

APPENDIX 4 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 1 AREA

The following appendix provides details of new information sources published since SEA 1 was completed in 2000. Changes (or clarifications) to the environmental baseline of the SEA 1 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 4a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds, marine mammals, and sites and species of nature conservation importance.
- 4b Geology and sediments
- 4c Landscape/Seascape
- 4d Water environment
- 4e Air quality
- 4f Climatic factors
- 4g Population and human health
- 4h Material assets (infrastructure, other natural resources)
- 4i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
4a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Edwards <i>et al.</i> (2001). Long-term and regional variability of phytoplankton biomass in the north-east Atlantic (1960–1995). <i>ICES Journal of Marine Science</i> 58: 39–49. • Beaugrand <i>et al.</i> (2002). Reorganisation of North Atlantic marine copepod biodiversity and climate. <i>Science</i> 296: 1692–1694. • Beaugrand (2003). Long-term changes in copepod abundance and diversity in the north-east Atlantic in relation to fluctuations in the hydroclimatic environment. <i>Fisheries Oceanography</i> 12: 270–283. • Debes (2003). Macrozooplankton in the Faroe-Shetland Channel. Faroese Fisheries Laboratory.² 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> • Johns & Wootton (2003). Plankton report for Strategic Environmental Assessment Area 4. Report to the DTI.¹ • Reid <i>et al.</i> (2005). 2. <i>State of plankton</i>. In: Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas. • Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 		
Benthos	<ul style="list-style-type: none"> • Bett (2001). UK Atlantic margin environmental survey: Introduction and overview of bathyal benthic ecology. <i>Continental Shelf Research</i> 21: 917-956. • Bett <i>et al.</i> (2001). Expert review of seabed fauna and chemistry. GEM² • ERTSL (2001). BP Clair field development (UKCS Block 206/8), seabed environmental survey April/May 2000. Report R00/203 for BP. • Gage (2001). Deep-sea benthic community and environmental impact assessment at the Atlantic Frontier. <i>Continental Shelf Research</i> 21: 957-986. • Hartley Anderson (2002). Suilven field development - Report of photographic and video environmental survey. Report to BP. • Mannvik <i>et al.</i> (2002). Environmental baseline survey of the Faroe offshore licence areas 001 – 004 in the Faroe – Shetland Channel. Akvaplan-NIVA.² • Bett (2003). An introduction to the benthic ecology of the Faroe-Shetland Channel (SEA 4). Report to the DTI.¹ • Eleftheriou (2003). Synthesis of information on the shallow benthos of the SEA 4 Area. Report to the DTI.¹ • Masson <i>et al.</i> (2003). The origin of deep-water, coral-topped mounds in the northern Rockall Trough, Northeast Atlantic. <i>Marine Geology</i> 194: 159-180. • Roberts <i>et al.</i> (2003). The cold-water coral <i>Lophelia pertusa</i> (Scleractinia) and enigmatic seabed mounds along the north-east Atlantic margin: are they related? <i>Marine Pollution Bulletin</i> 46: 7-20. • Henry & Roberts (2004). The biodiversity, characteristics and distinguishing features of deep-water epifaunal communities from the Wyville-Thomson Ridge, Darwin Mounds and Faeroes Plateau. Report to AFEN. • Van Gaever <i>et al.</i> (2004). The macro- and micro-scale patchiness of meiobenthos associated with the Darwin Mounds (north-east Atlantic). <i>Journal of the Marine Biological Association of the United Kingdom</i> 84: 	<p>Distribution patterns and abundance of benthic species in the Faroe Shetland Channel (FSC) well documented.</p> <p>Further information collated (often as part of the SEA process) on potential habitats of international importance including deep water coral reefs.</p>	<p>Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected reef habitats of the Darwin Mounds pSAC and Wyville Thomson Ridge dSAC.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>547-556.</p> <ul style="list-style-type: none"> • Costello <i>et al.</i> (2005). Role of cold-water <i>Lophelia pertusa</i> reefs as fish habitat in the NE Atlantic. In: A Freiwald & JM Roberts (Eds.). <i>Cold-water corals and ecosystems</i>. Springer-Verlag, Berlin Heidelberg. • Davies <i>et al.</i> (2005). 3. State of benthos. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas</i>. • Gage <i>et al.</i> (2005). Potential impacts of deep-sea trawling on the benthic ecosystem along the northern European continental margin: a review. • Narayanaswamy <i>et al.</i> (2005). Ecology of bathyal polychaete fauna at an Arctic-Atlantic boundary (Faroe-Shetland Channel, North-east Atlantic). <i>Marine Biology Research</i> 1: 20-32. • Davies <i>et al.</i> (2006). An Introduction to the benthic ecology of the Rockall-Hatton Area (SEA 7). Report to the DTI.¹ • Jones <i>et al.</i> (2006). Effects of physical disturbance on the cold-water megafaunal communities of the Faroe Shetland Channel. <i>Marine Ecology Progress Series</i> 319: 43-54. 		
Cephalopods	<ul style="list-style-type: none"> • Pierce <i>et al.</i> (2003). An overview of cephalopods relevant to the SEA 4 Area. Report to the DTI.¹ • Pierce & Boyle (2003). Empirical modelling of interannual trends in abundance of squid (<i>Loligo forbesi</i>) in Scottish waters. <i>Fisheries Research</i> 59: 305-326. • Anonymous (2005). Report of the working group on cephalopod fisheries and life history (WGCEPH). ICES CM 2005/05. 	Limited information about cephalopod life histories, distribution and abundance, particularly of deeper water species.	Possible vulnerability to drilling & operational discharges or spills..
Fish and shellfish	<ul style="list-style-type: none"> • Gordon (2001). Deep-water fisheries at the Atlantic frontier. <i>Continental Shelf Research</i> 21: 987-1003. • Gordon (2003). Fish and fisheries in the SEA 4 Area. Report to the DTI.¹ • Fishery Agencies (2005). Marine fish and fisheries. The 4th of 5 reports produced to support DEFRA's Charting progress – an integrated assessment of the state of UK seas. • ICES (2005). Report of the study group on the bycatch of salmon in pelagic trawl fisheries (SGBYSAL), ICES CM 2005/ACFM:13. 	<p>The distribution and abundance of fish and their associated fisheries in the FSC well documented.</p> <p>Further clarification of the importance of the FSC for migrating salmon.</p>	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.
Marine reptiles	<ul style="list-style-type: none"> • UK & Eire marine turtle strandings & sightings annual reports (Penrose 2002, 2003, 2004, 2005, Penrose & Gander 2006, 2007). 	Marine turtles rarely sighted in the SEA 1 area with the majority of UK sightings recorded from the south and west.	Possible vulnerability to drilling & operational discharges or spills.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
Seabirds	<ul style="list-style-type: none"> • Taylor & Reid (2001). The distribution of seabirds and cetaceans around the Faroe Islands. JNCC.² • Wiese <i>et al.</i> (2001). Seabirds at risk around offshore oil platforms in the North-west Atlantic. <i>Marine Pollution Bulletin</i> 42: 1285-1290. • Mitchell <i>et al.</i> (2004). Seabird populations of Britain & Ireland. T. & A.D. Poyser, London. • Mitchell <i>et al.</i> (2005). 6. State of breeding seabirds. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas</i>. • Mavor <i>et al.</i> (2006). Seabird numbers and breeding success in Britain and Ireland, 2005. Peterborough, JNCC. • Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK waters to highlight gaps in coverage. A report to the DTI.¹ 	<p>Limited information on seabirds present over SEA 1 area.</p> <p>Overall ESAS survey coverage of SEA 1 area was 8% (29% of target coverage) and the second lowest after SEA 7 area. Seasonally, 42% of the target coverage was achieved in summer with almost 16% during the winter months.</p>	Vulnerability to oil spills.
