6. Conclusions

6.1. Conclusions for Habitats Directive Annex I habitats

The following builds upon the information obtained during this project as outlined in Section 2.3, and outlines the recommended next steps in a process to identify possible SACs for the three Annex I habitats present in UK offshore waters. This complements and builds upon the process previously followed for proposal of SACs in the UK for terrestrial, coastal and inshore habitats.

- Before a list or lists of SACs can be proposed to UK Government, decisions need to be made on whether to put forward some of these areas as SACs for different reef or sandbank types based only on interpolated generalised seabed geological data, with little or no biological information on communities present, or whether new survey work will be required.

- Several habitat-specific site identification problems need to be resolved:

  ◊ Reefs: broad scale survey, or specific analysis of seismic or sidescan data if available, will be required in order to distinguish between boulder and cobble (i.e. stony reef) and other 'gravel' (according to Folk classification) habitat areas which do not fit the definition of Annex I reef.

  ◊ Reefs: broad scale survey will be required to help determine boundaries for areas of different types of reef (especially for iceberg ploughmarks and deep cold water reefs).

  ◊ Reefs: strategic surveys in likely areas will be required to identify examples of biogenic reef (cold water corals and *Sabellaria spinulosa*).

  ◊ Shallow sandbanks: bathymetry data will need to be acquired (available summer 2002) and used to determine the full extent of individual sandbank features (as opposed to sandy sediments in less than 20 m water depth, as identified by BGS contract).

  ◊ Submarine structures made by leaking gases: a decision needs to be made as to whether the two examples of 'pockmarks' for which there is good information fit the definition of this Annex I habitat type.

- An estimate of the area of each habitat in UK waters, including offshore and inshore waters, needs to be made, to be used during the site selection process to estimate area of habitat within sites in relation to the total area covered by that habitat within the UK (see Section 2.2.1.2). The GIS developed for this project can be used to provide an estimate for UK offshore waters.

- Propose a number of sites, based on the selection criteria and principles outlined in Section 2.2, to best represent the different types of each Annex I habitat (see Section 2.1) and representing the different biogeographic zones and depth and temperature regimes in UK offshore waters. The proposed sites should be selected on best available information taking account of the decisions reached on adequacy of data (see above). Where uncertainties remain over the location of certain types (see above),

the list of sites should be considered interim until such time as adequate information becomes available.

- The offshore SACs proposed above should complement the existing SAC series for UK inshore waters, and complete the list of sites for UK marine waters as a whole.

6.2 Conclusions for Habitats Directive Annex II species

The purpose of this section of this report is to identify possible approaches and options that could be used to identify SAC sites for Annex II species in UK waters. Further data collation and analysis and, in some cases, survey work, will be required before this can be done. Further work on quantifying the populations occurring in UK waters (inshore as well as offshore) for each of the Annex II species will be required. For bottlenose dolphin and harbour porpoise, populations using UK waters are not well known, but it is likely that further research to improve estimates will prove unrealistic to achieve.

Special conservation measures (Approach D) require further investigation for all marine Annex II species under the Habitats Directive. Such measures may be required for particular activities which affect seals and/or cetaceans whilst at sea, whether or not areas qualifying as SAC can be identified.

6.2.1. Grey seal (*Halichoerus grypus*)

Existing SACs for grey seal breeding sites in the UK already include some sea areas around their colonies. From further examination of the limited data currently available on seal distributions at sea, it may be possible to identify preferred feeding areas in UK inshore and offshore waters. If such areas can be identified, it remains to be established whether they would fulfil SAC selection criteria and principles, in particular whether they are essential to the life and reproduction of the species, and consequently whether they should be considered as possible SACs.

Because of the lack of UK-wide effort-related data for grey seals in marine waters, it will not be possible to identify important feeding areas for them by spatial analysis (Approach B). It might be possible to employ a generic approach such as defining generic feeding radii around breeding colonies and haul-out sites (Approach A), but further data will be required in order to test the validity of this approach. One of the difficulties with employing a generic radius approach encountered during work carried out by JNCC on extensions to bird breeding colonies, is that feeding locations for birds from a particular breeding colony appear to be specific to that colony, rather than determined by a generic foraging distance for each species (Harding & Riley 2000b). From the limited data available on their feeding habits, it appears that the same is true of grey seals. Approach C based on identification of habitat, could be used to assist in the process of identification of important feeding areas for grey seals (for example, by identifying areas of sandeel habitat), but would need to be combined with actual data on the use of any area by the seals themselves. Also, although sandeels do form a major component of the diet of grey seals from some locations, they also feed on a wide range of other fish species and molluscs (McConnell *et al.* 1999). In addition to identification of sites, 'special measures' (Approach D) may be required if certain activities result in significant disturbance or harm to seal populations.

