

11 CONSIDERATION OF THE RE-OFFER FOR LICENSING OF BLOCKS IN THE PREVIOUSLY SEAed AREAS

11.1 Introduction

As described in Section 3, offshore licensing for oil and gas exploration and production has proceeded in a series of licensing rounds. Over time, a number of blocks or part blocks are relinquished by the operator and therefore become available for re-offer for licensing. Since 2002 the DTI has introduced an active process to encourage relinquishment of "fallow" blocks so that their potential may be explored or developed by others. Fallow blocks are currently defined as those where the initial term of the licence has expired and there has been no drilling for a period of 4 years, and there has been no dedicated seismic or other significant activity in the last 2 years. Some fallow blocks contain hydrocarbon discoveries, which for a variety of reasons have not been developed. 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 in the area 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 issue of how to assess within a SEA the implications of the re-offer of blocks in previously SEAed areas was discussed at the SEA 5 Expert Assessment Workshop in May of 2004 (see Appendix 2). The possibility of setting a numerical threshold above which a re-evaluation of a past SEA would be triggered was considered at length and it was concluded that the subject had to be addressed on a case by case basis taking due account of:

- The previous activity scenarios used in the original SEA and the scale of subsequent activity in the area
- Changes in environmental regulations
- New information on the environment of the area
- Changes in understanding of environmental effects from potential activities
- New pollution control techniques and technology

It was also agreed that the reoffer of blocks should be an agenda item for future SEA Expert Assessment Workshops.

The 23rd licensing round planned to follow SEA 5, could include unlicensed blocks within the SEA 1, SEA 2, SEA 3 and SEA 4 areas and a consideration for each area is given below. To reduce the need for cross referencing between the original SEA documents and this environmental report, a summary of the environment and uses, key new information sources, and then and now licensing status schematics are provided for each SEA area. These are followed by a discussion of potential licensing of blocks in previously SEAed areas.

11.2 Summary of SEA areas and relevant new information

11.2.1 SEA 1

SEA 1 Overview

The overall topography of the SEA 1 area is dominated by a number of large-scale features; the deep water Faroe-Shetland Channel and Faroe Bank Channels and the Wyville Thomson Ridge rising to within 400m of the water surface and dividing the Faroe Bank Channel from the Rockall Trough to the south. Numerous small to medium scale seabed

features are also present resulting from past volcanic and glacial activity as well as modern sediment erosion, transport and deposition.

Seabed sediments in the area are often mixed, with sediments in the deeper areas usually consisting of mud or muddy sand, and the proportion of mud decreasing upslope to the continental shelf break where the sediments are predominantly sands and gravel. Contaminant concentrations in sediments and seawater in the area are low and generally at, or close to, background levels.

The area has a complex hydrographic regime, with distinct water masses resulting in a pronounced difference in temperature between shallow and deeper waters. The main surface and slope currents flow northwards across the Wyville Thomson Ridge in water depths to around 500m, with a deeper southwesterly flowing cold current deflected westwards along the Faroe Bank Channel. Large scale atmospheric systems in the North Atlantic can induce significant variability to water mass characteristics and water flow patterns.

The topography and associated hydrographic conditions are strong determinants of the ecological character of the SEA 1 area. Phytoplankton productivity in the area varies seasonally. In the North Atlantic, the spring diatom bloom generally peaks in May with a sharp decline in June. Zooplankton communities are dominated by the copepod *Calanus finmarchicus* which represents an important food source for the young of many fish species and is important in the recruitment of fish stocks of the area. The Faroe-Shetland Channel is an important over-wintering area for *C. finmarchicus* which are transported into the North Sea in spring. Seabed communities in the area are characteristic of the interface of several biogeographic zones although they are widely distributed across the region. Water temperature and bathymetry are the primary environmental influences on distribution patterns in both community and species composition.

The Darwin Mounds on the southern flank of the Wyville Thomson Ridge were first discovered in 1998 and appear to be unique geological and biological features. The mound tails appear to have no physical expression, but are inhabited by dense populations of xenophyophores (single celled animals of up to 10cm diameter). The central mound appears to consist of blocky rubble with the cold water coral *Lophelia pertusa* usually present. The ecological significance of the mounds is unclear, although both *Lophelia* and xenophyophores are widely distributed elsewhere in the region. Following the introduction of enabling legislation, the mounds will be put forward as the UK's first offshore Special Area of Conservation (SAC) under the EU Habitats Directive. In addition, areas of Annex I reef habitat on the Wyville Thomson Ridge may also be protected by SAC designation in the future.

The adjacent islands and coasts all have important conservation sites on international, European and national scales. Designated conservation sites include World Heritage Sites (St Kilda and parts of Orkney), Biosphere Reserves, Special Protection Areas (SPAs), candidate Special Areas of Conservation (cSACs), and Ramsar sites. These have variously been designated for importance in relation to breeding seabirds, wildfowl and moorland birds, seals, otters, vegetated sea cliffs, submerged caves, reefs, lagoons and archaeology.

Seabird populations within the SEA 1 area consist mainly of breeding birds (fulmars, storm petrels, gannets, kittiwakes and various auks) from major colonies in the Faroe, Shetland, and Orkney Islands and more northerly breeding areas such as Norway and Iceland. In addition, a number of species migrate through the area in late summer and autumn (skuas and shearwaters), or are winter visitors (some gulls and little auk). The region to the north

and west of Scotland contains substantial proportions of the northeast Atlantic breeding populations of some species, in particular great skua, gannet, puffin and black guillemot.

Cetaceans in the area and adjacent waters can be broadly distinguished into several groups, on the basis of distribution and feeding:

- Baleen whales (blue, fin, sei and humpback) are mainly recorded in deep water
- Minke whales are summer visitors to shelf areas
- Sperm and beaked whales are concentrated on the eastern flank of Rockall Trough, the southern flank of Wyville Thomson Ridge and along the eastern side of the Faroe-Shetland Channel
- Atlantic white-sided and common dolphins are widely distributed in deep water
- White-beaked and Risso's dolphins are concentrated in shelf waters
- Killer whale, bottlenose dolphin and harbour porpoise are all widely distributed over deep and shelf waters.

Shetland and Orkney support large numbers of grey and common seals which breed on the islands and forage in coastal and offshore waters. Recent tagging data suggests that these animals forage more widely than that previously thought, although numbers in the SEA 1 area are likely to be small as sightings over deep water are rare. Hooded seals utilise deep water in the Faroe-Shetland Channel and north of the Faroes, throughout the year.

The cold Norwegian Sea water of the deep Faroe-Shetland and Faroe Bank Channels supports a sparse and distinct fish fauna, of little commercial value, with very few of the Atlantic deep water species which are found on the upper slopes of the Faroe-Shetland Channel being present. The Wyville Thomson Ridge appears to form a major faunal barrier to deeper water fish.