Marine mammals	<ul style="list-style-type: none"> • Harwood & Wilson (2001). The implications of developments on the Atlantic Frontier for marine mammals. <i>Continental Shelf Research</i> 21: 1073-1093. • Lawson <i>et al.</i> (2001). Assessment of noise issues relevant to marine mammals near the BP Clair Development. Report to BP. • Taylor & Reid (2001). The distribution of seabirds and cetaceans around the Faroe Islands. JNCC.² • Hammond <i>et al.</i> (2002). Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. <i>Journal of Applied Ecology</i> 39: 361-376. • Swift <i>et al.</i> (2002). Studying the distribution and behaviour of cetaceans in the northeast Atlantic using passive acoustic techniques. A report to AFEN. • Hammond <i>et al.</i> (2003). Background information on marine mammals relevant to Strategic Assessment 4.¹ • Reid <i>et al.</i> (2003). An atlas of cetacean distribution on the northwest European continental shelf. JNCC. • Stone (2003a). Marine mammal observations during seismic surveys in 2000. JNCC Report No. 322. • Stone (2003b). The effects of seismic activity on marine mammals in UK waters, 1998-2000. JNCC Report No. 323. • Matthiopoulos <i>et al.</i> (2004). Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. <i>Journal of Applied Ecology</i> 41: 476-491. • Boyd <i>et al.</i> (2005). 5. State of seals. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated</i> 	<p>Seal tagging studies indicate that seals forage more widely than previously thought although likely to be present in the SEA 1 area only rarely.</p> <p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Marine mammals survey coverage of the SEA 1 area still limited.</p> <p>Limited understanding of the effects of noise on marine mammals.</p>	Potential disturbance by seismic noise. Vulnerability to oil spills.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>assessment of the state of UK seas.</p> <ul style="list-style-type: none"> • Harland <i>et al.</i> (2005). Underwater ambient noise. SEA 6 Technical report.¹ • Reid <i>et al.</i> (2005). 4. State of cetaceans. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 		
Sites and species of nature conservation importance	<ul style="list-style-type: none"> • Gubbay <i>et al.</i> (2002). The offshore directory – Review of selection of habitats, communities and species of the north-east Atlantic. A report for WWF. • Johnston <i>et al.</i> (2002). Natura 2000 in UK offshore waters: Advice to support the implementation of the EC Habitats and Birds Directive in UK offshore waters. JNCC Report 325. • AICSM & Hartley Anderson (2003). Coastal conservation sites in the SEA 4 Area. Report to the DTI.¹ • Johnston <i>et al.</i> (2003). Marine Natura 2000. JNCC 03 P01. • The Food, Veterinary and Environmental Agency (2003). Faroe Islands coastal resources and prioritisation maps.² • JNCC (2004). Developing the concept of an ecologically coherent network of OSPAR Marine Protected Areas. JNCC 04 N08. • Johnston <i>et al.</i> (2004a). Progress in identifying SACs for Annex I habitats, including proposals for four offshore habitat SACs. JNCC 04 P23. • Johnston <i>et al.</i> (2004b). Update on progress in marine Natura. JNCC 04 P05. • Hill <i>et al.</i> (2005). 1. State of habitats. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Turnbull <i>et al.</i> (2005). Marine Natura 2000. JNCC 05 P10. • OSPAR (2006). 2005/2006 report on the status of the OSPAR network of Marine Protected Areas. • OSPAR (2006). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR biodiversity series. • Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. • Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 	<p>The Darwin Mounds on the Wyville Thomson Ridge were noted in SEA 1 as requiring special consideration. The mounds are a pSAC and have been afforded protection under Council Regulation (EC) No 602/2004 of 22 March 2004 amending Regulation (EC) No 850/98 as regards the protection of deepwater coral reefs from the effects of trawling in an area north west of Scotland which entered into force on 23 August 2004.</p> <p>The Wyville Thomson Ridge has been designated a dSAC for reef habitat.</p> <p>Areas of potential Annex I habitat for consideration as SACs include iceberg ploughmarks on northern shelf breaks (reefs).</p>	<p>Potential disturbance by seismic noise. Physical disturbance. Vulnerability to oil spills.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected reef habitats of the Darwin Mounds pSAC and Wyville Thomson Ridge dSAC.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	N09. <ul style="list-style-type: none"> SNH (http://www.snh.org.uk) and JNCC (http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites. 		
4b Geology and sediments	<ul style="list-style-type: none"> Masson (2001). Sedimentary processes shaping the eastern slope of the Faroe-Shetland Channel. <i>Continental Shelf Research</i> 21: 825-857. Hartley Anderson (2003). UKOOA drill cuttings initiative. Food chain effects literature review. Report to UKOOA from Hartley Anderson Ltd., Battelle Memorial Institute, Continental Shelf Associates Inc., and the School of Ocean Sciences, University of Bangor. Hitchen <i>et al.</i> (2003). DTI Strategic Environmental Assessment Area 4 (SEA 4): Subseabed geology. British Geological Survey.¹ Holmes <i>et al.</i> (2003a). DTI Strategic Environmental Assessment Area 4 (SEA 4): Continental shelf seabed geology and processes. British Geological Survey.¹ Holmes <i>et al.</i> (2003b). DTI Strategic Environmental Assessment Area 4 (SEA4): Geological evolution Pilot Whale diapirs and stability of the seabed habitat. British Geological Survey.¹ Masson <i>et al.</i> (2003). Seafloor sediments and sedimentary processes on the outer continental shelf, continental slope and basin floor. Southampton Oceanography Centre. Report for DTI SEA 4.¹ Review of the analysis of oil residues collected for AFEN January 1996 to February 2003 ERT Data Report 885 July 2003. Analyses of sediment samples taken during SEA 4 survey. ERT Data Report.¹ Hoydal (2004). Coastal baseline – Exposure and effects of PAH in the coastal zone around the Faroe Islands. Food, Veterinary and Environmental Agency.² Marine Environment Monitoring Group (2004). UK national marine monitoring programme - Second report (1999-2001). CEFAS. Marine Environmental Monitoring Group (2005). Marine environment quality. Report for Charting progress – an integrated assessment of the state of UK seas. OSPAR (2006a). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	<p>Further characterisation of the geology and sedimentary processes shaping the area.</p> <p>In general, very little contamination of water and sediments. Sediment hydrocarbon concentrations above background close to production installations.</p>	<p>Biodegradation & accumulation of contaminants. Range of benthic habitats present. Physical disturbance.</p>
4c Landscape/Seascape	-	-	-
4d Water environment	<ul style="list-style-type: none"> Swift & Thompson (2001). Identifying potential sources of industrial noise in the Foinaven and Schiehallion region. Report for BP. 	Further characterisation of the tidal currents and waves of the region.	Pattern of discharge dispersion.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> DTI (2004). Atlas of UK marine renewable energy resources. A Strategic Environmental Assessment Report. Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the Department of Trade and Industry.¹ 	<p>Information on temporal and spatial changes to water masses and flow through the region.</p> <p>Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.</p>	<p>Rate of degradation of organic material.</p> <p>Spilled oil behaviour.</p> <p>Spilled oil behaviour & response options.</p> <p>Particulate dispersion & re-dispersion.</p> <p>Noise pollution.</p>
4e Air quality	<ul style="list-style-type: none"> OSPAR (2006). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. 	Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.	Potential emissions of air pollutants.
4f Climatic factors	<ul style="list-style-type: none"> Baggott <i>et al.</i> (2005). Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2003. Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 	Further characterisation of the drivers of climate change and potential implications.	Oil spill trajectory. Atmospheric dispersion.
4g Population and human health	-	-	-
4h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> DTI (2003). Petroleum prospectivity of the principal sedimentary basins on the United Kingdom Continental Shelf. UK Promote. Hartley Anderson & AICSM (2003). Existing users and management initiatives relevant to SEA 4. Report to the DTI.¹ Mackay Consultants (2003). The potential socio-economic implications of licensing the SEA 4 area. A report for the DTI.¹ Prime Minister's Strategy Unit (2004) report "Net Benefits, a sustainable and profitable future for UK fishing." RSE (Royal Society of Edinburgh) (2004). Inquiry into the future of the Scottish fishing industry. Fishery Agencies (2005). Marine fish and fisheries. Report for Charting progress – an integrated assessment of the state of UK seas. DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) DTI energy statistics website 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities.	Interference with other users of the marine environment. Potential for cumulative effects.