Because of the above, the flow diagram of possible processes for site identification in Figure 5.1 shows grey seals on a separate 'branch' to those for other groups of Annex II species or birds which have different distributions, behaviour and data availability.

Further work is required to better describe dispersion and feeding patterns (both temporal and spatial) for grey seal, in particular in those geographical areas not fully covered by previous work (England, the Irish Sea and inner west coast of Scotland). If important feeding areas can be identified, further work on determining whether such areas are essential to the life and reproduction of grey seals would need to be carried out.

6.2.2. Common (or harbour) seal (*Phoca vitulina*)

Similarly to grey seals, existing SACs for common seals in the UK also include some sea areas around their haul-out, moulting and breeding sites. Existing at-sea distribution data for common seal are even more sparse than for grey seal. The limited data appear to indicate that common seals forage much closer to their haul-out sites than do grey seals (McConnell *et al.* 1999, Thompson *et al.* 1996). However, considerable further survey will be required before it can be determined if it will be possible to identify preferred feeding areas in UK inshore and offshore waters for common seals.

Possible approaches to site identification in waters away from the coast for common seals are similar to those discussed above for grey seals.

As for grey seals, the flow diagram of possible processes for site identification in Figure 5.1 shows common seals on a separate 'branch' to those for other groups of Annex II species or birds which have different distributions, behaviour and data availability.

Further work is required to better describe dispersion and feeding patterns (both temporal and spatial) for common seals, in particular in offshore areas. If important feeding areas can be identified, further work on determining whether such areas are essential to the life and reproduction of common seals would need to be carried out.

6.2.3. Bottlenose dolphin (*Tursiops truncatus*)

There are currently three candidate SACs for bottlenose dolphin in the UK: Cardigan Bay, the Lleyn Peninsula and the Sarnau in Wales, and the Moray Firth in Scotland. As can be seen from Figure 3.2 the main European aggregations of bottlenose dolphin in the UK, based on current data, are in inshore waters. However, there also appears to be a concentration of records of this species in the area of the Wyville-Thomson ridge in north-western UK offshore waters.

SAC sites for bottlenose dolphins in UK inshore waters were selected on the basis of the best available information at the time, consisting of sightings data and site-specific studies. These studies tended to concentrate on a relatively small area; there was little relevant data from wider afield with which to make any true comparisons. The boundaries of the SACs are drawn to encompass the areas most consistently used by bottlenose dolphins, in the case of Cardigan Bay, out to the 12 nm limit of the territorial sea. The SAC sites were considered as representing areas essential to the life and reproduction of the species but clearly do not encompass the entirety of the area over which individuals within the populations range. Their repeated occurrence and continual presence indicate that these sites are critical for the maintenance of the population(s) of bottlenose dolphin. At Newquay, in Cardigan Bay, the high proportion of dolphins with calves indicates that the area is favoured as a nursery area, with groups of females and calves joined intermittently by large males and other dolphins (Bristow & Rees 2001).

Effort related data on distribution of bottlenose dolphin exist throughout UK offshore waters, in the Joint Cetacean Database, and have been mapped in Figure 3.2 (Reid *et al.* in

prep). An approach such as spatial analysis of these data (by Approach B or other methods) may be appropriate to identify aggregations of this species in addition to those already included within inshore SAC boundaries. It will then be necessary to try to determine whether these areas are "essential to the life and reproduction" of the species before proposing SACs in UK offshore waters. Bottlenose dolphins breed at sea, therefore any approach to site identification based on generic radii around breeding colonies (similar to Approach A) will not be appropriate. Because bottlenose dolphins are present in a wide range of habitats throughout the world, and the precise habitat requirements for this species are largely unknown, Approach C (based on identification of specific habitat for the species) is unlikely to identify any further sites "essential to the life and reproduction" for this species. Due to the wide-ranging nature, sparse records, and apparent decline of this species in UK waters, 'special measures' (Approach D) will be required in addition to any further possible site identification, in order to ensure appropriate conservation of this species. The UK Species Action Plan for small dolphins outlines research work and actions needed to assist in non-site-based conservation of this species (UK Biodiversity Group 1999).

6.2.4. Harbour porpoise (*Phocoena phocoena*)

There are currently no SACs identified for harbour porpoise in the UK. Harbour porpoises breed at sea and much less is known about their breeding and feeding than is known for seals. They are not currently known to have discrete breeding areas, therefore any approach to site identification based on generic radii around breeding colonies (Approach A) will not be appropriate. Not enough is currently known about the ecology of the species to be able to identify areas of habitat (Approach C) which may be important to harbour porpoises. Earlier analysis of data from the Joint Cetacean Database was performed by JNCC, but no discrete areas could be identified which might be considered "essential to the life and reproduction" of this species.