The main commercial pelagic species found in the area are mackerel, Norway pout and blue whiting. Herring may also occur in the area and greater silver smelt is also present. Other than the greater silver smelt, commercial pelagic species are generally concentrated over the continental shelf and shelf break to the east.

Deep-water vessels from Scotland, France, Spain and Norway dominate fishing in the area, with fishing vessels from England, Faroe, Germany, Netherlands, Denmark and Ireland also present. The main demersal gears employed are otter trawls and long-lines, with some gill netting also being used. Demersal fishing effort in the area is relatively low compared to other UK waters with greatest effort being seen around the Wyville Thomson Ridge. Pelagic effort over the upper slope is at similar levels to that seen in other areas around the UK.

The waters of the SEA 1 area are of minor importance for shipping. Coastal industry and activities in adjacent areas (the Faroe, Shetland, Orkney and Western Isles and northwest Scotland) include fishing, aquaculture, tourism and recreation. All are of considerable importance to local economies.

SEA Context and New Information for SEA 1 Area

Aspect	Implications for SEA	Post SEA Information Sources
Geology & substrate	Biodegradation & accumulation of contaminants Range of benthic habitats present Physical disturbance.	1. Sub-seabed Geology ¹ 2. Continental Shelf Seabed Geology and Processes ¹ 3 Geological Evolution Pilot Whale Diapirs and Stability of the Seabed Habitat ¹ 4. Seafloor Sediments and Sedimentary Processes on the Outer Continental Shelf, Continental Slope and Basin Floor ¹
Climate & Meteorology	Oil spill trajectory. Atmospheric dispersion.	-
General bathymetry	Dispersion of discharges. Seabed features of potential conservation interest.	1. Geological Evolution Pilot Whale Diapirs and Stability of the Seabed Habitat ¹
Water masses	Pattern of discharge dispersion. Rate of degradation of organic material. Spilled oil behaviour.	-
Water currents & waves	Spilled oil behaviour & response options. Particulate dispersion & re-dispersion.	-
Existing contamination	Discharge quality criteria.	1. Review of the Analysis of Oil Residues Collected for the Atlantic Frontier Environmental Network January 1996 to February 2003 ERT Data Report 885 July 2003 2. Analyses of sediment samples taken during SEA 4 survey. ERT Data Report
Plankton	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.	Plankton Report for Strategic Environmental Assessment Area 4 ¹
Benthos	Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.	1. Synthesis of Information on the Shallow Benthos of the SEA 4 Area ¹ 2. An Overview of Benthic Ecology of the Faroe-Shetland Channel ¹
Cephalopods	Possible vulnerability to drilling & operational discharges or spills.	An Overview of Cephalopods Relevant to the SEA 4 Area ¹
Fish	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.	Fish and Fisheries in the SEA 4 Area ¹

Aspect	Implications for SEA	Post SEA Information Sources
Marine reptiles	Possible vulnerability to drilling & operational discharges or spills.	JNCC report on bycatch of marine turtles (Pierpoint 2000) - Report provides information from a database of turtle sightings in UK waters.
Seabirds	Vulnerability to oil spills.	Seabird populations of Britain & Ireland. Mitchell <i>et al</i> (2004). - Published results of Seabird 2000. The most recent & comprehensive study of the 25 species of seabird which breed in Britain & Ireland.
Seals	Potential disturbance by seismic noise. Vulnerability to oil spills.	1. Background Information on Marine Mammals Relevant to Strategic Assessment 4 ¹ 2. SMRU seal tagging studies indicate seals forage more widely than previously thought.
Cetaceans	Potential disturbance by seismic noise. Vulnerability to oil spills.	1. Background Information on Marine Mammals Relevant to Strategic Assessment 4 ¹ 2. JNCC Atlas of cetacean distribution in north-west European waters (Reid <i>et al.</i> 2003)
Potential offshore conservation sites	Potential disturbance by seismic noise. Vulnerability to oil spills	1. JNCC report – Natura 2000 in UK offshore waters (Johnston <i>et al.</i> 2002). 2. JNCC 03 P01 paper – Marine Natura 2000 (Johnston <i>et al.</i> 2003).
Existing human activities	Interference with other users of the marine environment. Potential for cumulative effects.	1. Existing Users and Management Initiatives Relevant to SEA 4 ¹ 2. The Potential Socio-Economic Implications of Licensing the SEA 4 Area ¹
Coastal sensitivities	Vulnerability to oil spills.	1. SNH and JNCC websites - provide up-to-date, detailed information on conservation sites. 2. Coastal Conservation Sites in the SEA 4 Area ¹
Cultural Heritage	Potential to damage sites during drilling or construction. Opportunity to discovery previously unrecognised sites.	The Scope of Strategic Environmental Assessment of Continental Shelf Area SEA 4 in Regard to Prehistoric Archaeological Remains ¹

Notes: ¹ All Technical Reports and the Consultation Document from SEA 4 are available on the DTI SEA website (www.offshore-sea.org.uk).

11.2.2 SEA 2

SEA 2 Overview

The SEA 2 area covers a large part of the southern, central and northern North Sea and contains the majority of the UK's oil and gas producing fields. Water depths gradually deepen from south to north and the main topographic features are the Dogger Bank which divides the southern and central North Sea, the Fladen/Witch Ground, a large muddy

depression between the central and northern North Sea, and the Norwegian Trench, a deep water channel to the east of the northern SEA 2 area.

Various inflows of Atlantic water into the North Sea occur from the west and north, with outflow mainly via the Norwegian Trough and along the Norwegian coast. Water circulation in the North Sea is anticlockwise, with an eddy forming over the Fladen Ground. The water column of the southern North Sea remains mixed throughout the year while to the north it becomes layered (stratified) in summer, effectively isolating surface and near bottom waters until autumn gales break down the stratification.

Seabed sediments over the majority of the area are sand or mud, or a mixture of the two. Typically, sandier sediments are found in the south and north, and in coastal waters, with muddy sediments present in the deeper areas of the central North Sea. Pockmarks (shallow seabed depressions formed from the seepage of gas) are found in muddy areas in particular the Fladen and Witch Grounds. Most pockmarks are relict features but a few continue to leak natural gas and some contain carbonate rocks which provide a habitat for encrusting and other surface living seabed animals.

The DTI commissioned survey for SEA 2 investigated habitats of potential conservation interest within the area. These covered potential areas of Annex I habitats defined by the EU Habitats Directive as *sandbanks in shallow water* and *submarine structures made by leaking gases*. Since SEA 2, the Dogger Bank and a series of large sandbanks off North Norfolk have been classified by the JNCC as Group 1 indicating that sufficient information exists to be able to consider the areas against the selection criteria for offshore Special Areas of Conservation. Pockmarks are the only habitat likely to conform to the Annex I habitat, *submarine structures made by leaking gases* and to date, the SEA 2 area contains two of the best examples of this habitat, both classified as Group 1. These areas may be designated as conservation sites in the future. In addition, the Dogger Bank has been proposed as a Marine Protected Area.

