European Community Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC)

Third Report by the United Kingdom under Article 17

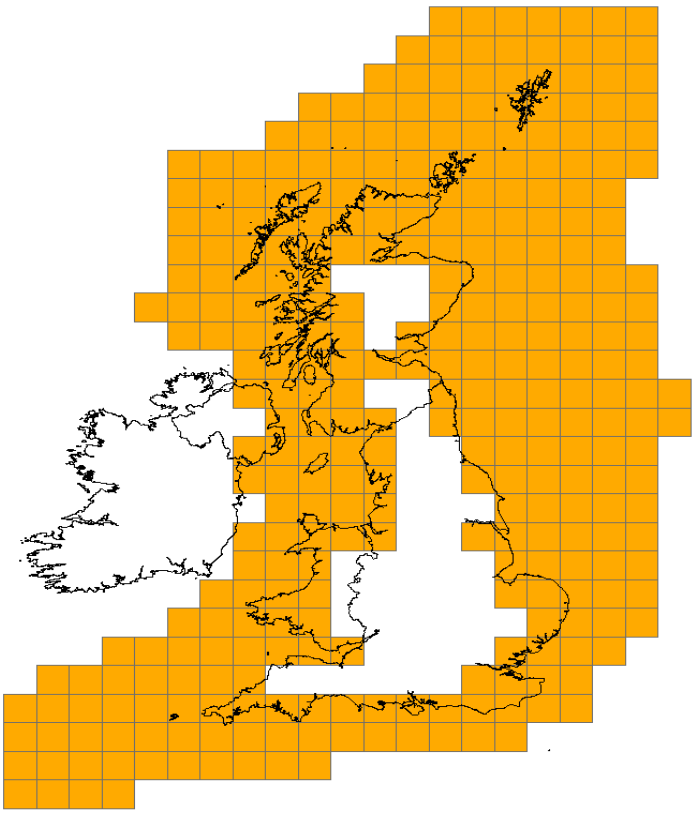
on the implementation of the Directive
from January 2007 to December 2012
Conservation status assessment for

Species:

S1364 - Grey seal (*Halichoerus grypus*)

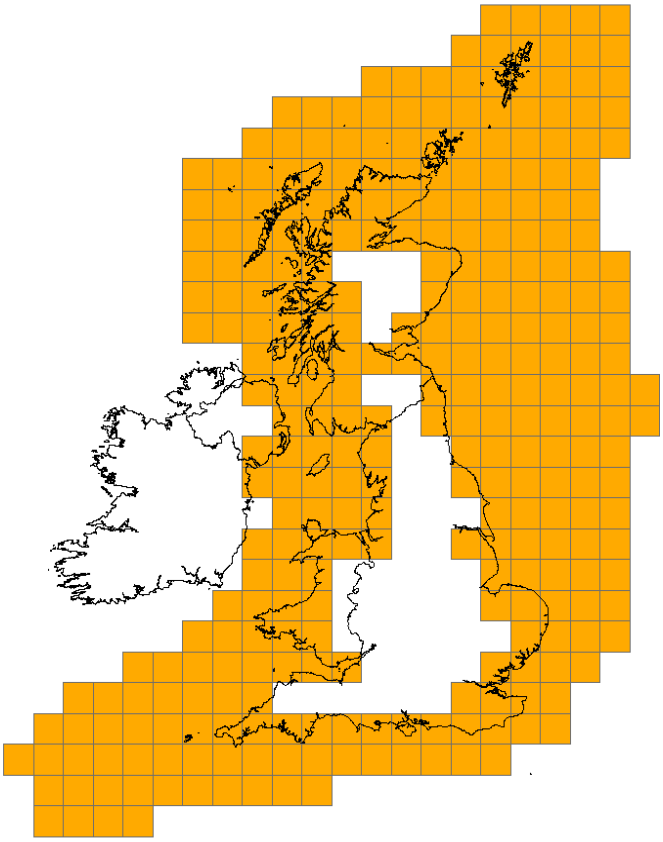
Reporting format on the 'main results of the surveillance under Article 11' for Annex II, IV & V species

Field name	*Brief explanations*	
0.2 Species	**0.2.1 Species code**	**S1364**
	0.2.2 Species scientific name	***Halichoerus grypus***
	0.2.3 Alternative species scientific name Optional	
	0.2.4 Common name Optional	

1.1 Maps			
1.1.1 Distribution map		**Sensitive**	**False**
	In the UK, grey seals typically breed on remote uninhabited islands or coasts and in small numbers in caves (SCOS, 2010, 2011, 2012). Breeding occurs on all of the UK's coasts, but major colonies occur on the east of England, Inner and Outer Hebrides, Orkney and north Scotland coast (Jones et al., 2011). Preferred breeding locations allow females with young pups to move inland away from busy beaches and storm surges (SCOS, 2010, 2011, 2012). Seals breeding on exposed, cliff-backed beaches and in caves may have limited opportunity to avoid storm surges and may experience higher levels of pup		

	mortality as a result. Breeding colonies vary considerably in size; at the smallest only a handful of pups are born, while at the biggest, over 5,000 pups are born annually. Grey seals are usually highly sensitive to disturbance by humans hence their preference for remote breeding sites. However, at one UK mainland colony at Donna Nook in Lincolnshire, seals have become habituated to human disturbance and over 70,000 people visit this colony during the breeding season with no apparent impact on the breeding seals (SCOS, 2012). UK grey seals usually breed in the autumn/winter, although pups have been seen throughout the year. There is a clockwise cline in the mean birth date around the UK.