SEA 7 – Offshore oil and gas licensing

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>(http://www.dti.gov.uk/energy/statistics/index.html).</p>		
<p>4i Cultural heritage, including architectural and archaeological heritage</p>	<ul style="list-style-type: none"> Flemming (2003). The scope of Strategic Environmental Assessment of continental shelf area SEA 4 in regard to prehistoric archaeological remains.¹ 	<p>Prospect of archaeological remains in the SEA 1 area very poor.</p>	<p>Potential to damage sites during drilling or construction. Opportunity to discover previously unrecognised sites.</p>

Notes:

1. All SEA Technical Reports and Consultation Documents are available on the DTI SEA website (www.offshore-sea.org.uk).
2. All reports available on the Faroese Oil Industry Group (FOIB) website (<http://www.foib.fo/FoibPortal/DesktopDefault.aspx?tabid=113>).

APPENDIX 5 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 2 AREA

The following appendix provides details of new information sources published since SEA 2 was completed in 2001. Changes (or clarifications) to the environmental baseline of the SEA 2 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 5a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds and coastal waterbirds, marine mammals, and sites and species of nature conservation importance.
- 5b Geology and sediments
- 5c Landscape/Seascape
- 5d Water environment
- 5e Air quality
- 5f Climatic factors
- 5g Population and human health
- 5h Material assets (infrastructure, other natural resources)
- 5i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
5a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Beaugrand <i>et al.</i> (2002). Reorganisation of North Atlantic marine copepod biodiversity and climate. <i>Science</i> 296: 1692–1694. • Edwards <i>et al.</i> (2002). Ocean climate anomalies and the ecology of the North Sea. <i>Marine Ecology Progress Series</i> 239: 1-10. • Johns (2002). Overview of plankton ecology in the North Sea Addendum to SEA 2. Report to the DTI.¹ • Beaugrand G (2003). Long-term changes in copepod abundance and diversity in the north-east Atlantic in relation to fluctuations in the hydroclimatic environment. <i>Fisheries Oceanography</i> 12: 270–283. • Beaugrand <i>et al.</i> (2003). Plankton effect on cod recruitment in the 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>North Sea. <i>Nature</i> 426: 661-664.</p> <ul style="list-style-type: none"> • Johns (2004). Plankton report for Strategic Environmental Assessment Area 5. Report to the DTI.¹ • Reid <i>et al.</i> (2005). 2. State of plankton. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 		
Benthos	<ul style="list-style-type: none"> • Callaway <i>et al.</i> (2002). Diversity and community structure of epibenthic invertebrates and fish in the North Sea. <i>ICES Journal of Marine Science</i> 59: 1199-1214. • Hiscock <i>et al.</i> (2002). Environmental screening for marine habitats & species for R2 wind licensing. • Whomersley & Picken (2003). Long-term dynamics of fouling communities found on offshore installations in the North Sea. <i>Journal of the Marine Biological Association of the United Kingdom</i> 83: 897-901. • Eleftheriou <i>et al.</i> (2004). Synthesis of information on the benthos of area SEA 5. Report for the DTI.¹ • Costello <i>et al.</i> (2005). Role of cold-water <i>Lophelia pertusa</i> reefs as fish habitat in the NE Atlantic. In: A Freiwald & JM Roberts (Eds.). <i>Cold-water corals and ecosystems.</i> Springer-Verlag, Berlin Heidelberg. • Davies <i>et al.</i> (2005). 3. State of benthos. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> 	<p>Distribution patterns and abundance of benthic species in the North Sea well documented.</p> <p>Further information collated (often as part of the SEA process) on potential habitats of international importance.</p> <p>See <i>Sites and species of nature conservation importance</i> below for details of protected benthic habitats.</p>	<p>Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features of the dSACs.</p>
Cephalopods	<ul style="list-style-type: none"> • Pierce <i>et al.</i> (2002). Overview of cephalopods relevant to the SEA 2 and SEA 3 Areas. Report to the DTI.¹ • Pierce & Boyle (2003). Empirical modelling of interannual trends in abundance of squid (<i>Loligo forbesi</i>) in Scottish waters. <i>Fisheries Research</i> 59: 305-326. • Stowasser <i>et al.</i> (2004). An overview of cephalopods relevant to the SEA 5 Area. Report to the DTI.¹ • Anonymous (2005). Report of the working group on cephalopod fisheries and life history (WGCEPH). ICES CM 2005/05. 	<p>Limited information about cephalopod life histories, distribution and abundance, particularly of deeper water species.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Fish and shellfish	<ul style="list-style-type: none"> • Chapman (2004). Northern North Sea shellfish and fisheries. SEA 5 technical report for DTI.¹ • Fishery Agencies (2005). Marine fish and fisheries. The 4th of 5 reports produced to support DEFRA's Charting progress – an integrated 	<p>The distribution and abundance of fish and shellfish and their associated fisheries in the North Sea fairly well documented.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>assessment of the state of UK seas.</p> <ul style="list-style-type: none"> • Heath (2005). Changes in the structure and function of the North Sea fish foodweb, 1973-2000, and the impacts of fishing and climate. <i>ICES Journal of Marine Science</i> 62: 847-868. • ICES (2005). Report of the study group on the bycatch of salmon in pelagic trawl fisheries (SGBYSAL), ICES CM 2005/ACFM:13. • Daan (2006). Spatial and temporal trends in species richness and abundance for the southerly and northerly components of the North Sea fish community separately, based on IBTS data 1977-2005. ICES CM 2006/D:02. 	<p>There appears to have been a gradual change in the demersal fish communities of the North Sea with overexploitation and climate change potential drivers.</p>	<p>Timing of seismic surveys.</p>
Marine reptiles	<ul style="list-style-type: none"> • UK & Eire marine turtle strandings & sightings annual reports (Penrose 2002, 2003, 2004, 2005, Penrose & Gander 2006, 2007). 	<p>Marine turtles rarely sighted in the North Sea with the majority of UK sightings recorded from the south and west.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Seabirds and coastal waterbirds	<ul style="list-style-type: none"> • Barton & Pollock (2004a). Review of the potential impacts of offshore wind farms on migrating and overwintering swans and geese in the SEA 5 area. Cork Ecology. Report to the DTI.¹ • Barton & Pollock (2004b). Review of divers, grebes and seaduck distribution and abundance in the SEA 5 area. Report to the DTI.¹ • Dean <i>et al.</i> (2004). Surveillance of wintering seaduck, divers and grebes in UK inshore areas: Aerial surveys 2002/03. JNCC Report No. 345. • Mitchell <i>et al.</i> (2004). Seabird populations of Britain & Ireland. T. & A.D. Poyser, London. • Mitchell <i>et al.</i> (2005). 6. State of breeding seabirds. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Banks <i>et al.</i> (2006). The wetland bird survey 2004/05: Wildfowl and wader counts. BTO/WWT/RSPB/JNCC, Thetford. • Mavor <i>et al.</i> (2006). Seabird numbers and breeding success in Britain and Ireland, 2005. Peterborough, JNCC. • Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK waters to highlight gaps in coverage. A report to the DTI.¹ 	<p>Further information on the distribution and abundance of coastal waterbirds and seabirds.</p> <p>Overall ESAS survey coverage of SEA 2 area was 12% (44% of target coverage). Seasonally, 63% of the target coverage was achieved in summer with almost 25% during the winter months.</p>	<p>Vulnerability to oil spills.</p>
Marine mammals	<ul style="list-style-type: none"> • Hammond <i>et al.</i> (2002). Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. <i>Journal of Applied Ecology</i> 39: 361-376. • Hammond <i>et al.</i> (2002). Background information on marine mammals relevant to Strategic Environmental Assessments 2 and 3. Report to 	<p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Limited understanding of the effects</p>	<p>Potential disturbance by seismic noise. Vulnerability to oil spills.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>the DTI.¹</p> <ul style="list-style-type: none"> • Reid <i>et al.</i> (2003). An atlas of cetacean distribution on the northwest European continental shelf. JNCC. • Stone (2003). Marine mammal observations during seismic surveys in 2000. JNCC Report No. 322. • Stone (2003). The effects of seismic activity on marine mammals in UK waters, 1998-2000. JNCC Report No. 323. • Hammond <i>et al.</i> (2004). Background information on marine mammals relevant to Strategic Environmental Assessment 5. Report to the DTI.¹ • Matthiopoulos <i>et al.</i> (2004). Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. <i>Journal of Applied Ecology</i> 41: 476-491. • Boyd <i>et al.</i> (2005). 5. State of seals. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Harland <i>et al.</i> (2005). Underwater ambient noise. SEA 6 technical report.¹ • Reid <i>et al.</i> (2005). 4. State of cetaceans. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Longeran <i>et al.</i> (2007). Using sparse survey data to investigate the declining abundance of British harbour seals. <i>Journal of Zoology</i> 271: 261–269. • SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 	<p>of noise on marine mammals.</p> <p>Recent tagging studies indicate that both grey and common seals forage extensively in nearshore and offshore areas of the North Sea.</p> <p>Potential declines in the UK harbour seal population.</p>	