The North Sea is a very productive area with a "food web" linking the plankton (the source of much of the initial productivity) with fish, birds, marine mammals, other water column animals and the fauna of the seabed.

Recently, phytoplankton biomass has increased in the SEA 2 area possibly associated with large scale meteorological and hydrographical variations. The zooplankton community has also shown significant changes particularly in the proportions of the dominant copepod species, which have been linked to increasing sea surface temperatures. The ecological importance of these changes to the plankton community has yet to be fully understood. Benthic communities are also determined broadly by hydrographic conditions with water temperature particularly important. On a smaller scale, community types reflect local sediment distribution patterns.

Offshore areas of the North Sea including the SEA 2 area contain peak numbers of seabirds following the breeding season and through winter, with birds tending to forage closer to coastal breeding colonies in spring and early summer. Many shorebirds and waterfowl also use North Sea coastal waters and shores extensively, particularly during spring and autumn migrations and some species overwinter in large numbers.

A wide range of cetaceans are sighted in the North Sea, the most common being the harbour porpoise, minke whale and white beaked dolphin. Bottlenose dolphins from the nearshore population of the Moray Firth are rarely seen far offshore. Important grey and common seal breeding colonies on the UK east coast have been protected through

designation as Special Areas of Conservation. Recent tagging studies indicate that both species forage extensively in nearshore and offshore areas of the North Sea.

The North Sea coastline has many sites of conservation, economic and human interest. A large number of coastal sites have been protected at a European level under the EU Habitats and Birds Directives and a variety of UK offshore areas are under consideration for such protection. Important archaeological sites dating back to prehistoric times have been found in coastal areas surrounding the North Sea with significant offshore sites likely although few have yet been discovered.

Fish species diversity in the SEA 2 area is higher in the central and northern North Sea and in inshore waters. The North Sea is one of the world's most important fishing grounds with extensive fisheries for pelagic species (e.g. herring and mackerel) demersal species (cod, haddock and whiting in the central and northern North Sea, with plaice and sole targeted in the south). In addition there are important shellfisheries for Norway lobster, crab and scallop and industrial fisheries for sandeel and Norway pout. Commercial fishing in the area is of significant importance for both the UK and other North Sea states.

The oil and gas fields of the SEA 2 area have formed the focus of much of the UK offshore industry over the last 30 years. Shipping is another major user of offshore areas of the North Sea, particularly in southern parts with the large ports on the UK east coast forming an important focus for many of the shipping routes.

Contamination concentrations are typically very low but in some (usually coastal) areas they can be high enough to result in marked biological effects (eg through eutrophication). The historic discharge of oil based drill muds with rock cuttings from oil and gas well drilling has resulted in numerous piles of cuttings on the seabed in the northern and central SEA 2 areas. Produced water from existing oil industry activities remains a source of contaminants although company, national and OSPAR actions have succeeded in reducing the average concentration of oil in these discharges.

SEA Context and new information for SEA 2 area

Summary	Implications for SEA	Post SEA Information Sources
Geology & substrates	Biodegradation & accumulation of contaminants. Range of benthic habitats present. Physical disturbance, creating mounds or scars.	North Sea Geology - updated BGS report for SEA 3 ¹ .
Climate & Meteorology	Oil spill trajectory. Atmospheric dispersion.	
General bathymetry	Dispersion of discharges. Seabed features of potential conservation interest.	
Water masses	Pattern of discharge dispersion. Rate of degradation of organic material. Spilled oil behaviour.	
Water currents and waves	Spilled oil behaviour & response options. Particulate dispersion & re-dispersion.	

Summary	Implications for SEA	Post SEA Information Sources
Existing contamination	Discharge quality criteria.	Walsham et al. (2002) report on changes in Fladen Ground sediment hydrocarbon composition and concentration between 1989 and 2000
Plankton	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.	Overview of plankton ecology in the North Sea Addendum to SEA2 ¹
Benthos	Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.	1. Callaway et al. (2002). Paper on diversity and community structure of epibenthic invertebrates and fish in the North Sea. 2. Hiscock et al. (2002) environmental screening for marine habitats & species for R2 wind licensing
Cephalopods	Possible vulnerability to drilling & operational discharges & spills.	Overview of Cephalopods relevant to the SEA 2 and SEA 3 Areas ¹ - updated Aberdeen University report for SEA 3
Fish	Possible vulnerability to drilling & operational discharges & spills. Timing of seismic surveys.	1. Prime Minister's Strategy Unit (2004) report "Net Benefits, a sustainable and profitable future for UK fishing" 2. Royal Society of Edinburgh (2004) "Inquiry into the Future of the Scottish Fishing Industry"
Marine reptiles	Possible vulnerability to drilling & operational discharges & spills. Timing of seismic surveys.	JNCC report on bycatch of marine turtles (Pierpoint 2000) - Report provides information from a database of turtle sightings in UK waters.
Seabirds (& coastal birds)	Vulnerability to oil spills.	Seabird populations of Britain & Ireland. Mitchell <i>et al</i> (2004). - Published results of Seabird 2000. The most recent & comprehensive study of the 25 species of seabird which breed in Britain & Ireland. JNCC report – aerial surveys of UK inshore waters for wintering seaducks, divers & grebes (2003). - Report provides recent data on numbers & distributions at important inshore UK sites.
Seals	Potential disturbance by seismic noise. Vulnerability to oil spills.	SMRU report on marine mammals relevant to SEA 2 & SEA 3. -Seal tagging studies indicate seals forage more widely than previously thought.

Summary	Implications for SEA	Post SEA Information Sources
Cetaceans	Potential disturbance by seismic noise. Vulnerability to oil spills.	Marine mammals in the North Sea - SMRU report updated for SEA 3. JNCC Atlas of cetacean distribution in north-west European waters (Reid et al. 2003)
Potential offshore conservation sites	Potential disturbance by seismic noise. Vulnerability to oil spills.	1. Conservation Sites in the SEA 3 Area ¹ 2. JNCC report – Natura 2000 in UK offshore waters (Johnston et al. 2002). 3. JNCC 03 P01 paper – Marine Natura 2000 (Johnston et al. 2003).
Existing human activities	Interference with other users of the marine environment.	1. Human activities in the SEA 3 Area ¹ 2. The Potential Socio-Economic Implications of Licensing the SEA 3 Area ¹ 3. Coastal Initiatives and Management Plans in the SEA 3 Area ¹
Coastal sensitivities	Vulnerability to oil spills.	1. Conservation Sites in the SEA 3 Area ¹ 2. SNH, EN and JNCC websites - provide up-to-date, detailed information on conservation sites. 3. Other Designated Sites in the SEA 3 Area ¹
Cultural Heritage	Potential to damage to sites during drilling or construction. Opportunity to discovery previously unrecognised sites.	The scope of Strategic Environmental Assessment of North Sea areas SEA 3 and SEA 2 in regard to prehistoric archaeological remains ¹

Notes: ¹ Technical Reports and the Consultation Document from SEA 3 are available on the DTI SEA website (www.offshore-sea.org.uk). ²

11.2.3 SEA 3

SEA 3 overview

The SEA 3 area covers a large part of the central and southern North Sea and includes the entire coast of eastern England. Water depth gradually deepens from south to north with the Dogger Bank, the main topographic feature of the region. Water circulation consists of a southerly coastal flow which in the southern part moves offshore across the North Sea. There is a relatively minor inflow of water into the area through the English Channel.