1.1.2 Method used - map	**Complete survey/Complete survey or a statistically robust estimate**
	The map used to interpret distribution is based on land and at-sea distribution from long-term count and telemetry data. Tagging of adults has been carried out across the UK with particularly large numbers in the Abertay and Farnes areas. Pups have been tagged in the Outer Hebrides (Monach Isles), North Scotland, East Scotland (Isle of May), North-East England (Farne Islands), and Wales (Russell et al. 2011).The distribution of breeding haulouts as reported in Special Committee on Seals (2011) was mapped, together with telemetry tracks in ArcMap 10.1. A 50 x 50 km grid was overlaid in accordance with the EU guidance for mobile species, and individual grid cells assigned a value of 1 (i.e. presence) if there was one or more haul-out/tag location within the cell.
1.1.3 Year or period	**1988-2008**
	The haul-out and telemetry data span the period 1988-2012 (Jones et al., 2011; Russell et al., 2011a, b). Spatial and temporal coverage throughout this period varies for the telemetry data.
1.1.4 Additional distribution map Optional	**False**
	A map of modelled total density of grey seals at sea around the UK has been derived from telemetry data from 1991-2011 and count data from 1988-2012 where such data are available (Jones et al. 2012; Jones et al., 2011; Russell et al., 2011a, b). The map represents the aggregated at-sea and hauled-out densities. It is evident that the density of grey seals is higher around Scotland and the Northern Isles, with pockets of high density further south off north and southwest Wales and around the Humber Estuary in the North Sea.

1.1.5 Range map	
	The range map is based on the mapped distribution (1.1.1) and the total grey seal density map. So collectively, the data span the period 1988-2012. When at sea the grey seals' range is restricted to the continental shelf and the western boundary of its range to the northwest of the UK has been aligned with the 200m depth contour. Grey seals occur in very low densities in the SW approaches and the English Channel where there are a few scattered haul-outs (SCOS, 2010, 2011, 2012).

2.1 Biogeographical region & marine regions	**MATL**
2.2 Published sources	**Allen, P. J., W. Amos, et al. 1995. Microsatellite variation in grey seals (Halichoerus grypus) shows evidence of genetic differentiation between two British breeding colonies."" Molecular Ecology 4(6): 653- 662.** **Allen, R., Jarvis, D., Sayer, S. and Mills, C., 2012. Entanglement of grey seals Halichoerus grypus at a haul out site in Cornwall, UK. Marine Pollution Bulletin 64, 2815–2819** **Duck, C. D. and Morris, C.D., 2011. Grey seal production in Britain in 2010. SCOS briefing paper 11/1.** **Duck, C. D. and Morris, C.D., 2011. Seals in Northern Ireland. Helicopter survey of harbour and grey seals. August 2011. Survey Report for Northern Ireland Environment Agency.**

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Hall, A. 2002. Gray seal Halichoerus grypus. In: W. F. Perrin, B. Wursig, J. and G. M. Thewissen (eds), Encyclopedia of Marine Mammals, pp. 522-524. Academic Press, San Diego, California, USA.

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Lonergan, M. 2009. Analysis of the monthly boat counts of seals in Strangford Lough 1992-2009. SMRU Ltd Report to Northern Ireland Environment Agency.

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Northridge, S., Kingston, A. & Thomas, L. 2012. Report to the European Commission on the implementation of Regulation

812/2004 by the United Kingdom for the calender year 2011.

McConnell, B. J., Fedak, M. A., Lovell, P. and Hammond, P. S. 1999. Movements and foraging areas of grey seals in the North Sea. Journal of Applied Ecology 36: 573-590

Pomeroy, P.P., Twiss, S. and Redman,P. 2000. Philopatry, site fidelity and local kin associations within grey seal breeding colonies. Ethology 106 (10): 899-919.

Russell DJF, Jones E, Matthiopoulos J, Duck C, Morris C and McConnell B.J. 2011. SMRU seal telemetry data holdings. SCOS Briefing paper 11/16.

Russell DJF, Matthiopoulos J and McConnell B.J. 2011. SMRU seal telemetry quality control process. SCOS Briefing paper 11/17.