Sites and species of nature conservation importance	<ul style="list-style-type: none"> • Gubbay <i>et al.</i> (2002). The Offshore directory – Review of selection of habitats, communities and species of the north-east Atlantic. A report for WWF. • Hartley Anderson (2002). Conservation sites in the SEA 3 Area. Report to the DTI.¹ • Johnston <i>et al.</i> (2002). Natura 2000 in UK offshore waters: Advice to support the implementation of the EC Habitats and Birds Directive in UK offshore waters. JNCC Report 325. • Johnston <i>et al.</i> (2003). Marine Natura 2000. JNCC 03 P01. • AICSM & Hartley Anderson (2004). Conservation sites in the SEA 5 Area. Report to the DTI.¹ • JNCC (2004). Developing the concept of an ecologically coherent network of OSPAR Marine Protected Areas. JNCC 04 N08. • Johnston <i>et al.</i> (2004). Progress in identifying SACs for Annex I 	<p>Since SEA 2, number of offshore sites put forward as draft SACs in the area - the Dogger Bank, North Norfolk Sandbanks and Saturn Reef, Scanner pockmark, and the Braemar Pockmarks.</p> <p>Areas of potential Annex I habitat for consideration as SACs include carbonate structures in Block 23/16 (submarine structures made by leaking gases); Haddock Bank; Haisborough Tail, Hewett Ridges, Hammond Knoll & Smiths Knoll</p>	<p>Potential disturbance by seismic noise. Physical disturbance. Vulnerability to oil spills.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features of the dSACs.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>habitats, including proposals for four offshore habitat SACs. JNCC 04 P23.</p> <ul style="list-style-type: none"> • Johnston <i>et al.</i> (2004). Update on progress in marine Natura. JNCC 04 P05. • Turnbull (2004). The use of generic guidance for extending existing SPAs for breeding seabirds. JNCC Marine Natura 2000 consultation document. • Turnbull <i>et al.</i> (2005). Marine Natura 2000. JNCC 05 P10. • Hill <i>et al.</i> (2005). 1. State of habitats. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • OSPAR (2006b). 2005/2006 report on the status of the OSPAR network of Marine Protected Areas. • OSPAR (2005). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR Biodiversity Series. • Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. • Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 N09. • SNH (http://www.snh.org.uk), Natural England (http://www.naturalengland.org.uk/) and JNCC (http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites. 	<p>(sandbank slightly covered by seawater all the time).</p>	
5b Geology and sediments	<ul style="list-style-type: none"> • BGS (2002). North Sea geology. Technical report produced for SEA 2 & SEA 3. British Geological Survey.¹ • Second phase reports of the UKOOA/OLF drill cuttings research and development programme (http://www.ukooa.co.uk/issues/drillcuttings).² • Hartley Anderson (2003). UKOOA drill cuttings initiative. Food chain effects literature review. Report to UKOOA from Hartley Anderson Ltd., Battelle Memorial Institute, Continental Shelf Associates Inc., and the School of Ocean Sciences, University of Bangor. • Russell <i>et al.</i> (2003). The effects of oil exploration and production in the Fladen Ground: temporal trends in hydrocarbon composition and concentration between 1989 and 2001. FRS website (http://www.frs-scotland.gov.uk). • DNV (2004). Cutting piles – Area contaminated with THC.³ • Holmes <i>et al.</i> (2004). DTI Strategic Environmental Assessment Area 5 (SEA5): Seabed and superficial geology and processes. British 	<p>Further characterisation of the geology and sedimentary processes shaping the area.</p> <p>BGS completed a study of the origin of shallow gas in Blocks 15/20c and 15/25d which are currently restricted for licensing as a result of the SEA process.</p> <p>The potential environmental impacts of cuttings piles and other pollutants further defined.</p> <p>Contaminant sampling of the Fladen</p>	<p>Biodegradation & accumulation of contaminants Range of benthic habitats present Physical disturbance.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>Geological Survey.¹</p> <ul style="list-style-type: none"> • Marine Environment Monitoring Group (2004). UK national marine monitoring programme - Second report (1999-2001). CEFAS. • Holmes & Stoker (2005). Investigation of the origin of shallow gas in Outer Moray Firth open blocks 15/20c and 15/25d. Report to the DTI.¹ • Kenyon & Cooper (2005). Sand banks, sand transport and offshore wind farms. Report to the DTI.¹ • Marine Environmental Monitoring Group (2005). Marine environment quality. Report for Charting progress – an integrated assessment of the state of UK seas. • OLF (2005). Risk assessment of reproductive effects of alkyl phenols in produced water on fish stocks in the North Sea.³ • OSPAR (2006). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	<p>Ground by FRS (reported 2002 and 2005) has indicated that hydrocarbon concentrations in sediments have declined significantly in recent years.</p>	
5c Landscape/Seascape	-	-	-
5d Water environment	<ul style="list-style-type: none"> • DTI (2004). Atlas of UK marine renewable energy resources. A Strategic Environmental Assessment Report. • Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. • Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the DTI.¹ 	<p>Further characterisation of the tidal currents and waves of the region.</p> <p>Information on temporal and spatial changes to water masses and flow through the region.</p> <p>Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.</p>	<p>Pattern of discharge dispersion.</p> <p>Rate of degradation of organic material.</p> <p>Spilled oil behaviour.</p> <p>Spilled oil behaviour & response options.</p> <p>Particulate dispersion & re-dispersion.</p> <p>Noise pollution.</p>
5e Air quality	<ul style="list-style-type: none"> • OSPAR (2006c). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. • Local air quality management website http://www.airquality.co.uk/archive/laqm/laqm.php • National atmospheric emissions inventory website http://www.naei.org.uk/index.php 	<p>Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.</p>	<p>Potential emissions of air pollutants.</p>
5f Climatic factors	<ul style="list-style-type: none"> • DEFRA (2002). Climate change scenarios for the United Kingdom. The 	<p>Further characterisation of the</p>	<p>Oil spill trajectory.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>UKCIP02 briefing report.</p> <ul style="list-style-type: none"> • Baggott <i>et al.</i> (2005). Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2003. • Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. • Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 	drivers of climate change and potential implications.	Atmospheric dispersion.
5g Population and human health	-	-	-
5h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> • Hartley Anderson (2002). Coastal initiatives and management plans in the SEA 3 area. Report to the DTI.¹ • Hartley Anderson (2002). Human activities in the SEA 3 area. Report to the DTI.¹ • Hartley Anderson (2002). Other designated sites in the SEA 3 area. Report to the DTI.¹ • Kemp & Stephen (2002). The potential socio-economic implications of licensing the SEA 3 area. Report to the DTI.¹ • DTI (2003). Petroleum prospectivity of the principal sedimentary basins on the United Kingdom continental shelf. UK Promote. • Hartley Anderson & AICSM (2004). Existing users and management initiatives relevant to SEA 5. Report to the DTI.¹ • Mackay Consultants (2004). The potential socio-economic implications of licensing the SEA 5 area. A report for the DTI.¹ • RSE (Royal Society of Edinburgh) (2004). Inquiry into the future of the Scottish fishing industry. • Fishery Agencies (2005). Marine fish and fisheries. Report for Charting progress – an integrated assessment of the state of UK seas. • DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) • DTI energy statistics website (http://www.dti.gov.uk/energy/statistics/index.html). 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities particularly in the SEA 2 area.	Interference with other users of the marine environment. Potential for cumulative effects.
5i Cultural heritage, including architectural and archaeological heritage	<ul style="list-style-type: none"> • Flemming (2002). The scope of Strategic Environmental Assessment of North Sea areas SEA3 and SEA2 in regard to prehistoric archaeological remains. Report to the DTI.¹ • Dawson (2003). Coastal archaeology and erosion in Scotland. Conference Edinburgh 1998. Historic Scotland. • Flemming (2004). The scope of Strategic Environmental Assessment of North Sea area SEA5 in regard to prehistoric archaeological remains. 	Further definition of potential and actual archaeological resource.	Potential to damage sites during drilling or construction. Opportunity to discover previously unrecognised sites.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	Report to the DTI. ¹		