Seabed sediments in SEA 3 are generally sandy and gravelly in the south and in coastal waters. Large sandbanks of variable morphology and sediment composition are present in both coastal and offshore waters. Rocky outcrops and platforms are associated with discrete sections of the coast, primarily in the northern part of the area. Several large estuaries including the Thames estuary and Wash embayment are also present. Many of these coastal habitats support a diverse range of benthic species as well as internationally important numbers of seabirds, waterbirds and marine mammals and are protected at national and international levels and many sites have been proposed for designation as SACs. Further offshore, the DTI survey of the SEA 2 and adjacent areas highlighted the

species richness of certain types of sandbank which may be designated as conservation sites in the future under the EU Habitats Directive.

The SEA 3 area supports a wide variety of fish species although in general diversity is highest in the central and northern North Sea and in inshore waters. Coastal waters of SEA 3 support important fixed gear fisheries for crab, lobster, whelk, and cockles as well as netting for a number of fish species, including cod, herring and sole. Salmon netting off the North East coast has declined significantly due to a recent buy-out of fishing licences. Further offshore, a mixed demersal fishery primarily targets cod, whiting, plaice and sole. Herring are taken from northwest of the Dogger Bank and in the coastal waters of eastern England. An industrial sandeel fishery targets the Dogger Bank as well as coastal and offshore areas of the northern part of the SEA 3 area.

Sandeels represent an important prey species for a number of seabird species, many of which utilise internationally important seabird breeding colonies along the SEA 3 coast in the spring and early summer. Offshore areas of SEA 3 contain peak numbers of seabirds following the breeding season and throughout the winter. Many of the estuaries along the English east coast also support important populations of migratory and wintering wildfowl and waders, as well as breeding birds. Many of the coastal sites of international importance for seabirds and waterbirds have been protected through various designations at national, European and international levels.

The SEA 3 area is of less overall importance to cetaceans compared to more northerly parts of the North Sea, although some areas are important for harbour porpoise and white-beaked dolphin. The SEA 3 coast, particularly around the Farne Islands and the Wash, supports internationally important (and protected) grey and common seal breeding sites and both species forage extensively in nearshore and offshore areas.

Prehistoric sites discovered within the SEA 3 area are important but limited. Important coastal sites have been discovered along the coasts of Cleveland, Yorkshire, Norfolk, Essex and Kent. Offshore archaeological discoveries have been made on the Dogger Bank, the Leman and Ower Banks and the Brown Ridge in the southern North Sea. There are also a number of historic wrecks and protected monuments in coastal waters of the southern SEA 3 area.

The SEA 3 marine environment provides an important resource for a wide variety of users. The extensive natural gas reservoirs of the southern North Sea have attracted significant infrastructure development and a number of oil and gas pipelines traverse the SEA 3 area. The greater Wash area and the Thames estuary are the focus of considerable development in offshore wind farms with large areas licensed recently for development. The presence of offshore sand and gravel deposits in coastal waters provides an important source of marine aggregates and, within the same area there are a number of marine disposal sites for spoil from harbour and other dredging operations.

SEA context and new information for SEA 3 area

Summary	Implications for SEA	Post SEA Information Sources
Geology & substrates	Biodegradation & accumulation of contaminants. Range of benthic habitats present. Physical disturbance, creating mounds or scars.	-

Summary	Implications for SEA	Post SEA Information Sources
Climate & Meteorology	Oil spill trajectory. Atmospheric dispersion.	-
General bathymetry	Dispersion of discharges. Seabed features of potential conservation interest.	-
Water masses	Pattern of discharge dispersion. Rate of degradation of organic material. Spilled oil behaviour.	-
Water currents and waves	Spilled oil behaviour & response options. Particulate dispersion & re-dispersion.	-
Existing contamination	Discharge quality criteria.	-
Plankton	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.	-
Benthos	Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.	1. Callaway et al. (2002). Paper on diversity and community structure of epibenthic invertebrates and fish in the North Sea. 2. Hiscock et al. (2002) environmental screening for marine habitats & species for R2 wind licensing
Cephalopods	Possible vulnerability to drilling & operational discharges & spills.	-
Fish	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.	Prime Minister's Strategy Unit (2004) report "Net Benefits, a sustainable and profitable future for UK fishing"
Marine reptiles	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.	-
Seabirds (& coastal birds)	Vulnerability to oil spills.	Seabird populations of Britain & Ireland. Mitchell <i>et al</i> (2004). - Published results of Seabird 2000. The most recent & comprehensive study of the 25 species of seabird which breed in Britain & Ireland. JNCC report – aerial surveys of UK inshore waters for wintering seaducks, divers & grebes (2003). - Report provides recent data on numbers & distributions at important inshore UK sites.
Seals	Potential disturbance by seismic noise. Vulnerability to oil spills.	Early results from SMRU satellite tagging on harbour seals in the Wash

Summary	Implications for SEA	Post SEA Information Sources
Cetaceans	Potential disturbance by seismic noise. Vulnerability to oil spills.	JNCC Atlas of cetacean distribution in north-west European waters (Reid et al. 2003)
Potential offshore conservation sites	Potential disturbance by seismic noise. Vulnerability to oil spills.	JNCC report – Natura 2000 in UK offshore waters (Johnston et al. 2002). JNCC 03 P01 paper – Marine Natura 2000 (Johnston et al. 2003). - Reports indicate the locations of potential offshore conservation sites in the SEA 3 area.
Existing human activities	Interference with other users of the marine environment.	-
Coastal sensitivities	Vulnerability to oil spills.	EN, SNH and JNCC websites - provide up-to-date, detailed information on conservation sites.

11.2.4 SEA 4

SEA 4 overview

Broadly, the SEA 4 area consists of two contrasting environments; an area of continental shelf and upper slope to the north and west of Orkney and Shetland characterised by relatively high temperatures, hydrodynamic energy and primary productivity; and the much colder, less dynamic and dark waters of the deep Faroe-Shetland and Faroe Bank Channels (described previously for SEA 1).

On shelf areas, the high sediment mobility associated with tidal and wave action results in mobile and often patchy benthic habitats with the high productivity of benthic and fish species assemblages driven by a highly seasonal input of phytoplankton and detrital carbon. There is also a coupling, to some degree, of the shelf ecosystem to productive coastal, intertidal and terrestrial systems through the export of detritus, and through foraging and seasonal migrations of fish, seabirds and marine mammals.