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Thomas, L. and Harwood, J. 2009. Estimating the size of the UK grey seal population between 1984 and 2006, and related

	research. SCOS Briefing Paper 09/02. **Thompson, D., Duck, C.D. & Lonergan, M., 2006. A retrospective description of regional patterns in grey seal pup production trends in the UK. SCOS Briefing Paper 06/04.** **Thompson, S. Bexton, A. Brownlow, D. Wood, A, Patterson, K. Pye, M. Lonergan and R. Milne. 2011. Report on recent seal mortalities in UK waters caused by extensive lacerations: October 2010. SCOS Briefing Paper 11/07.** **Walton M. and Stanley, H.F. 1997. Population structure of some grey seal breeding colonies around the UK and Norway. European Research on Cetaceans. Proc 11th annual conference of European cetacean society. 293-296.**

2.3 Range		
2.3.1 Surface area Range	**627999**	
	The range is based on the distribution (1.1.1) and total density (haul-out and at-sea) of grey seals for data spanning 1988-2012. Expert judgement has been used as to where the likely boundaries of the species range lie. The relative use of parts of this species range varies. In the breeding season, the range is considerably reduced with both sexes remaining hauled-out for extended periods (Lidgard et al. 2003). Similarly during the moult, the at-sea range and density is reduced; in the UK, adult females moult from mid-January to mid-February, and males moult from mid-February through until early April. The entire range is also not used evenly for foraging and seals at a particularly haul-out will often favour particular foraging grounds. Grey seals will often travel several hundred kilometres on foraging trips of 2-3 days (McConnell et al. 1999) and make repeated trips to the same areas. Therefore, the range map represents the likely greatest extent of this species considering year-round distribution of haul-out and at-sea data.	
2.3.2 Method used Surface area of Range	**Estimate based on partial data with some extrapolation and/or modelling**	
	The range is based on distribution (1.1.1) and total density (haul-out and at-sea) of grey seals for data spanning 1988-2012. These data sources were used to inform judgement about where this species regularly occurs and therefore determine range. Range was mapped and measured in ArcMap 10.1 using the ETRS_1989_LAEA projection.	
2.3.3 Short-term trend Period	**2005-2010**	
2.3.4 Short term trend Trend direction	**stable**	
2.3.5 Short-term trend Magnitude Optional	**a) Minimum**	

	b) Maximum	
2.3.6 Long-term trend Period Optional	**1984-2010**	
2.3.7 Long-term trend Trend direction Optional	**stable**	
	Grey seal pup production monitoring started in the late 1950s and early 1960s and numbers have increased consistently since (Duck et al., 2011). In recent years, there has been a significant reduction in the rate of increase (SCOS, 2012). In both the Inner and Outer Hebrides, the rate of increase declined in the early 1990s and production has been relatively constant since the mid-1990s. The rate of increase in Orkney has declined since 2000 and pup production has been increasing more slowly since 2004. Overall pup production at colonies in the North Sea colonies continues to increase exponentially, although the increase has apparently slowed at the Isle of May and Farne Islands and is mainly due to expansion of newer colonies on the mainland coasts in Berwickshire, Lincolnshire, Norfolk and Suffolk. Interestingly, these colonies are all at easily accessible sites on the mainland.	
2.3.8 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
2.3.9 Favourable reference range	**a) Value in km²**	
	b) Operator for FRR	**approximately equal to**
	c) FRR is unknown (indicated by "true")	**False**
	d) Method used to set FRR	**The Sea Mammal Research Unit (SMRU) conducts aerial surveys of the major grey seal breeding colonies in Scotland. Colonies in other parts of the UK are monitored either by Non-Governmental Organisations (e.g. the Wildlife Trust, the National Trust) or by Statutory Nature Conservation Bodies (e.g. the Countryside Council for Wales and Northern Ireland Environment Agency)(SCOS, 2012). The trends in distribution and range are**

		associated with these land-based colonies and are not indicative of movements at sea. Within Scotland, Wales and Northern Ireland there has been no significant change in the distribution of grey seal breeding colonies. Within this range, however, there have been some changes in the pattern of distribution, with three new colonies becoming established in the Outer Hebrides. There has been a large change in the distribution of the species in the English southern North Sea with the establishment of new colonies. Overall pup production at colonies in the North Sea continues to increase exponentially, although the increase has apparently slowed at the Isle of May and Farne Islands. The North Sea increase is mainly due to the establishment of new and the expansion of recently formed colonies on the mainland coasts in Berwickshire, Lincolnshire, Norfolk and Suffolk (SCOS, 2012).
2.3.10 Reason for change Is the difference between the reported value in 2.3.1 and the previous reporting round mainly due to…	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.4 Population		
2.4.1 Population size estimation (using individuals or agreed exceptions where possible)	**a) Unit**	**number of individuals**
	b) Minimum	**76100**
	c) Maximum	**116300**
2.4.2 Population size estimation (using population unit other than individuals)	**a) Unit**	

Optional *(if 2.4.1 filled in)*	**b) Minimum**	
	c) Maximum	
2.4.3 Additional information on population estimates / conversion Optional	**a) Definition of "locality"**	
	b) Method to convert data	
	c) Problems encountered to provide population size estimation	
2.4.4 Year or period	**2011**	
2.4.5 Method used Population size	**Estimate based on partial data with some extrapolation and/or modelling**	
	The estimate of the total population size is derived from Bayesian state-space models of grey seal population dynamics to estimate population size from the pup production estimates (Thomas, 2012). The population estimates for 2011 and those of the FRP were therefore calculated using the model incorporating density-dependent pup survival and are therefore comparable (SCOS, 2011; Thomas, 2012).	
2.4.6 Short-term trend Period	**2005-2010**	
2.4.7 Short-term trend Trend direction	**increase**	
2.4.8 Short-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
2.4.9 Short-term trend Method used	**Estimate based on partial data with some extrapolation and/or modelling**	