Notes:

1. All SEA Technical Reports and Consultation Documents are available on the DTI SEA website (www.offshore-sea.org.uk).
2. Reports available on UKOOA website (<http://www.ukooa.co.uk>).
3. Reports available on the OLF website (<http://www.olf.no>).

APPENDIX 6 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 3 AREA

The following appendix provides details of new information sources published since SEA 3 was completed in 2002. Changes (or clarifications) to the environmental baseline of the SEA 3 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 6a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds and coastal waterbirds, marine mammals, and sites and species of nature conservation importance.
- 6b Geology and sediments
- 6c Landscape/Seascape
- 6d Water environment
- 6e Air quality
- 6f Climatic factors
- 6g Population and human health
- 6h Material assets (infrastructure, other natural resources)
- 6i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
6a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Beaugrand G (2003). Long-term changes in copepod abundance and diversity in the north-east Atlantic in relation to fluctuations in the hydroclimatic environment. <i>Fisheries Oceanography</i> 12: 270–283. • Beaugrand <i>et al.</i> (2003). Plankton effect on cod recruitment in the North Sea. <i>Nature</i> 426: 661-664. • Johns (2004). Plankton report for Strategic Environmental Assessment Area 5. Report to the DTI.¹ • Reid <i>et al.</i> (2005). 2. State of plankton. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 		
Benthos	<ul style="list-style-type: none"> Whomersley & Picken (2003). Long-term dynamics of fouling communities found on offshore installations in the North Sea. <i>Journal of the Marine Biological Association of the United Kingdom</i> 83: 897-901. Eleftheriou <i>et al.</i> (2004). Synthesis of information on the benthos of area SEA 5. Report for the DTI.¹ Davies <i>et al.</i> (2005). 3. State of benthos. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> 	<p>Distribution patterns and abundance of benthic species in the North Sea well documented.</p> <p>Further information collated (often as part of the SEA process) on potential habitats of international importance.</p> <p>See <i>Sites and species of nature conservation importance</i> below for details of protected benthic habitats.</p>	<p>Vulnerable faunal community or species. Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features of the dSACs.</p>
Cephalopods	<ul style="list-style-type: none"> Stowasser <i>et al.</i> (2004). An overview of cephalopods relevant to the SEA 5 area. Report to the DTI.¹ Anonymous (2005). Report of the working group on cephalopod fisheries and life history (WGCEPH). ICES CM 2005/05. 	<p>Limited information about cephalopod life histories, distribution and abundance.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Fish and shellfish	<ul style="list-style-type: none"> Chapman (2004). Northern North Sea shellfish and fisheries. SEA 5 technical report for DTI.¹ Fishery Agencies (2005). Marine fish and fisheries. The 4th of 5 reports produced to support DEFRA's Charting progress – an integrated assessment of the state of UK seas. Heath (2005). Changes in the structure and function of the North Sea fish foodweb, 1973-2000, and the impacts of fishing and climate. <i>ICES Journal of Marine Science</i> 62: 847-868. ICES (2005). Report of the study group on the bycatch of salmon in pelagic trawl fisheries (SGBYSAL), ICES CM 2005/ACFM:13. Daan (2006). Spatial and temporal trends in species richness and abundance for the southerly and northerly components of the North Sea fish community separately, based on IBTS data 1977-2005. ICES CM 2006/D:02. 	<p>The distribution and abundance of fish and shellfish and their associated fisheries in the North Sea well documented.</p> <p>There appears to have been a gradual change in the demersal fish communities of the North Sea with overexploitation and climate change potential drivers.</p>	<p>Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.</p>
Marine reptiles	<ul style="list-style-type: none"> UK & Eire marine turtle strandings & sightings annual reports (Penrose 2003, 2004, 2005, Penrose & Gander 2006, 2007). 	<p>Information from a database of turtle sightings in UK waters. Not many</p>	<p>Possible vulnerability to drilling &</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
		sightings from the North Sea.	operational discharges or spills.
Seabirds and coastal waterbirds	<ul style="list-style-type: none"> • McSorley <i>et al.</i> (2003). Seabird use of waters adjacent to colonies: Implications for seaward extensions to existing breeding seabird colony Special Protection Areas. JNCC Report, No. 329. • Barton & Pollock (2004a). Review of divers, grebes and seaduck distribution and abundance in the SEA 5 area. Report to the DTI.¹ • Barton & Pollock (2004b). Review of the potential impacts of offshore wind farms on migrating and overwintering swans and geese in the SEA 5 area. Cork Ecology. Report to the DTI.¹ • Dean <i>et al.</i> (2004). Surveillance of wintering seaduck, divers and grebes in UK inshore areas: Aerial surveys 2002/03. JNCC Report No. 345. • Mitchell <i>et al.</i> (2004). Seabird populations of Britain & Ireland. T. & A.D. Poyser, London. • Mitchell <i>et al.</i> (2005). 6. <i>State of breeding seabirds</i>. In: Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas. • Banks <i>et al.</i> (2006). The wetland bird survey 2004/05: Wildfowl and wader counts. BTO/WWT/RSPB/JNCC, Thetford. • DTI (2006). Aerial surveys of waterbirds in strategic windfarm areas: 2004/05 final report. • Mavor <i>et al.</i> (2006). Seabird numbers and breeding success in Britain and Ireland, 2005. Peterborough, JNCC. • Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK waters to highlight gaps in coverage. A report to the DTI.¹ 	<p>Further information on the distribution and abundance of coastal waterbirds and seabirds.</p> <p>Overall ESAS survey coverage of SEA 3 area was 17% (60% of target coverage). Seasonally, 75% of the target coverage was achieved in summer with almost 45% during the winter months.</p> <p>Small-scale boat-based seabird surveys by wind farm developers have also improved coverage.</p>	Vulnerability to oil spills.
Marine mammals	<ul style="list-style-type: none"> • Reid <i>et al.</i> (2003). An atlas of cetacean distribution on the northwest European continental shelf. JNCC. • Stone (2003). Marine mammal observations during seismic surveys in 2000. JNCC Report No. 322. • Stone (2003). The effects of seismic activity on marine mammals in UK waters, 1998-2000. JNCC Report No. 323. • Hammond <i>et al.</i> (2004). Background information on marine mammals relevant to Strategic Environmental Assessment 5. Report to the DTI.¹ • Matthiopoulos <i>et al.</i> (2004). Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. <i>Journal of Applied Ecology</i> 41: 476-491. • Harland <i>et al.</i> (2005). Underwater ambient noise. SEA 6 technical report.¹ 	<p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Limited understanding of the effects of noise on marine mammals.</p> <p>Recent tagging studies indicate that both grey and common seals forage extensively in nearshore and offshore areas of the North Sea.</p>	Potential disturbance by seismic noise. Vulnerability to oil spills.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> • Boyd <i>et al.</i> (2005). 5. State of seals. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Reid <i>et al.</i> (2005). 4. State of cetaceans. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Longeran <i>et al.</i> (2007). Using sparse survey data to investigate the declining abundance of British harbour seals. <i>Journal of Zoology</i> 271: 261–269. • SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 	<p>Potential declines in the UK harbour seal population.</p>	
<p>Sites and species of nature conservation importance</p>	<ul style="list-style-type: none"> • Johnston <i>et al.</i> (2003). Marine Natura 2000. JNCC 03 P01. • AICSM & Hartley Anderson (2004). Conservation sites in the SEA 5 Area. Report to the DTI.¹ • JNCC (2004). Developing the concept of an ecologically coherent network of OSPAR Marine Protected Areas. JNCC 04 N08. • Johnston <i>et al.</i> (2004). Progress in identifying SACs for Annex I habitats, including proposals for four offshore habitat SACs. JNCC 04 P23. • Johnston <i>et al.</i> (2004). Update on progress in marine Natura. JNCC 04 P05. • Turnbull (2004). The use of generic guidance for extending existing SPAs for breeding seabirds. JNCC Marine Natura 2000 Consultation Document. • Hill <i>et al.</i> (2005). 1. State of habitats. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Turnbull <i>et al.</i> (2005). Marine Natura 2000. JNCC 05 P10. • OSPAR (2006). 2005/2006 report on the status of the OSPAR network of Marine Protected Areas. • OSPAR (2006). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR Biodiversity Series. • Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. • Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 N09. • Natural England (http://www.naturalengland.org.uk/) and JNCC 	<p>Since SEA 3, number of offshore sites put forward as draft SACs in the area - the Dogger Bank and North Norfolk Sandbanks and Saturn Reef.</p> <p>Areas of potential Annex I habitat for consideration as SACs include Haisborough Tail, Hewett Ridges, Hammond Knoll & Smiths Knoll; Galloper; Inner Gabbard; Outer Gabbard' and North and South Falls (sandbank slightly covered by seawater all the time).</p>	<p>Potential disturbance by seismic noise. Physical disturbance. Vulnerability to oil spills.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features of the dSACs.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>(http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites.</p>		
6b Geology and soils	<ul style="list-style-type: none"> • Second phase reports of the UKOOA/OLF drill cuttings research and development programme (http://www.ukooa.co.uk/issues/drillcuttings).² • Hartley Anderson (2003). UKOOA drill cuttings initiative. Food chain effects literature review. Report to UKOOA from Hartley Anderson Ltd., Battelle Memorial Institute, Continental Shelf Associates Inc., and the School of Ocean Sciences, University of Bangor. • DNV (2004). Cutting piles – Area contaminated with THC.³ • Holmes <i>et al.</i> (2004). DTI Strategic Environmental Assessment Area 5 (SEA5): Seabed and superficial geology and processes. British Geological Survey.¹ • Marine Environment Monitoring Group (2004). UK national marine monitoring programme - Second report (1999-2001). CEFAS. • Kenyon & Cooper (2005). Sand banks, sand transport and offshore wind farms. Report to the DTI.¹ • Marine Environmental Monitoring Group (2005). Marine environment quality. Report for Charting progress – an integrated assessment of the state of UK seas. • OLF (2005). Risk assessment of reproductive effects of alkyl phenols in produced water on fish stocks in the North Sea.³ • OSPAR (2006a). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	<p>Further characterisation of the geology and sedimentary processes shaping the area.</p> <p>The potential environmental impacts of cuttings piles and other pollutants further defined.</p>	<p>Biodegradation & accumulation of contaminants Range of benthic habitats present Physical disturbance.</p>
6c Landscape/Seascape	<ul style="list-style-type: none"> • BMT Cordah (2003). Offshore wind energy generation: Phase 1 proposals and Environmental Report. Report to the DTI.¹ 	<p>Strategic assessment of the sensitivity of the seascape/ landscape of wind farm strategic areas in the southern North Sea to development.</p>	<p>Visual intrusion</p>
6d Water resources	<ul style="list-style-type: none"> • DTI (2004). Atlas of UK marine renewable energy resources. A Strategic Environmental Assessment report. • Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. • Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the DTI.¹ 	<p>Further characterisation of the tidal currents and waves of the region.</p> <p>Information on temporal and spatial changes to water masses and flow through the region.</p> <p>Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping)</p>	<p>Pattern of discharge dispersion. Rate of degradation of organic material. Spilled oil behaviour. Spilled oil behaviour & response options. Particulate dispersion & re-dispersion. Noise pollution.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
		and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.	
6e Air quality	<ul style="list-style-type: none"> • OSPAR (2006c). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. • Local air quality management website http://www.airquality.co.uk/archive/laqm/laqm.php • National atmospheric emissions inventory website http://www.naei.org.uk/index.php 	Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.	Potential emissions of air pollutants.
6f Climatic factors	<ul style="list-style-type: none"> • Baggott <i>et al.</i> (2005). Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2003. • Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. • Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 	Further characterisation of the drivers of climate change and potential implications.	Oil spill trajectory. Atmospheric dispersion.
6g Population and human health	-	-	-
6h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> • DTI (2003). Petroleum prospectivity of the principal sedimentary basins on the United Kingdom continental shelf. UK Promote. • Hartley Anderson & AICSM (2004). Existing users and management initiatives relevant to SEA 5. Report to the DTI.¹ • Mackay Consultants (2004). The potential socio-economic implications of licensing the SEA 5 area. A report for the DTI.¹ • RSE (Royal Society of Edinburgh) (2004). Inquiry into the future of the Scottish fishing industry. • Fishery Agencies (2005). Marine fish and fisheries. Report for Charting progress – an integrated assessment of the state of UK seas. • DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) • DTI energy statistics website (http://www.dti.gov.uk/energy/statistics/index.html). 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities.	Interference with other users of the marine environment. Potential for cumulative effects.
6i Cultural heritage, including architectural and archaeological heritage	<ul style="list-style-type: none"> • Flemming (2004). The scope of Strategic Environmental Assessment of North Sea area SEA 5 in regard to prehistoric archaeological remains. Report to the DTI.¹ 	Further definition of potential and actual archaeological resource.	Potential to damage sites during drilling or construction. Opportunity to discover previously

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
			unrecognised sites.

Notes:

1. All SEA Technical Reports and Consultation Documents are available on the DTI SEA website (www.offshore-sea.org.uk).
2. Reports available on UKOOA website (<http://www.ukooa.co.uk>).
3. Reports available on the OLF website (<http://www.olf.no>).