The deep channels and basins of the SEA 4 area are characterised by a lower hydrodynamic energy, although still erosive seabed environment; contrasting with most other areas in comparable water depth which are more quiescent and depositional. There is distinct zonation of species assemblages with depth; and less direct pelagic-benthic coupling. Vertical transfers of carbon and energy also result from diurnal migrations of zooplankton, cephalopods and fish, and predation on squid and fish by marine mammals. Near-surface predation on zooplankton, cephalopods and fish by seabirds is probably less intense than in coastal waters, due to distance from breeding colonies.

The deepwater SEA 4 area has been described (SEA 4 assessment workshop) as being of considerable scientific and conservation interest, as a result of the presence in close spatial proximity of contrasting seabed habitats and communities. Deep water cetacean populations of the SEA 4 area are of national and international significance. Coastal habitats and communities adjacent to the area are widely recognised as being of high conservation value, associated particularly with breeding seabird and seal colonies. A number of offshore areas have been identified as containing potential areas of 'reef' habitat which may be protected in the future. These include iceberg ploughmarks along the West Shetland Slope and Wyville Thomson Ridge; the Judd Deeps; Solan Bank; Turbot and Otter

Banks, and areas around the Shetland Islands. In addition, the Pilot Whale diapirs (mud volcanoes) in the north of the area are large features with the possible presence of seep chemosynthetic communities and are of conservation interest.

A large number of internationally important seabird colonies are found on the cliffs of the SEA 4 area coast and huge numbers of breeding seabirds are associated with these in spring and early summer. After the breeding season, species such as fulmar, gannet, kittiwake, guillemot, puffin and razorbill leave coastal waters and disperse offshore to feed. Coastal and sheltered waters also support important populations of migratory and wintering wildfowl and waders, as well as breeding birds.

A wide variety of marine mammals occur in the SEA 4 area, with internationally important numbers of grey and common seals found at coastal breeding colonies. The most common cetaceans sighted in shelf waters are harbour porpoise, minke whale and white-beaked dolphin. Offshore species include Atlantic white-sided dolphin, long-finned pilot whale, killer whale, sperm whale and fin whale, some of which are thought to migrate through the area. Several species of beaked whale are thought to inhabit deeper water in the Faroe-Shetland Channel, although there is very little information concerning these species. Hooded seals, which breed in the Arctic, are found in considerable numbers in the deeper waters of the SEA 4 area.

Fisheries are very important in parts of the SEA 4 area. There are several demersal fisheries of which the mixed fishery for cod, haddock and whiting is the most important. The main pelagic fisheries are for herring and mackerel and there are industrial fisheries for sandeel and blue whiting.

Parts of the area have been licensed for oil & gas exploration since 1965 and approaching 200 exploration and appraisal wells have been drilled to date. There are currently two major oilfields in production (Foinaven and Schiehallion) with the Clair field under development. The Sullom Voe and Flotta oil terminals provide facilities for the export of resources from developments to the east and west of the islands. A pipeline transports surplus gas from the Foinaven and Schiehallion fields to the Sullom Voe terminal where the gas is enhanced with natural gas liquids before being piped to the Magnus oilfield in the northern North Sea for use in enhanced oil recovery.

In addition to the oil and gas industry and commercial fisheries, the SEA 4 area provides an important resource for a number of other users. The area experiences low to moderate shipping pressures and a proportion of this involves tanker traffic to and from the Sullom Voe and Flotta oil terminals. Much of the SEA 4 coast is rural in nature and attracts tourists to its unspoilt scenery and natural history interest. Sheltered coastal waters are important for both finfish and shellfish cultivation.

The coastal region supports many prehistoric sites and due to changes in relative sea level, prehistoric submarine archaeological remains of up to about 9,000 years old could occur in the SEA 4 area down to water depths of around 150m. However, despite the potential for sites, marine archaeological discoveries are very rare primarily due to the strong currents and exposed nature of much of the shelf area. There are a large number of identified wrecks throughout the area, some of which are protected.

The SEA 4 area is remote from areas of major industrial activity. However, there are local sources of various contaminants and the atmospheric and hydrographic transport of persistent contaminants into the SEA 4 area has probably resulted in detectable pollution throughout the region. However, contaminant concentrations in water and sediments are typically at background levels.

SEA context and new information for SEA 4 area

Summary	Implications for SEA	Post SEA Information Sources
Geology & substrates	Biodegradation & accumulation of contaminants Range of benthic habitats present Physical disturbance, creating mounds or scars.	-
Climate & Meteorology	Oil spill trajectory. Atmospheric dispersion.	-
General bathymetry	Dispersion of discharges. Seabed features of potential conservation interest.	-
Water masses	Pattern of discharge dispersion. Rate of degradation of organic material. Spilled oil behaviour.	-
Water currents and waves	Spilled oil behaviour & response options. Particulate dispersion & re-dispersion.	-
Existing contamination	Discharge quality criteria.	-
Plankton	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.	-
Benthos	Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.	1. Axelsson (2003) Ph.D. thesis 2. Roberts <i>et al.</i> (2003) paper on <i>Lophelia</i> coral and seabed mounds 3. Van Gaever <i>et al.</i> (2004) paper on meiofauna of the Darwin Mounds
Cephalopods	Possible vulnerability to drilling & operational discharges & spills.	-
Fish	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.	1. Prime Minister's Strategy Unit (2004) report "Net Benefits, a sustainable and profitable future for UK fishing" 2. Royal Society of Edinburgh (2004) "Inquiry into the Future of the Scottish Fishing Industry"
Marine reptiles	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.	-
Seabirds (& coastal birds)	Vulnerability to oil spills.	Seabird populations of Britain & Ireland. Mitchell <i>et al.</i> (2004). Published results of Seabird 2000. The most recent & comprehensive study of the 25 species of seabird which breed in Britain & Ireland.
Seals	Potential disturbance by seismic noise. Vulnerability to oil spills.	-
Cetaceans	Potential disturbance by seismic noise. Vulnerability to oil spills.	-
Potential offshore conservation sites	Potential disturbance by seismic noise. Vulnerability to oil spills.	-

Summary	Implications for SEA	Post SEA Information Sources
Existing human activities	Interference with other users of the marine environment.	-
Coastal sensitivities	Vulnerability to oil spills.	SNH and JNCC websites - provide up-to-date, detailed information on conservation sites.

11.3 Perspectives on prospectivity, scenarios and activity

Consultation with the DTI Licensing and Consents Unit indicates that the summaries of hydrocarbon prospectivity provided in SEAs 1 to 4 remain valid since there have not been any recent significant shifts in perspectives for any of the previously SEAed areas.