2.4.10 Long-term trend – Period Optional	**1984-2010**	
2.4.11 Long-term trend Trend direction Optional	**increase**	
2.4.12 Long-term trend Magnitude Optional	**a) Minimum**	
	b) Maximum	
	c) Confidence interval	
2.4.13 Long term trend Method used Optional	**Estimate based on partial data with some extrapolation and/or modelling**	
2.4.14 Favourable reference population	**a) Number of individuals/agreed exceptions/other units**	
	b) Operator	**less than**
	Pup production is used to estimate total population size with appropriate population - operator's estimates of pup and non-pup survival and age-specific fecundity rates (Thomas, 2012). Until the late 1990s the population grew exponentially, implying that the demographic parameters were on average constant over the period of data collection (Thomas and Harwood, 2009). Thus, single maximum likelihood estimates of the demographic parameters were available from a simple population model fitted to the entire pup production time series. The recent levelling off in pup production in the Orkney and Hebrides is the result of some combination of reductions in the reproductive rate and/or the survival rates of pups, juveniles or adults (Thompson et al., 2006). The time series of pup production estimates does not contain sufficient information to quantify the relative contributions of these factors. However, additional information is now available in the form of an independent estimate of population size based on counts of the numbers of grey seals hauled out during the summer combines with information on their haul-out behaviour (Lonegan et al., 2010, 2011). This estimate is assumed to represent the total population of grey seals just before the 2008 breeding season. This independent estimate of the total population size is used with Bayesian state-space models of grey seal population dynamics to estimate population size from the pup production estimates (Thomas,	

	2010, 2011). This work has demonstrated that pup survival is the main density-dependent factor responsible for the levelling off of the pup production trajectory. Incorporating pup survival into the modelling provide the favourable reference population estimate of 66,500 (95% Credibility interval 56,700 – 81,800); i.e. the size of the population in 1992 (Thomas, 2012). Using the same model, the 2011 total population estimate was 93,000 (95% Credibility interval: 76,100 – 116,300) (Thomas, 2012). The current population is therefore greater than the FRV.	
	c) FRP is unknown (indicated by "true")	**False**
	d) Method used to set FRP	**Variation in the number of pups born in a seal population can be used as an indicator of change in the size of the population and with sufficient understanding of population dynamics may allow estimation of total numbers of seals (Duck et al., 2011). SMRU conducts aerial surveys of the major grey seal breeding colonies in Scotland to determine the number of pups born (pup production) whilst other colonies are covered by NGOs and SNCBs (SCOS, 2012). The SMRU surveyed colonies account for approximately 85% of all grey seal pups born throughout the UK. The remaining colonies that contribute the remaining 15% of pups are surveyed less frequently. The total number of seals associated with the regularly surveyed colonies is estimated by applying a population model to the estimates of pup production. Estimates of the total number of seals (from pup counts) at other breeding colonies that are surveyed less frequently are then added in to give an estimate of the total UK grey seal population (SCOS, 2012). While pup production was increasing at a constant exponential rate, i.e. the population was growing at a constant rate, the stable age structure for the female population could be calculated. However, since the mid-1990s this has not been possible since changes in pup production growth rates imply changes in age structure. The independent population estimate derived in 2008 during harbour seal surveys strongly suggests that the density dependent effect is operating through reduced pup survival (Lonergan et al., 2010, 2011). This is now incorporated into the models used to estimate total population from**

		the pup production estimate (Thomas, 2012). There is continual development of the priors used in the model which means that data for one year are not always comparable to that for others unless the model is re-run for the entire data set. In 2012, it was demonstrated that the model incorporating a density-dependent pup survival factor was favoured over the model incorporating adult survival. The population estimates for 2011 and those of the FRP were therefore calculated using the model incorporating density-dependent pup survival and are therefore comparable (Thomas, 2012). Incorporating pup survival into the modelling provide the favourable reference population estimate of 66,500 (95% Credibility interval: 56,700 – 81,800); i.e. the size of the population in 1992. Using the same model, the 2011 total population estimate was 93,000 (95% Credibility interval: 76,100 – 116,300) (Thomas, 2012).
2.4.15 Reason for change Is the difference between the value reported at 2.4.1 or 2.4.2 and the previous reporting round mainly due to:	**a) Genuine change?**	**True**
	The trajectory of the pup-survival model indicates that the grey seal population change genuine increased by around 0.6% between 2009 and 2010 and has been increasing at an average of 1% p.a. for the last 10 years. Most of the increase has occurred in the North Sea population, although there has been some increase in Northern Ireland. For example, within Strangford Lough SAC (Northern Ireland), grey seal numbers were found to have increased almost exponentially at around 9 % p.a. (95% CI 7.7-10.5) with figures suggesting that the overall proportion of grey seal pups were also gradually increasing (Lonergan, 2009; Duck and Morris, 2011). In contrast, pup production in the Western Isles has not changed since 2000 and the Orkney pup production has increased by less than 1% p.a. since 2000. The North Sea Pup production has increased at around 4% p.a. since 2000. During the most recent 5-year period (2005-2010) the total pup production for all annually monitored colonies in the Inner and Outer Hebrides has remained almost constant and Orkney pup production has grown slowly (Duck et al., 2011). However, pup production at colonies in the North Sea continued to increase at around 10% p.a. over the same 5 year period. Within the North Sea, pup production at the southernmost colonies in Lincolnshire and East grew at more than 15% p.a. for the last 10 years. This rate of increase probably indicates that seals from outside the local area are recruiting into the southern North Sea breeding population. Between 2005 and 2010, the UK pup production increased at a rate of 2.2% per annum. The long term average rates of change suggest that the growth of pup production in the Inner and Outer Hebrides has effectively stopped with little change in the Inner Hebrides and possibly a small decrease in the Outer Hebrides since the	