APPENDIX 7 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 4 AREA

The following appendix provides details of new information sources published since SEA 4 was completed in 2003. Changes (or clarifications) to the environmental baseline of the SEA 4 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 7a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds and coastal waterbirds, marine mammals, and sites and species of nature conservation importance.
- 7b Geology and sediments
- 7c Landscape/Seascape
- 7d Water environment
- 7e Air quality
- 7f Climatic factors
- 7g Population and human health
- 7h Material assets (infrastructure, other natural resources)
- 7i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
7a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Johns (2004). Plankton report for Strategic Environmental Assessment Area 5. Report to the DTI.¹ • Reid <i>et al.</i> (2005). 2. State of plankton. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.
Benthos	<ul style="list-style-type: none"> • Eleftheriou <i>et al.</i> (2004). Synthesis of information on the benthos of area SEA 5. Report for the DTI.¹ 	Distribution patterns and abundance of benthic species well documented.	Vulnerable faunal community or species.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> Henry & Roberts (2004). The biodiversity, characteristics and distinguishing features of deep-water epifaunal communities from the Wyville Thomson Ridge, Darwin Mounds and Faeroes Plateau. Report to AFEN. Van Gaever <i>et al.</i> (2004). The macro- and micro-scale patchiness of meiobenthos associated with the Darwin Mounds (north-east Atlantic). <i>Journal of the Marine Biological Association of the United Kingdom</i> 84: 547-556. Costello <i>et al.</i> (2005). Role of cold-water <i>Lophelia pertusa</i> reefs as fish habitat in the NE Atlantic. In: A Freiwald & JM Roberts (Eds.). <i>Cold-water corals and ecosystems</i>. Springer-Verlag, Berlin Heidelberg. Davies <i>et al.</i> (2005). 3. <i>State of benthos</i>. In: Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas. Gage <i>et al.</i> (2005). Potential impacts of deep-sea trawling on the benthic ecosystem along the northern European continental margin: a review. Davies <i>et al.</i> (2006). An introduction to the benthic ecology of the Rockall-Hatton area (SEA 7). Report to the DTI.¹ Jones <i>et al.</i> (2006). Effects of physical disturbance on the cold-water megafaunal communities of the Faroe Shetland Channel. <i>Marine Ecology Progress Series</i> 319: 43-54. 	<p>Further information collated (often as part of the SEA process) on potential habitats of international importance including deep water coral reefs.</p> <p>See <i>Sites and species of nature conservation importance</i> below for details of protected benthic habitats.</p>	<p>Rate of recovery. Contaminant transfer into food web. Smothering & changed sediment type.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features.</p>
Cephalopods	<ul style="list-style-type: none"> Stowasser <i>et al.</i> (2004). An overview of cephalopods relevant to the SEA 5 Area. Report to the DTI.¹ Anonymous (2005). Report of the working group on cephalopod fisheries and life history (WGCEPH). ICES CM 2005/05. 	Limited information about cephalopod life histories, distribution and abundance.	Possible vulnerability to drilling & operational discharges or spills.
Fish and shellfish	<ul style="list-style-type: none"> Chapman (2004). Northern North Sea shellfish and fisheries. SEA 5 technical report for DTI.¹ Fishery Agencies (2005). Marine fish and fisheries. The 4th of 5 reports produced to support DEFRA's Charting progress – an integrated assessment of the state of UK seas. ICES (2005). Report of the study group on the bycatch of salmon in pelagic trawl fisheries (SGBYSAL), ICES CM 2005/ACFM:13. 	<p>The distribution and abundance of fish and shellfish and their associated fisheries in the region well documented.</p> <p>Further clarification of the importance of the region for migrating salmon.</p>	Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.
Marine reptiles	<ul style="list-style-type: none"> UK & Eire marine turtle strandings & sightings annual reports (Penrose 2004, 2005, Penrose & Gander 2006, 2007). 	Occasional recordings of marine turtles from coastal waters of Orkney and Shetland. Majority of UK sightings from the south and west.	Possible vulnerability to drilling & operational discharges or spills.
Seabirds and coastal	<ul style="list-style-type: none"> Barton & Pollock (2004a). Review of divers, grebes and seaduck 	Further information on the	Vulnerability to oil

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
waterbirds	<p>distribution and abundance in the SEA 5 area. Report to the DTI.¹</p> <ul style="list-style-type: none"> Barton & Pollock (2004b). Review of the potential impacts of offshore wind farms on migrating and overwintering swans and geese in the SEA 5 area. Cork Ecology. Report to the DTI.¹ Dean <i>et al.</i> (2004). Surveillance of wintering seaduck, divers and grebes in UK inshore areas: Aerial surveys 2002/03. JNCC Report No. 345. Mitchell <i>et al.</i> (2004). Seabird populations of Britain & Ireland. T. & A.D. Poyser, London. Mitchell <i>et al.</i> (2005). 6. State of breeding seabirds. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> Banks <i>et al.</i> (2006). The wetland bird survey 2004/05: Wildfowl and wader counts. BTO/WWT/RSPB/JNCC, Thetford. Mavor <i>et al.</i> (2006). Seabird numbers and breeding success in Britain and Ireland, 2005. Peterborough, JNCC. Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK waters to highlight gaps in coverage. A report to the DTI.¹ 	<p>distribution and abundance of coastal waterbirds and seabirds.</p> <p>Overall ESAS survey coverage of SEA 4 area was 14% (50% of target coverage). Seasonally, 68% of the target coverage was achieved in summer with almost 31% during the winter months. Biggest gaps in north of the area.</p>	spills.
Marine mammals	<ul style="list-style-type: none"> Hammond <i>et al.</i> (2004). Background information on marine mammals relevant to Strategic Environmental Assessment 5. Report to the DTI.¹ Matthiopoulos <i>et al.</i> (2004). Using satellite telemetry and aerial counts to estimate space use by grey seals around the British Isles. <i>Journal of Applied Ecology</i> 41: 476-491. Harland <i>et al.</i> (2005). Underwater ambient noise. SEA 6 technical report.¹ Boyd <i>et al.</i> (2005). 5. State of seals. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> Reid <i>et al.</i> (2005). 4. State of cetaceans. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> Longeran <i>et al.</i> (2007). Using sparse survey data to investigate the declining abundance of British harbour seals. <i>Journal of Zoology</i> 271: 261–269. SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 	<p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Limited understanding of the effects of noise on marine mammals.</p> <p>Recent tagging studies indicate that both grey and common seals forage extensively in nearshore and offshore areas.</p> <p>Potential declines in the UK harbour seal population.</p>	Potential disturbance by seismic noise. Vulnerability to oil spills.
Sites and species of nature conservation importance	<ul style="list-style-type: none"> AICSM & Hartley Anderson (2004). Conservation sites in the SEA 5 Area. Report to the DTI.¹ JNCC (2004). Developing the concept of an ecologically coherent 	Protected reef habitats include the Darwin Mounds pSAC and the Wyville Thomson Ridge dSAC.	Potential disturbance by seismic noise. Physical disturbance.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>network of OSPAR Marine Protected Areas. JNCC 04 N08.</p> <ul style="list-style-type: none"> • Johnston <i>et al.</i> (2004a). Progress in identifying SACs for Annex I habitats, including proposals for four offshore habitat SACs. JNCC 04 P23. • Johnston <i>et al.</i> (2004b). Update on progress in marine Natura. JNCC 04 P05. • Turnbull (2004). The use of generic guidance for extending existing SPAs for breeding seabirds. JNCC Marine Natura 2000 Consultation Document. • Hill <i>et al.</i> (2005). 1. State of habitats. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress – an integrated assessment of the state of UK seas.</i> • Turnbull <i>et al.</i> (2005). Marine Natura 2000. JNCC 05 P10. • OSPAR (2006b). 2005/2006 Report on the status of the OSPAR network of Marine Protected Areas. • OSPAR (2005). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR biodiversity series. • Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. • Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 N09. • SNH (http://www.snh.org.uk) and JNCC (http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites. 	<p>Areas of potential Annex I habitat for consideration as SACs include iceberg ploughmarks on northern shelf breaks; Turbot, Otter & Papa Banks, and Solan Bank & Rona (reefs).</p>	<p>Vulnerability to oil spills.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features.</p>
7b Geology and sediments	<ul style="list-style-type: none"> • DNV (2004). Cutting piles – Area contaminated with THC.² • Holmes <i>et al.</i> (2004). DTI Strategic Environmental Assessment Area 5 (SEA5): Seabed and superficial geology and processes. British Geological Survey.¹ • Marine Environment Monitoring Group (2004). UK national marine monitoring programme - Second report (1999-2001). CEFAS. • Kenyon & Cooper (2005). Sand banks, sand transport and offshore wind farms. Report to the DTI.¹ • Marine Environmental Monitoring Group (2005). Marine environment quality. Report for Charting progress – an integrated assessment of the state of UK seas. • OSPAR (2006a). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	<p>Further characterisation of the geology and sedimentary processes shaping the area.</p> <p>The potential environmental impacts of cuttings piles and other pollutants further defined.</p>	<p>Biodegradation & accumulation of contaminants</p> <p>Range of benthic habitats present</p> <p>Physical disturbance.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
7c Landscape/Seascape	<ul style="list-style-type: none"> Scott <i>et al.</i> (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. SNH Commissioned Report No.103. 	Characterisation of the Scottish coastal seascape and its sensitivity to development.	Visual intrusion.
7d Water environment	<ul style="list-style-type: none"> DTI (2004). Atlas of UK marine renewable energy resources. A Strategic Environmental Assessment Report. Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the DTI.¹ 	<p>Further characterisation of the tidal currents and waves of the region.</p> <p>Information on temporal and spatial changes to water masses and flow through the region.</p> <p>Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.</p>	<p>Pattern of discharge dispersion.</p> <p>Rate of degradation of organic material.</p> <p>Spilled oil behaviour.</p> <p>Spilled oil behaviour & response options.</p> <p>Particulate dispersion & re-dispersion.</p> <p>Noise pollution.</p>
7e Air quality	<ul style="list-style-type: none"> OSPAR (2006c). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. Local air quality management website http://www.airquality.co.uk/archive/laqm/laqm.php National atmospheric emissions inventory website http://www.naei.org.uk/index.php 	Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.	Potential emissions of air pollutants.
7f Climatic factors	<ul style="list-style-type: none"> Baggott <i>et al.</i> (2005). Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2003. Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 	Further characterisation of the drivers of climate change and potential implications.	Oil spill trajectory. Atmospheric dispersion.
7g Population and human health	-	-	-
7h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> Hartley Anderson & AICSM (2004). Existing users and management initiatives relevant to SEA 5. Report to the DTI.¹ Mackay Consultants (2004). The potential socio-economic implications of licensing the SEA 5 area. A report for the DTI.¹ RSE (Royal Society of Edinburgh) (2004). Inquiry into the future of the 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities.	Interference with other users of the marine environment. Potential for cumulative effects.