The levels of exploration, appraisal and development activity predicted for the areas assessed previously (SEAs 1, 2, 3, & 4) have not yet been exceeded. Table 11.1 below provides a comparison of activity scenarios used in previous SEAs with the actual work programmes accepted by the DTI as part of licence award. The number of exploration and appraisal wells drilled since licence award in the relevant SEA areas is also indicated.

Table 11.1 – Comparison for previous SEAs of predicted and actual activity levels

SEA	Seismic surveys		Exploration wells		
	Predicted	Programmes Bid ¹	Predicted	Programmes Bid	Wells Drilled to Date
SEA 1	10	5	15	7 Firm 6 Contingent 3 D/D	6
SEA 2	16	11	21	4 Firm 5 Contingent 19 D/D	11
SEA 2 Extension	3	5	11	5 Firm 5 Contingent 2 D/D	6
SEA 3	100-200km 2D 500- 2500km ² 3D	8	15	13 D/D	0

Notes:

1. Where work programmes have indicated, "acquire seismic data" this has been interpreted for comparison purposes as a new seismic survey although it can also represent the purchase of existing seismic data i.e. not involving new survey. Reprocessing of existing seismic data has not been included.
2. 52 Promote licences were awarded in the 21st round. The associated confirmed work initial programmes do not involve any activities in the field.

Estimating the likely scale of uptake and subsequent activity in reoffered blocks is complex because of the range of licences that could be offered (traditional, promote or frontier) and uncertainty as to the numbers of blocks which may be relinquished before the next licensing round. For context, since the fallow acreage process began in 2002, 22 exploration or appraisal wells have been drilled resulting in the development of 3 small fields and 2 new discoveries. In addition, since 2002, six new proprietary seismic surveys have been carried out in fallow blocks.

There is an expectation that the fallow acreage process will result in further acreage turnover, particularly in the SEA 2 area, but as prospective blocks are re-evaluated, the percentage take-up will reduce over time. Take-up of relinquished blocks (total of all licence types) in the SEA 2 area is anticipated to be around 50%, and in the other SEA areas about 10-15%. The likely continued uptake of blocks re-offered 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 (as happened in the early to mid 1990s following the discovery of the Foinaven and Schiehallion fields).

A series of paired, colour coded schematics is given (Figures 11.1-11.4) to assist in visualisation of the changes which have occurred in block licensing status between the time of the relevant SEA and today (including the offers made in the 22nd Round – see note below). These schematics give an indication of the areas of low perceived hydrocarbon prospectivity (for example where blocks have been offered but never applied for), as well as changes resulting from whole or part block relinquishment. Where blocks are held under promote licences, these are indicated by a P in the block; Frontier licences are indicated by an F in the block; other blocks licensed are held under traditional production licences.

Note:

On the 14th September 2004, the new UK Energy Minister, Mike O'Brien, announced the results of the 22nd Offshore Licensing Round. In total, 97 offshore licences for the North Sea were offered to 58 companies, covering 163 blocks.

The full awards consisted of 32 'Traditional' Offshore Production Licences and 58 'Promote' Licences. In addition, 7 licences were offered under the 'Frontier' licence scheme, introduced in this round to stimulate renewed interest in the area West of Shetlands. The licence awards affect 2 quadrants in SEA 1, 22 in SEA 2, 5 in SEA 3 and 7 in SEA 4. In the programme of work to be carried out under the awards, there are 3 firm wells in addition to those in Table 11.1 (2 wells in the SEA 2 area and 1 in the SEA 3 area).

The successful applicants now have a fixed period of time in which to decide whether or not to accept the offers; this will affect the exact number of licences that are finally awarded.

Figure 11.1 – Pair of schematics of blocks within the SEA 1 area indicating licensing status before the 19th licensing round, either currently licensed or potentially available for licensing (top) and changes in licensing status since the 19th licensing round (bottom)

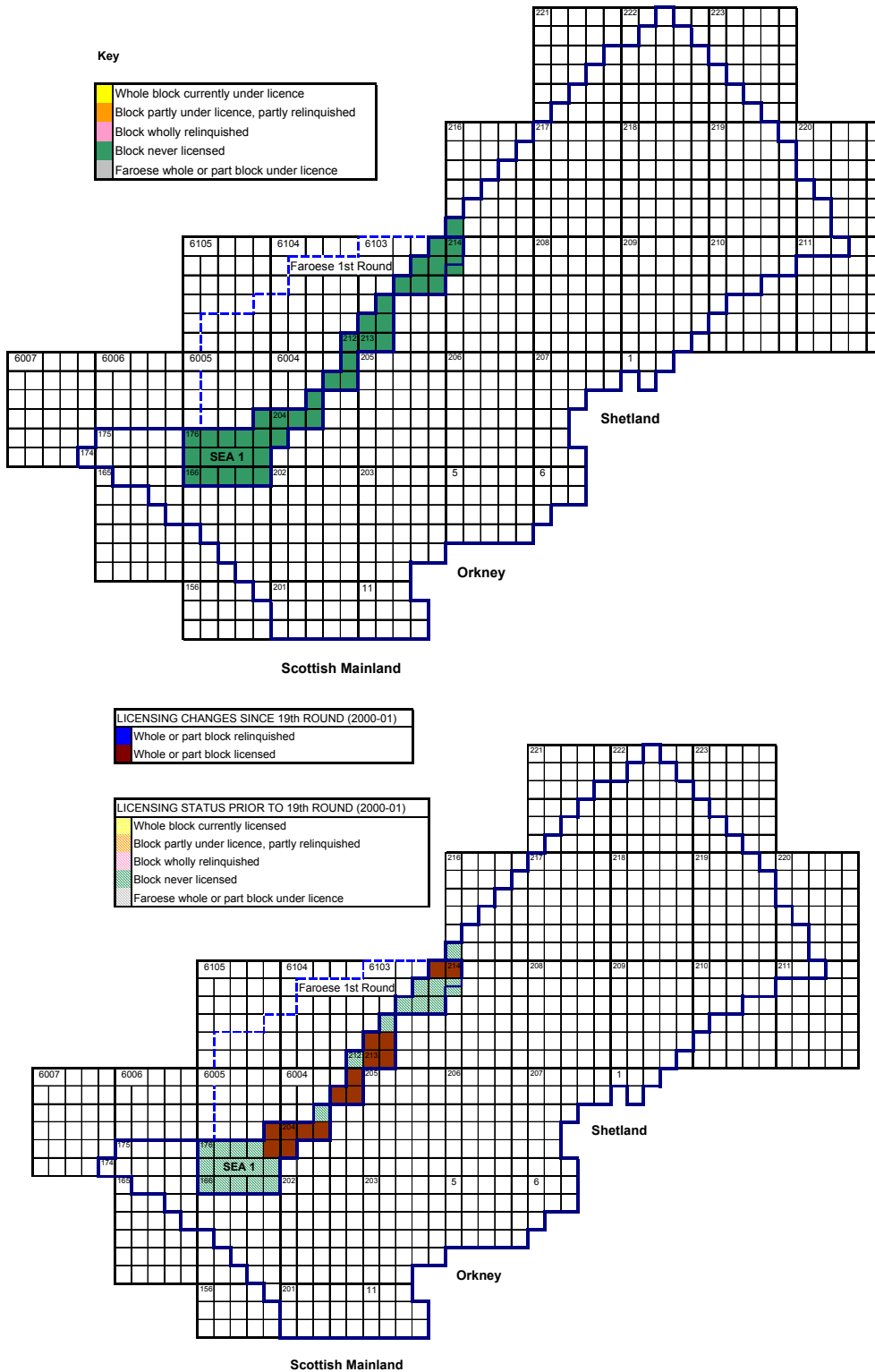


Figure 11.2 – Pair of schematics of blocks within the SEA 2 areas indicating licensing status before the 20th licensing round (left) and changes in licensing status since the 20th licensing round (right)