	mid-1990s. Pup production in Orkney also appears to have levelled off since approximately 2000. The independent population estimate suggests that density dependence is acting mainly on pup survival (SCOS, 2012). This also implies that the overall population will closely track the pup production estimates. It is therefore likely that the total populations of grey seals in the Hebrides and Orkney will have followed similar trajectories to those shown by the time series of pup productions while the North Sea population is thought to still be growing exponentially (SCOS, 2012).	
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.5 Habitat for the species		
2.5.1 Area estimation	**627999**	
	The suitable habitat for this species is assumed to be equivalent to its range in the current reporting period. However, parts of the range are used preferentially but cannot currently be quantified.	
2.5.2 Year or period	**1988-2008**	
2.5.3 Method used Habitat for the species	**Estimate based on partial data with some extrapolation and/or modelling**	
2.5.4 Quality of the habitat	**a) Habitat quality**	**Good**
	In the UK, grey seals typically breed on remote uninhabited islands or coasts and in small numbers in caves (SCOS, 2010, 2011, 2012). Preferred breeding locations allow females with young pups to move inland away from busy beaches and storm surges (SCOS, 2010, 2011, 2012). Seals breeding on exposed, cliff-backed beaches and in caves may have limited opportunity to avoid storm surges and may experience higher levels of pup mortality as a result (SCOS, 2010, 2011, 2012). Breeding colonies vary considerably in size; at the smallest only a handful of pups are born, while at the biggest, over 5,000 pups are born annually. In general grey seals are highly sensitive to disturbance by humans hence their preference for remote breeding sites. However, at one UK mainland colony at Donna Nook in Lincolnshire, seals have become habituated to human disturbance and over 70,000 people visit this colony during the breeding season with no apparent impact on the breeding seals (SCOS, 2010, 2011, 2012). UK grey seals breed in the autumn, but there is a clockwise cline in the mean birth date around the UK (SCOS, 2012). The majority of pups in SW Britain are born between August and September, in north and west Scotland pupping occurs mainly between September and late November	

	and eastern England pupping occurs mainly between early November to mid-December. Female grey seals give birth to a single white coated pup which they suckle for 17 to 23 days. Pups moult their white natal coat (also called "lanugo") around the time of weaning and then remain on the breeding colony for up to two weeks before going to sea. Mating occurs at the end of lactation and then adult females depart to sea and provide no further parental care. In general, female grey seals return to the same colony to breed in successive years and often breed at the colony in which they were born. Grey seals have a polygynous breeding system, with dominant males monopolising access to females as they come into oestrus. The degree of polygyny varies regionally and in relation to the breeding habitat (Pomeroy et al., 2000). Males breeding in dense, open colonies are able to restrict access to a larger number of females (especially where they congregate around pools) than males breeding in sparse colonies or those with restricted breeding space, such as in caves or on cliff-backed beaches. Grey seals forage in the open sea and return regularly to haul-out on land where they rest, moult and breed. They may range widely to forage and frequently travel over 100km between haul-out sites (McConnell et al., 1999). Foraging trips can last anywhere between 1 and 30 days. Compared with other times of the year, grey seals in the UK spend longer hauled out during their annual moult (between December and April) and during their breeding season (between August and December). Tracking of individual seals has shown that they can feed up to several hundred kilometres offshore although most foraging probably occurs within 100km of a haul-out site. Individual grey seals based at a specific haul-out site often make repeated trips to the same region offshore, but will occasionally move to a new haul-out site and begin foraging in a new region. Movements of grey seals between haul-out sites in the North Sea and the Outer Hebrides have been recorded. Grey seals are generalists, feeding mainly on the sea bed at depths up to 100m although they are probably capable of feeding at all the depths found across the UK continental shelf. They take a wide variety of prey including sandeels, gadoids (cod, haddock, whiting, ling), and flatfish (plaice, sole, flounder, dab) (Sharples et al., 2009). Diet varies seasonally and from region to region. Food requirements depend on the size of the seal and fat content (oiliness) of the prey, but an average consumption estimate is 4 to 7 kg per seal per day depending on the prey species.
	b) Assessment method	**Expert opinion. Unknown but assumed good given distribution and population increases.**
2.5.5 Short-term trend Period	**2005-2010**	
2.5.6 Short-term trend Trend direction	**stable**	
2.5.7 Long-term trend Period Optional	**1984-2010**	
2.5.8 Long-term trend Trend direction Optional	**stable**	
	Detailed studies at breeding colonies and re-sightings of branded and	

