.

Potential effects in relation to postulated archaeological heritage are considered positive (associated with discovery through site survey) and risk of damage to sites/artefacts (including wrecks) is low.

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 small scale of such effects which could follow from 23rd round licensing indicates that the number of exclusion zones that may be established is unlikely to cause significant economic impacts. The established oil industry and UK fishing industry consultation, liaison and compensation mechanisms, should serve to mitigate any conflicts.

Discharges

Concerns over discharges to sea relate primarily to produced water and drilling discharges, with other (non-significant) potential sources of effect including drainage, sewage, subsea control and pipeline commissioning discharges.

Discharge of produced water will be limited primarily by a presumption against discharges from new developments in favour on 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 North Sea and other dispersive environments have been shown to have minimal ecological effects.

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. However, preventative measures are in the process of being developed through the International Convention for the Control and Management of Ships' Ballast Water and Sediments, and the EU and the potential for significant effects arising from ballast water discharge as a result of E&P activities resulting from 23rd round licensing is considered to be very low.

Atmospheric emissions

Significant combustion emissions from oil or gas flaring are not expected from potential developments in the SEA 5 area, in view of regulatory controls and commercial considerations. Combustion emissions from power generation would only be a minor contribution to total emissions from the UK oil industry, and a very small component of overall emissions by UK industry. Local environmental effects of atmospheric emissions are not expected to be significant in view of the high atmospheric dispersion associated with offshore locations. Incremental contribution to regional and global effects associated with acid and greenhouse gases will not be significant.

Wastes to shore

Oil-based muds may be needed to drill through some of the rock types found in the SEA 5 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 to undergo treatment prior to onshore disposal. The environmental management of treatment and disposal of such cuttings, both onshore and offshore, is strictly controlled. The incremental volumes of cuttings will be small in the context of overall waste disposals from offshore.

Accidental events

Oil spills are probably the issue of greatest public concern in relation to the offshore oil and gas industry, although the historical frequency of major accidents in the UK resulting from exploration and production has been very low. Specific concerns associated with 23rd round licensing include the location of sensitive coastlines supporting numerous breeding bird and seal colonies; the presence of large concentrations of wintering seabirds and coastal waterbirds; the importance of aquaculture along adjacent Shetland coastlines; and, fisheries generally within the area. For some potential exploration or development locations, the time it would take a spill to beach under worst case weather conditions may not be sufficient to allow the deployment of usual response measures, and additional local resources may be necessary.

Although the consequences of major oil spills in much of the SEA 5 and adjacent areas may clearly be severe, in both ecological and economic terms, the incremental risk associated with the predicted level of activity is moderate or low. Existing exposure to risk is "high" or "very high" as a result of shipping around the north of Shetland, Fair Isle Channel and western Orkney, and Firth of Forth and oil spill contingency arrangements have been revised and significantly upgraded since 1999.

The DTI has regulatory mechanisms in place requiring oil companies to develop effective oil spill mitigation measures, covering organisational aspects and the

provision of physical and human resources; the DTI may refuse consent for specific activities (including exploration drilling and development) where adequate risk management cannot be provided. The SEA therefore concludes that, subject to regulatory controls outlined above, there are no areas within the SEA 5 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 and seal moulting/pupping periods.

The persistence and biological effects of most chemicals used in the oil and gas industry are equivalent to, or lower than, those of oil and similar risk assessment conclusions will therefore apply to chemical spills.

Cumulative effects

Cumulative effects from activities resulting from the proposed 23rd round licensing have the potential to act additively with those from other oil and gas activity, including both existing activities and new activities in existing licensed areas, or to act additively with those of other human activities (e.g. fishing and marine transport of crude oil and refined products etc). 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), although further research is recommended into possible cumulative effects of seismic noise on whales and dolphins. No synergistic effects were identified that were considered to be potentially significant.

Transboundary effects

The SEA 5 area is not contiguous with waters under the jurisdiction of any other state as it is buffered from Norwegian waters to the east by the SEA 2 area and from Faroese waters to the west by SEA 4. However, prevailing wind and residual water circulation of the SEA 5 area will result in the transport of atmospheric emissions and spills towards Norway. Sources of potentially significant environmental effects, with the additional potential for transboundary effects are underwater noise, atmospheric emissions, and oil spills.

All of the above aspects may be able to be detected physically or chemically in adjacent state territories. The scale and consequences of environmental effects in adjacent state territories due to activities resulting from the proposed 23rd round licensing will be less than those in UK waters and are unlikely to be significant.

Socio-economic effects

Production from fields in the SEA 5 area could make significant contributions to overall UKCS production, employment and tax revenues, as well as extending the lives of facilities such as the Sullom Voe and Flotta terminals. Shetland and Orkney have experienced influences from activity on the UKCS for about 30 years and the oil and gas industry is now a well established and important part of the two local economies. Any negative socio-economic impacts of SEA 5 related development will therefore not be new to these areas and will be on a relatively small scale compared with what has happened in the past.

Forecasts of UKCS oil production suggest an average decline of 5% per year. Under a pessimistic scenario SEA 5 production would slow down that decline, whereas an optimistic SEA 5 scenario predicts that production would actually increase during the five years 2009-2013 before the decline resumed.

Also under the pessimistic scenario, SEA 5 expenditure accounts for nearly a quarter of total UKCS offshore oil industry capital expenditure in 2010-2011. With the optimistic scenario, the SEA 5 expenditure accounts for over 50% of the total in 2010-2011. The implications for employment have also been considered. For the optimistic scenario, the overall UK total of SEA 5 related jobs (person years) peak at 1970 in 2010. For the pessimistic scenario, the jobs (person years) peak at 985 in 2010.

Wider policy objectives

No significant effect on UK Government or other wider policy and commitments from activities following the proposed 23rd licence round are predicted.

Conclusions

Significant synergistic effects of exploration and production activities with those of other activities in the area are not predicted. A number of potential sources of effects could conceivably be detectable across national boundaries with other European states; however, only oil spills are regarded as having the potential to result in significant negative environmental effects.

The DTI, as licensing authority and offshore environmental regulator, has at its disposal a range of powerful permit-based legislation and other environmental control mechanisms, which provide a sound basis for the regulation of future oil and gas activities in the SEA 5 area. Project-specific permitting allows due attention to be given to the protection of environmental sensitivities (e.g. seasonal seabird vulnerability, and actual or potential conservation sites), other users of the sea and other marine resources. These permits can and do, where necessary, specify timing, spatial and activity constraints relevant to the sensitivities of the area. No specific additional controls were identified as being essential. A number of gaps in information and understanding relevant to potential environmental sensitivities have also been identified, and may be addressed most efficiently through continuation of ongoing co-operative industry and government programmes, including broad scale environmental monitoring.

The findings of the previous SEAs in terms of areas to be excluded from licensing or blocks requiring additional mitigation measures if licensed remain generally valid and no new areas requiring additional protection have been identified. If blocks/part blocks previously excluded from licensing on environmental grounds are to be offered in subsequent licensing rounds, this needs to be supported by a documented rationale (typically based on better understanding of the features of interest in the blocks and the process that formed/maintain them).

The overall conclusion of the SEA is that there are no overriding reasons to preclude the consideration of further oil and gas licensing within the SEA 5 area or of blocks within areas covered by previous oil and gas SEAs.