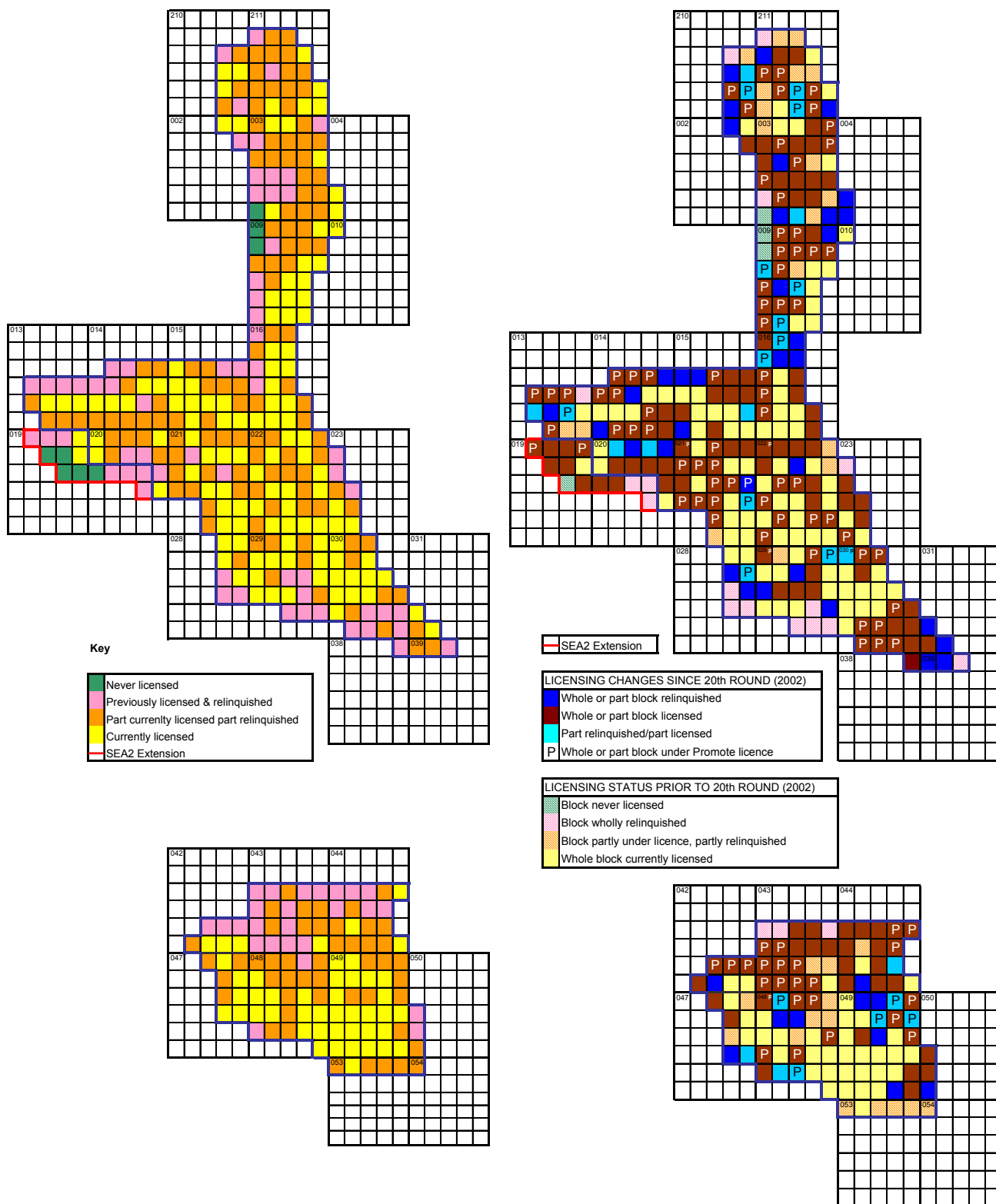
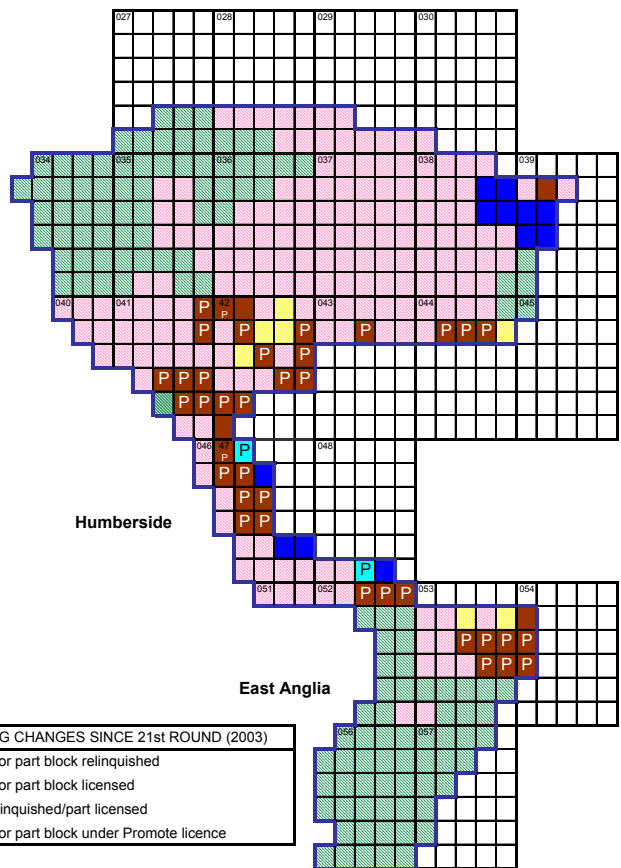
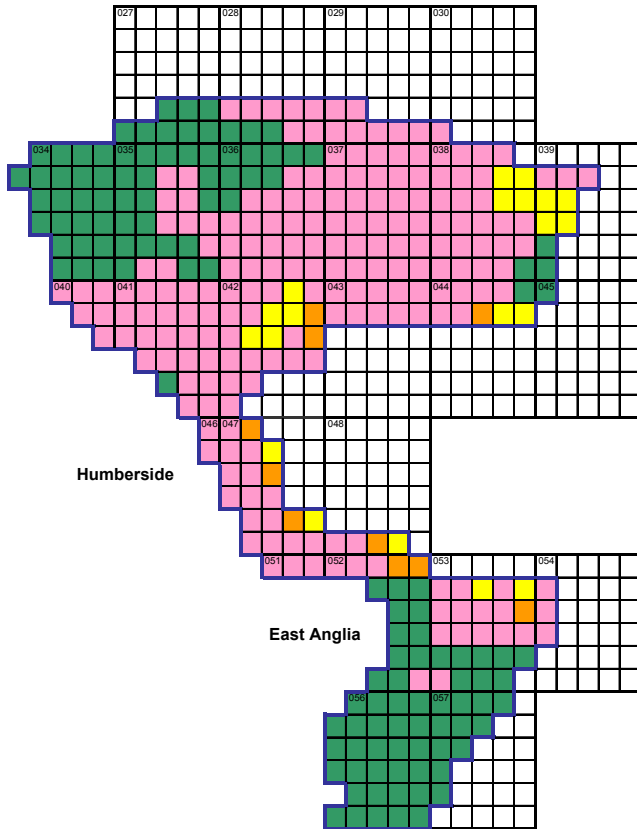