	flipper tagged females indicate that breeding females tend to return to their natal breeding colony; with evidence from photo-identified individuals indicating that they remain faithful to that colony for most of their lives (Pomeroy et al., 2000; SCOS, 2012). There is therefore little movement of breeding animals between Inner Hebrides, Outer Hebrides, Orkney and North Sea colonies. At a finer scale, i.e. within these sub-populations, there may be substantial movement or recruitment of breeding females to colonies other than their natal sites. This is thought to be the explanation for the rapid initial growth of colonies in the North Sea and at specific sites in the Hebrides and Orkney. In this respect, the grey seals at all of the English North Sea breeding sites are considered to have been relatively recently derived from other North Sea colonies and as such are unlikely to show any significant differentiation (SCOS, 2012). This North Sea group is thought to show a degree of reproductive isolation from those breeding in Devon, Cornwall and the Isles of Scilly (Allen et al., 1995; Walton & Stanley, 1997).	
2.5.9 Area of suitable habitat for the species	**a) Value in km²**	
	b) Absence of data indicated as '0'	
2.5.10 Reason for change Is the difference between the value reported at 2.5.1 and the previous reporting round mainly due to	**a) Genuine change?**	**False**
	b) Improved knowledge/more accurate data?	**False**
	c) Use of different method (e.g. "Range tool")?	**False**

2.6 Main pressures		
a) Pressure	**b) Ranking**	**c) Pollution qualifier**
	H = high importance (max 5 entries) M = medium importance L = low importance	
F01: Marine and Freshwater Aquaculture	M	
G05: Other human intrusions and disturbances	M	
C02: Exploration and extraction of oil or gas	L	
F06: Hunting, fishing or collecting	L	

activities not referred to above		
G01: Outdoor sports and leisure activities, recreational activities	L	

Fish farms and salmon netting stations – predator control: Grey seals can be shot at fish farms and salmon netting stations to prevent stock loss. This is regulated by licence from Marine Scotland under the Marine (Scotland) Act 2010. The interaction of seals and fish farms has been recognised as a problem for some time in terms of the damage caused to cages and fish, but also in terms of secondary effects because of salmon escaping from cages and mixing with local wild populations (Graham et al., 2010). More recently, however, the potential effects of methods used to control seals around fin fish farms, involving acoustic deterrent devices (ADDs) and/or shooting seals in the vicinity of farm cages, have been increasingly viewed as a concern. This is partly because of potential effects of ADDs on other marine mammals and partly because the decline of common seals has focussed attention on ways in which it may be possible to reduce unnecessary killing of seals by man. A combined observation, video monitoring and photo identification study was carried out at several farms (Northridge et al., 2010). Preliminary results indicate that photo-identification is possible at fish farm sites and can be used to explore the behaviour of individual animals. Trials of a novel seal deterrence system based on an acoustic signal specifically designed to trigger a seal's startle response is currently being tested and preliminary results suggest that it may be effective in deterring seals at salmon farms. Anecdotal information suggests that such measures have allowed some fish farmers to significantly reduce the number of successful seal attacks on nets and dramatically reduce fish mortality. Additional observations of seal activity and photo-identification at netting stations in both the Moray Firth and the Angus coast south of Montrose have recently been initiated. Initial results from the photo-identification work indicate that few seals are actually involved in predation at nets and that such specialists are responsible for most seal activity and presumably predation events at netting stations with 2 grey seals comprising 63% of the visits to the study area when individuals were identified (SCOS, 2012). Available mitigation methods that provide alternatives to shooting include use of ADDs. Work undertaken in 2009 and 2010 demonstrated that during periods when the ADD was switched on, significantly fewer seals observed and significantly more fish were landed per hour than when the ADD was switched off. There was evidence that the higher fish landings when the ADD was operating were a direct result of the reduction in the number of seals in the vicinity of the net and the amount of time that seals spent in the area. Fish remains were only found within the net during off treatments. Overall, the ADD was found to be an effective seal deterrent. Further modifications to nets and how ADDs are deployed could increase their effectiveness.

The renewable industry: The only direct information on interactions between seals and marine renewables is from Strangford Narrows in Northern Ireland where a long term study of seal populations and seal foraging movements has been carried out during the development and early deployment stage of SeaGen, a large twin rotor tidal turbine (SCOS, 2012). Telemetry data shows seals continue to use Strangford Narrows and SeaGen appears not to be a barrier to their passage. Analysis of all of the tagged seals showed no statistically significant change during operation and non-operation of SeaGen. It should be noted, however, that this results is likely due to high inter-individual variation in transit rates. Further investigation revealed that for those seals which transited the Narrows regularly, they tended to transit less during operation. The biological significance of this is unclear. Analysis of visual survey data has shown that there was no change or redistribution for either grey seals or harbour porpoises although sightings rates much lower for these species than harbour seal and power to detect change low Studies on the effects of windfarm developments in Danish waters indicate that satellite tagged harbour seals showed some avoidance of the wind farm site at Horns Reef during construction phase with high noise levels during pile driving operations. Although position accuracies made comparisons difficult, seals were seen foraging within the site during the operational phase. Both grey and harbour seals have continued to use the Scroby Sands haul-out site (off East Anglia) despite the construction of a large wind turbine array within a few kilometres of the site.