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Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>Scottish fishing industry.</p> <ul style="list-style-type: none"> • Fishery Agencies (2005). Marine fish and fisheries. Report for Charting progress – an integrated assessment of the state of UK seas. • DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) • DTI energy statistics website (http://www.dti.gov.uk/energy/statistics/index.html). 		
7i Cultural heritage, including architectural and archaeological heritage	<ul style="list-style-type: none"> • Flemming (2004). The scope of Strategic Environmental Assessment of North Sea area SEA 5 in regard to prehistoric archaeological remains. Report to the DTI.¹ 	Further definition of potential and actual archaeological resource.	Potential to damage sites during drilling or construction. Opportunity to discover previously unrecognised sites.

Notes:

1. Technical Reports are available on the DTI SEA website (www.offshore-sea.org.uk).
2. Report available on the OLF website (www.olf.no).

APPENDIX 8 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 5 AREA

The following appendix provides details of new information sources published since SEA 5 was completed in 2004. Changes (or clarifications) to the environmental baseline of the SEA 5 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 8a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds and coastal waterbirds, marine mammals, and sites and species of nature conservation importance.
- 8b Geology and sediments
- 8c Landscape/Seascape
- 8d Water environment
- 8e Air quality
- 8f Climatic factors
- 8g Population and human health
- 8h Material assets (infrastructure, other natural resources)
- 8i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
8a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Reid <i>et al.</i> (2005). 2. State of plankton. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.
Benthos	<ul style="list-style-type: none"> • Costello <i>et al.</i> (2005). Role of cold-water <i>Lophelia pertusa</i> reefs as fish habitat in the NE Atlantic. In: A Freiwald & JM Roberts (Eds.). <i>Cold-water corals and ecosystems.</i> Springer-Verlag, Berlin Heidelberg. • Davies <i>et al.</i> (2005). 3. State of benthos. In: <i>Marine habitats and</i> 	Distribution patterns and abundance of benthic species well documented. Further information collated (often as	Vulnerable faunal community or species. Rate of recovery. Contaminant transfer

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p><i>species</i>: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</p>	<p>part of the SEA process) on potential habitats of international importance including deep water coral reefs.</p> <p>See <i>Sites and species of nature conservation importance</i> below for details of protected benthic habitats.</p>	<p>into food web. Smothering & changed sediment type.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features.</p>
Cephalopods	<ul style="list-style-type: none"> Anonymous (2005). Report of the working group on cephalopod fisheries and life history (WGCEPH). ICES CM 2005/05. Young <i>et al.</i> (2006). The Moray Firth directed squid fishery. <i>Fisheries Research</i> 78: 39-43. 	<p>Limited information about cephalopod life histories, distribution and abundance.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Fish and shellfish	<ul style="list-style-type: none"> Fishery Agencies (2005). Marine fish and fisheries. The 4th of 5 reports produced to support DEFRA's Charting progress – an integrated assessment of the state of UK seas. Heath (2005). Changes in the structure and function of the North Sea fish foodweb, 1973-2000, and the impacts of fishing and climate. <i>ICES Journal of Marine Science</i> 62: 847-868. ICES (2005). Report of the study group on the bycatch of salmon in pelagic trawl fisheries (SGBYSAL), ICES CM 2005/ACFM:13. Daan (2006). Spatial and temporal trends in species richness and abundance for the southerly and northerly components of the North Sea fish community separately, based on IBTS data 1977-2005. ICES CM 2006/D:02. 	<p>The distribution and abundance of fish and shellfish and their associated fisheries in the region well documented.</p> <p>Further information on the importance of the region for migrating salmon.</p>	<p>Possible vulnerability to drilling & operational discharges or spills. Timing of seismic surveys.</p>
Marine reptiles	<ul style="list-style-type: none"> UK & Eire marine turtle strandings & sightings annual reports (Penrose 2005, Penrose & Gander 2006, 2007). 	<p>Occasional recordings of marine turtles from coastal waters of Orkney and Shetland. Majority of UK sightings from the south and west.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Seabirds and coastal waterbirds	<ul style="list-style-type: none"> Mitchell <i>et al.</i> (2005). 6. State of breeding seabirds. In: <i>Marine habitats and species</i>: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas. Banks <i>et al.</i> (2006). The wetland bird survey 2004/05: Wildfowl and wader counts. BTO/WWT/RSPB/JNCC, Thetford. Mavor <i>et al.</i> (2006). Seabird numbers and breeding success in Britain and Ireland, 2005. Peterborough, JNCC. Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK 	<p>Further information on the distribution and abundance of coastal waterbirds and seabirds.</p> <p>Overall ESAS survey coverage of SEA 5 area was 16% (58% of target coverage). Seasonally, 79% of the target coverage was achieved in summer with almost 36% during the</p>	<p>Vulnerability to oil spills.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	waters to highlight gaps in coverage. A report to the DTI. ¹	winter months.	
Marine mammals	<ul style="list-style-type: none"> • Boyd <i>et al.</i> (2005). 5. State of seals. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Harland <i>et al.</i> (2005). Underwater ambient noise. SEA 6 technical report.¹ • Reid <i>et al.</i> (2005). 4. State of cetaceans. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress - an integrated assessment of the state of UK seas.</i> • Sini <i>et al.</i> (2005). Bottlenose dolphins around Aberdeen harbour, north-east Scotland: a short study of habitat utilization and the potential effects of boat traffic. <i>Journal of the Marine Biological Association of the United Kingdom</i> 85: 1547-1554. • Longeran <i>et al.</i> (2007). Using sparse survey data to investigate the declining abundance of British harbour seals. <i>Journal of Zoology</i> 271: 261–269. • SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 	<p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Limited understanding of the effects of noise on marine mammals.</p> <p>Recent tagging studies indicate that both grey and common seals forage extensively in nearshore and offshore areas.</p> <p>Potential declines in the UK harbour seal population.</p>	Potential disturbance by seismic noise. Vulnerability to oil spills.
Sites and species of nature conservation importance	<ul style="list-style-type: none"> • Hill <i>et al.</i> (2005). 1. State of habitats. In: <i>Marine habitats and species: The marine biodiversity contribution to Charting progress – an integrated assessment of the state of UK seas.</i> • Turnbull <i>et al.</i> (2005). Marine Natura 2000. JNCC 05 P10. • OSPAR (2006). 2005/2006 Report on the status of the OSPAR network of Marine Protected Areas. • OSPAR (2006). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR biodiversity series. • Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. • Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 N09. • SNH (http://www.snh.org.uk) and JNCC (http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites. 	Areas of potential Annex I habitat for consideration as SACs include the east of Shetland reef.	<p>Potential disturbance by seismic noise. Physical disturbance. Vulnerability to oil spills.</p> <p>Appropriate Assessment likely for any activities that could impact upon the protected features of the dSACs.</p>
8b Geology and sediments	<ul style="list-style-type: none"> • Holmes & Stoker (2005). Investigation of the origin of shallow gas in Outer Moray Firth open blocks 15/20c and 15/25d. Report to the DTI.¹ • Kenyon & Cooper (2005). Sand banks, sand transport and offshore wind farms. Report to the DTI.¹ 	Further characterisation of the geology and sedimentary processes shaping the area.	Biodegradation & accumulation of contaminants Range of benthic

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> Marine Environmental Monitoring Group (2005). Marine environment quality. Report for Charting progress – an integrated assessment of the state of UK seas. OLF (2005). Risk assessment of reproductive effects of alkyl phenols in produced water on fish stocks in the North Sea.² Russell <i>et al.</i> (2005). The environmental effects of oil exploration and production in the east Shetland Basin: composition and concentration of hydrocarbons in sediment samples collected in 2002 using a stratified random sampling design. FRS website (http://www.frs-scotland.gov.uk). OSPAR (2006a). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	The potential environmental impacts of relevant pollutants further defined.	habitats present Physical disturbance.
8c Landscape/Seascape	<ul style="list-style-type: none"> Scott <i>et al.</i> (2005). An assessment of the sensitivity and capacity of the Scottish seascape in relation to offshore windfarms. SNH Commissioned Report No.103. 	Characterisation of the Scottish coastal seascape and its sensitivity to development.	Visual intrusion
8d Water environment	<ul style="list-style-type: none"> Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to Charting progress - an integrated assessment of the state of UK seas. Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the DTI.¹ 	<p>Information on temporal and spatial changes to water masses and flow through the region.</p> <p>Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.</p>	<p>Pattern of discharge dispersion.</p> <p>Rate of degradation of organic material.</p> <p>Spilled oil behaviour.</p> <p>Spilled oil behaviour & response options.</p> <p>Particulate dispersion & re-dispersion.</p> <p>Noise pollution.</p>
8e Air quality	<ul style="list-style-type: none"> OSPAR (2006c). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. Local air quality management website http://www.airquality.co.uk/archive/laqm/laqm.php National atmospheric emissions inventory website http://www.naei.org.uk/index.php 	Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.	Potential emissions of air pollutants.
8f Climatic factors	<ul style="list-style-type: none"> Baggott <i>et al.</i> (2005). Greenhouse gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2003. Inter-Agency Committee on Marine Science and Technology (IACMST) (2005). Marine processes and climate. IACMST contribution to 	Further characterisation of the drivers of climate change and potential implications.	Oil spill trajectory. Atmospheric dispersion.