Figure 11.3 – Pair of schematic of blocks within the SEA 3 area indicating licensing status before the 21st licensing round (top) and changes in licensing status since the 21st licensing round (bottom)

Key

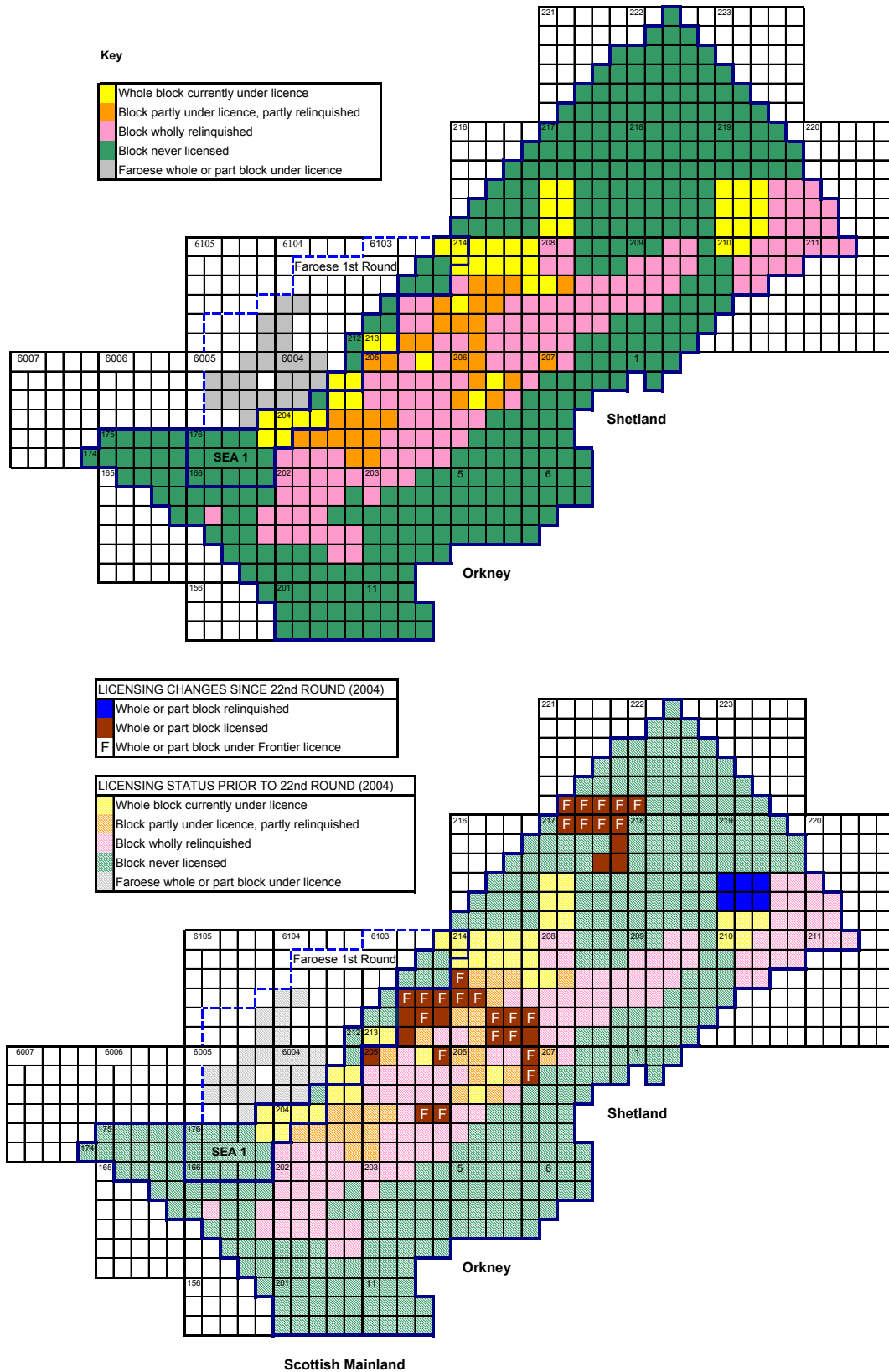
	Whole block currently under licence
	Block partly under licence, partly relinquished
	Block wholly relinquished
	Block never licensed



	Whole or part block relinquished
	Whole or part block licensed
	Part relinquished/part licensed
	Whole or part block under Promote licence

	Block never licensed
	Block wholly relinquished
	Block partly under licence, partly relinquished
	Whole block currently licensed

Figure 11.4 – Pair of schematics of blocks within the SEA 4 area indicating licensing status before the 22nd licensing round (top) (awards yet to be announced) and changes since SEA 4 completed (bottom)



11.4 Discussion

There has been a progression of new environmental regulations which have increased controls on offshore oil and gas activities, and these have been documented in previous SEAs and in Section 3 of this Environmental Report. In addition, the processes and potential areas for designation as coastal and offshore conservation sites have become clearer (see underpinning reports for SEA 2 onwards) although most offshore sites have yet to be proposed.

The new information on the environment and uses for the various SEA areas outlined in Section 11.2 in general provides amplification to existing perspectives rather than revolutionising them. Similarly, the new information which has appeared on the effects of oil and gas activities has not shown any new significant or unanticipated sources of significant effect that would alter the conclusions of the earlier DTI SEAs.

Equally however, substantive 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.

From this consideration it is concluded that 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 that subsequently 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).

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