Death and injury by collision - Unusual seal mortalities: A number of severely damaged seal carcasses have washed ashore in eastern Scotland and Eastern England. A total of 14 grey and harbour seals were found in St Andrews Bay, Tay and Eden Estuaries and Firth of Forth between 2008 and September 2010 and a total of 38 grey and harbour seals were found along the North Norfolk coast

between December 2009 and September 2010 (Thompson et al., 2011). No further carcasses were seen in Norfolk but carcasses continue to appear along the Scottish east coast. In total 9 juvenile grey seals were recorded in the vicinity of the Isle of May in early December 2010 and 5 adult females and one adult male harbour seal washed ashore in the Tay and Eden Estuaries. The seals were all apparently killed by a characteristic wound consisting of a single smooth-edged cut that started at the head and spiraled around the body. In most cases the resulting spiral strip of skin and blubber was detached from the underlying tissue. The wound was clearly the cause of death in each case examined. Similar injuries have been described on seals in Strangford Lough in Northern Ireland, at two locations on the Scottish west coast, in Orkney and at Aberdeen and Montrose. Re-examination of pathology reports indicates that the mechanism is the same in each case and that these wounds have been seen on seals as far back as 1985. The extremely neat edge to the spiral wound strongly indicates a cut made by a rotating blade within a channel or cowling of some sort or by the seal rotating past some form of static blade. The presence of additional facial wounds that match the shape of propeller rope cutter blades strongly suggests that the wounds were caused by some form of ducted propellers such as Kort drives or some types of azimuth thruster.

Bycatch: Entanglement in fishing gear, possibly discarded, can be an issue at some colonies with entanglement rates varying between 3.6% to 5%. (Allen et al., 2012). Data from the UK Bycatch Monitoring Scheme provided an estimate of 231-1706 seals being bycaught, thought to be mostly grey seals, in set nets in 2011 (Northridge et al., 2012). The recorded level of bycatch is however not thought to pose a significant risk at the population level.

2.6.1 Method used – Pressures	**mainly based on expert judgement and other data**

2.7 Threats		
a) Threat	**b) Ranking**	**c) Pollution qualifier**
	H = high importance (max 5 entries) M = medium importance L = low importance	
C03: Renewable abiotic energy use	M	
F01: Marine and Freshwater Aquaculture	M	
C02: Exploration and extraction of oil or gas	L	
F06: Hunting, fishing or collecting activities not referred to above	L	
G01: Outdoor sports and leisure activities, recreational activities	L	
M01: Changes in abiotic conditions	L	
M02: Changes in biotic conditions	L	

The pressures identified are expected to continue in the longer term. In recent years, there has been a continued development and expansion of the marine renewable industry. This is likely to increase further into the future. New threats from climate change are expected. At present there is no direct evidence of significant effects of climate change on seal populations. However, indirect effects including new biotoxins, disease agents and parasites and possible changes in prey availability, which are difficult to detect and document, are potential factors in the recent declines in common seals in Shetland, Orkney and along the northern North Sea coasts (Hall, 2006). The precautionary position would be to assume that climate change is more likely to add stresses to populations than to be either neutral or beneficial. In these circumstances, practical measures to actively manage human factors that may either intentionally or inadvertently add additional stress to seal populations need to be encouraged.	
2.7.1 Method used – Threats	**expert opinion**

2.8 Complementary information	
2.8.1 Justification of % thresholds for trends	
2.8.2 Other relevant information	**Female grey seals give birth to a single white coated pup which they suckle for 17 to 23 days. Pups moult their white natal coat (also called "lanugo") around the time of weaning and then remain on the breeding colony for up to two weeks before going to sea (Hall, 2002). Mating occurs towards the end of lactation and then adult females depart to sea and provide no further parental care. In general, female grey seals return to the same colony to breed in successive years and often breed at the colony in which they were born (Pomeroy et al., 2000). Grey seals have a polygynous breeding system, with dominant males monopolising access to females as they come into oestrus. The degree of polygyny varies regionally and in relation to the breeding habitat. Males breeding on dense, open colonies are able to restrict access to a larger number of females (especially where they congregate around pools) than males breeding in sparse colonies or those with restricted breeding space, such as in caves or on cliff-backed beaches. Survival rates and fecundity estimates for adult females breeding at North Rona and the Isle of May have been estimated from re-sightings of permanently marked animals. An integrated analysis of re-sightings, post-partum mass and reproductive success data was used to explore the relationship between mass and probability of breeding (individual fecundity) (SCOS, 2012). Results suggest important differences between the Isle of May and North Rona. Adult survival at the Isle of May was not related to mass and was estimated to be generally high with low variance 0.950 (CI 0.933, 0.965). At North Rona survival rates varied over time between 0.75 and 0.99. There was no evidence of mass dependent survival, but there was annual variation in mass gain at the Isle of May. Overall fecundity estimates differed between sites (North Rona =0.63(CI 0.55, 0.69); Isle of May = 0.76(CI 0.72, 0.82)) and fecundity declined rapidly with decreasing maternal mass at the end of a breeding episode. These estimates are lower than previous estimates for UK grey seals of 0.94 for the Farne Islands, and 0.83 for the Hebrides. Both results are consistent with the differing dynamics at these two colonies and suggest**

	that differences in vital rates among colonies may be widespread.
2.8.3 Trans-boundary assessment	