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	Charting progress - an integrated assessment of the state of UK seas. <ul style="list-style-type: none"> Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 		
8g Population and human health	-	-	-
8h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> Fishery Agencies (2005). Marine fish and fisheries. Report for Charting progress – an integrated assessment of the state of UK seas. Ongoing development of the Beatrice windfarm proposal. http://www.beatricewind.co.uk/ DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) DTI energy statistics website (http://www.dti.gov.uk/energy/statistics/index.html). 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities.	Interference with other users of the marine environment. Potential for cumulative effects.
8i Cultural heritage, including architectural and archaeological heritage	-	-	-

Notes:

1. Technical Reports are available on the DTI SEA website (www.offshore-sea.org.uk).
2. Report available on the OLF website (www.olf.no).

APPENDIX 9 - CHANGES TO ENVIRONMENTAL BASELINE SINCE SEA - SEA 6 AREA

The following appendix provides details of new information sources published since SEA 6 was completed in 2005. Changes (or clarifications) to the environmental baseline of the SEA 6 area resulting from this new information are also summarised.

For ease of use, the information is arranged in the same order as the headings under which the environmental characteristics were described in *Section 4.2* and Appendix 3:

- 9a Biodiversity, habitats, flora and fauna
Including plankton, benthos, cephalopods, fish and shellfish, marine reptiles, seabirds and coastal waterbirds, marine mammals, and sites and species of nature conservation importance.
- 9b Geology and sediments
- 9c Landscape/Seascape
- 9d Water environment
- 9e Air quality
- 9f Climatic factors
- 9g Population and human health
- 9h Material assets (infrastructure, other natural resources)
- 9i Cultural heritage, including architectural and archaeological heritage

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
9a Biodiversity, habitats, flora and fauna			
Plankton	<ul style="list-style-type: none"> • Leterme <i>et al.</i> (2006). Differential contribution of diatoms and dinoflagellates to phytoplankton biomass in the NE Atlantic Ocean and the North Sea. <i>Marine Ecology Progress Series</i> 312: 57-65. 	Plankton assemblage appears to be changing with range extension of warmer water species and restriction of colder species.	Vulnerability to spills. Pelagic-benthic system coupling, rapid transfer of material to seabed.
Benthos	-	-	-
Cephalopods	-	-	-
Fish and shellfish	<ul style="list-style-type: none"> • Southall <i>et al.</i> (2006a). Seasonal space-use estimates of basking sharks in relation to protection and political-economic zones in the 	The distribution and abundance of fish and shellfish and their	Possible vulnerability to drilling &

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<p>North-east Atlantic. <i>Biological Conservation</i> 132: 33-39.</p> <ul style="list-style-type: none"> Southall <i>et al.</i> (2006b). Spatial distribution patterns of basking sharks on the European shelf: preliminary comparison of satellite-tag geolocation, survey and public sightings data. <i>Journal of the Marine Biological Association of the United Kingdom</i> 85: 1083-1088. 	<p>associated fisheries in the region well documented.</p> <p>Further clarification of the importance of the region for basking shark.</p>	<p>operational discharges or spills. Timing of seismic surveys.</p>
Marine reptiles	<ul style="list-style-type: none"> UK & Eire marine turtle strandings & sightings annual reports (Penrose & Gander 2006, 2007). 	<p>Irish Sea appears to be an important area for marine turtles with a large proportion of sightings recorded from the area.</p>	<p>Possible vulnerability to drilling & operational discharges or spills.</p>
Seabirds and coastal waterbirds	<ul style="list-style-type: none"> Pollock & Barton (2006). An analysis of ESAS seabird surveys in UK waters to highlight gaps in coverage. A report to the DTI.¹ 	<p>Further information on the distribution and abundance of coastal waterbirds and seabirds.</p> <p>Overall ESAS survey coverage of SEA 6 area was 33% (119% of target coverage). Seasonally, 140% of the target coverage was achieved in summer with almost 99% during the winter months.</p>	<p>Vulnerability to oil spills.</p>
Marine mammals	<ul style="list-style-type: none"> Longeran <i>et al.</i> (2007). Using sparse survey data to investigate the declining abundance of British harbour seals. <i>Journal of Zoology</i> 271: 261–269. SCANS (Small Cetacean Abundance in the North Sea) II survey (http://biology.st-andrews.ac.uk/scans2). 	<p>SCANS II survey provides updated information on the numbers and densities of small cetaceans in the North Sea and NE Atlantic.</p> <p>Limited understanding of the effects of noise on marine mammals.</p> <p>Recent tagging studies indicate that both grey and common seals forage extensively in nearshore and offshore areas.</p> <p>Potential declines in the UK harbour seal population.</p>	<p>Potential disturbance by seismic noise. Vulnerability to oil spills.</p>
Sites and species of nature conservation importance	<ul style="list-style-type: none"> OSPAR (2006b). 2005/2006 Report on the status of the OSPAR network of Marine Protected Areas. OSPAR (2005). Case reports for the initial list of threatened and/or declining species and habitats in the OSPAR maritime area. OSPAR biodiversity series. 	<p>No offshore SACs designated in the SEA 6 area.</p> <p>Areas of potential Annex I habitat for consideration as SACs include the</p>	<p>Potential disturbance by seismic noise. Physical disturbance. Vulnerability to oil spills.</p>

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
	<ul style="list-style-type: none"> Reid (2006). Update on progress with the identification of marine SPAs. JNCC 06 N06. Turnbull <i>et al.</i> (2006). Towards achieving a representative suite of marine habitat SACs for UK waters: Update on progress. JNCC 06 N09. SNH (http://www.snh.org.uk) and JNCC (http://www.jncc.gov.uk) websites -provide up-to-date, detailed information on conservation sites. 	mid Irish Sea reef, NW Irish Sea mounds, North Anglesey Reef (reefs); the Isle of Man sandy mound (sandbank slightly covered by seawater all the time), and Texel 11 (submarine structures made by leaking gases).	
9b Geology and sediments	<ul style="list-style-type: none"> OSPAR (2006a). 2005/2006 Coordinated environmental monitoring programme (CEMP) assessment: Trends and concentrations of selected hazardous substances in the marine environment. 	The potential environmental impacts of relevant pollutants further defined.	Biodegradation & accumulation of contaminants.
9c Landscape/Seascape	-	-	-
9d Water environment	<ul style="list-style-type: none"> Harland & Richards (2006). SEA 7 technical report: Underwater ambient noise. QinetiQ. Report to the DTI.¹ 	Underwater ambient noise likely to be dominated by noise from anthropogenic sources (e.g. shipping and production installations) during calm periods. Natural sources (wind, rain and waves) likely to dominate during storm periods.	Noise pollution.
9e Air quality	<ul style="list-style-type: none"> OSPAR (2006c). Comprehensive atmospheric monitoring programme (CAMP): Pollutant deposits and air quality around the North Sea and the North-East Atlantic in 2004. Local air quality management website http://www.airquality.co.uk/archive/laqm/laqm.php National atmospheric emissions inventory website http://www.naei.org.uk/index.php 	Further characterisation of air quality, emissions of pollutants, and deposition of pollutants to the area.	Potential emissions of air pollutants.
9f Climatic factors	<ul style="list-style-type: none"> Intergovernmental Panel on Climate Change (2007). Climate change 2007: The physical science basis - Summary for policymakers. 	Further characterisation of the drivers of climate change and potential implications.	Oil spill trajectory. Atmospheric dispersion.
9g Population and human health	-	-	-
9h Material assets (infrastructure, other natural resources)	<ul style="list-style-type: none"> DTI oil and gas website (http://www.og.dti.gov.uk/information/index.htm) DTI energy statistics website (http://www.dti.gov.uk/energy/statistics/index.html). 	Offshore oil and gas production from the UKCS continuing to decline. Recent high oil prices have encouraged greater uptake of licenses and exploration activities.	Interference with other users of the marine environment. Potential for cumulative effects.
9i Cultural heritage, including	-	-	-

SEA 7 – Offshore oil and gas licensing

Environmental characteristics	New Information Sources Post SEA	Summary	Implications for SEA
architectural and archaeological heritage			

Notes:

1. Technical Reports are available on the DTI SEA website (www.offshore-sea.org.uk).