2.9 Conclusions *(assessment of conservation status at end of reporting period)*		
2.9.1 Range	**a) Conclusion**	**Favourable**
	Considered to be favourable due to evidence of colony expansion.	
	b) Qualifier	
2.9.2 Population	**a) Conclusion**	**Favourable**
	Favourable due to the long term trends indicating a continual increase in population size since records began in the 1960s. Current rate is 2.2% per annum for the UK.	
	b) Qualifier	
2.9.3 Habitat for the species	**a) Conclusion**	**Favourable**
	Due to expansion of colonies and increase in population this is considered to be favourable.	
	b) Qualifier	
2.9.4 Future prospects	**a) Conclusion**	**Favourable**
	Although a number of human activities impact this species, none are considered to be sufficiently significant to have an impact on the size of the population, which continues to expand but at a slower rate than previously.	
	b) Qualifier	
2.9.5 Overall assessment of Conservation Status	**Favourable**	
2.9.6 Overall trend in Conservation Status		

3 Natura 2000 coverage & conservation measures - Annex II species
(only applies to species listed under Annex II of the Directive)

3.1 Population		
3.1.1 Population size Estimation of population size included in the SAC network	**a) Unit**	**number of individuals**
	b) Minimum	**26268**
	c) Maximum	**39634**
3.1.2 Method used	**Estimate based on partial data with some extrapolation and/or modelling**	
	Because of the way in which the seal population data is collected, it is difficult to assess the proportion of the population that resides within SACs during the breeding season. Pup production counts indicate that approximately 43% of all pups born annually are born within SACs. Data from the Scottish sites (account for the majority) show that the number of individuals at these sites represent between 39.5% and 59.6% of the population; these percentages have been applied to the FRP and presented as the minimum and maximum number of individuals in the Natura 2000 network. Although pup production rates vary between SAC sites, for most sites it has been increasing in recent years. All SACs for grey seals are considered to be in a favourable condition. Work is currently being undertaken to identify additional sites away from the coast (feeding and movement corridors) that could potentially be designated as SACs in the future.	
3.1.3 Trend of population size within the network (short-term trend) Optional	**increase**	

3.2 Conservation measures

Conservation measures taken (i.e. already being implemented) within the reporting period and provided information about their importance, location and evaluation.

3.2.1 Measure	3.2.2 Type					3.2.3 Ranking H = high importance M = medium importance L = low importance	3.2.4 Location where the measure is PRIMARILY applied			3.2.5 Broad evaluation of the measure					
	a) Legal/statutory	b) Administrative	c) Contractual	d) Recurrent	e) One-off		a) Inside	b) Outside	c) Both inside & outside	a) Maintain	b) Enhance	c) Long term	d) No effect	e) Unknown	f) Not evaluated
5.0: Other marine-related measures	Y				Y	H			Y			Y		Y	

In the UK seals were protected under the Conservation of Seals Act 1970 (England, Scotland and Wales) and The Wildlife (Northern Ireland) Order 1985 (as amended). In Scotland, the legislation has been superseded by the new Marine (Scotland) Act 2010. The Wildlife (Northern Ireland) Order is currently under review. The Conservation of Seals Act 1970 prohibits taking seals during a close season (01/09 to 31/12 for grey seals) except under licence. The act allows for specific
Conservation Orders to extend the close season to protect vulnerable populations. The Marine (Scotland) Act 2010 has similar measures. At present, five such orders have been established providing year round protection to grey and harbour seals on the east coast of England, Scottish east coast, the Moray Firth, the Northern Isles and the Western Isles. These have been put in place to effectively protect all the main concentrations of harbour seals in England and Scotland.n The Marine (Scotland) Act 2010 (Section 6) prohibits the taking of seals except under licence. Licences can be granted for the protection of fisheries, for scientific and welfare reasons and for the protection of aquaculture activities. In addition, in Scotland it is now an offence to disturb seals at designated haul-out sites. NERC (and others) provide advice on all licence applications and haul-out designations.
Given the recent concerns raised over vessels using dynamic positioning (linked to the unusual seal mortalities), the use of such vessels is controlled within 20km of SACs and SSSIs for grey seals during the breeding season when animals are concentrated in these areas. Seismic survey activities are also controlled close to such sites, as are the use of ADDs.
Marine Scotland will shortly be designating significant seal haul-outs in an effort to protect grey seals from 'reckless and intentional harassment' under the Marine Scotland Act 2010.