In response to discussions with experts and the EC (see Section 3.2.1.2), data analyses (including spatial analysis involving kriging, described in Section 5.2.2 under Approach B, and analyses of sightings data) are currently being carried out by JNCC and by CCW with the aim of identifying for harbour porpoise areas of:

1. Continuous or regular presence;

2. elevated population density; and

3. areas with good adult to young ratio.

If discrete areas fulfilling any of the above criteria for harbour porpoise can be identified in UK waters by this further analysis, these will be suitable for consideration as possible SACs.

One of the difficulties encountered when trying to identify aggregations of wide ranging species is that because of the lack of easily identifiable natural boundaries in the marine environment, the size of any area identified has to be to some extent defined by the detail of the analytical method employed. This situation is very similar to that for certain species of wide-ranging birds such as fulmar, gannet and Manx shearwater (Group 2B in Section 6.3.2), as well as for harbour porpoise. The criteria to be used to select possible sites for these two groups will, however, be different (see Sections 3.2 and 4.2) as sites are selected under different EC Directives. The flow diagram in Figure 5.1 indicates two options for processes that could be followed for this group of species:

1. Define areas as described above.

2. Where sites cannot be identified as "essential to the life and reproduction" of the species (for Annex II species) or as the "most suitable territories" (for Annex I and regularly occurring migratory birds), special measures (Approach D) will be required to ensure the conservation of these species.

6.3 Conclusions for Birds Directive Annex I and migratory birds

6.3.1. The JNCC Marine SPA Project

Some of the work to try to identify areas that may qualify for classification as SPAs for inshore groups of Annex I and migratory birds is already ongoing under JNCC's Marine SPA Project, separate from the 'Offshore Natura 2000 project'. Although initially separate projects, the two are closely integrated due to potential overlap in work areas. The three main types of marine SPAs are currently envisaged as:

a) Seaward extensions of breeding colony SPAs beyond low water mark;

b) inshore areas used by birds in the non-breeding seasons e.g. seaduck and divers; and

c) marine feeding areas.

The third type is the only one that relates to offshore waters, and forms part of the JNCC 'Offshore Natura 2000 Project'.

Work on JNCC's Marine SPA Project is in progress. For work on *seaward extensions of breeding colony SPAs*, JNCC conducted surveys of bird use of waters close to certain breeding colony SPAs in 2001, with the aim of applying a radius approach to extensions to bird breeding colonies. These data were collected up to 4-5 km from each colony, and are being interpolated (using the kriging/variogram method described in Section 5.2.2). Initial analyses of these survey data (Andy Webb pers. comm.), indicate that relatively well defined areas within a short distance (approximately 1km) of the colonies were used during the breeding season by birds (mainly the auks and gannets) engaged in behaviour such as bathing, preening, resting, etc. Location of feeding areas in relation to each colony depended on the species, the site, and variable physical and environmental conditions. For those species that have enough observations to model spatially (guillemots, razorbills, gannets, puffins), analyses of the interpolated data will generate proposed boundaries for each species. These proposed boundaries will be applied to all UK colonies, paying particular attention to the predominant species on that colony, and tailoring the size of the SPA to species-specific priorities.

For the identification of *inshore areas used by birds in the non-breeding seasons* that may qualify for classification as SPAs, aerial survey data, combined with some data from the ESAS database and WeBS core counts, are likely to be the primary sources of data. This aspect of the 'Marine SPA Project' is ongoing.

For *marine feeding areas* that may qualify for classification as SPAs, work is proceeding under JNCC's 'Offshore Natura 2000 Project'. Work on this aspect of marine SPAs is not as far advanced as for *seaward extensions of breeding colony SPAs* and *inshore areas used by birds in the non-breeding seasons*. However, some preliminary analyses have been carried out in order to subdivide the long list of birds into relevant groups of

species. The following section of this report (Section 6.3.2) identifies different groups of birds for which different sets of data may be used to identify marine feeding areas that may qualify for classification as SPAs. The ESAS database is likely to be the primary source of data for identification of such areas for species for which there are adequate data in the database. Other sources of data will need to be investigated for the other groups of species. The following analysis (and the flow chart in Figure 5.1) include feeding areas for all UK Annex I and migratory birds, irrespective of whether other aspects of their lifecycles are included in the JNCC 'Marine SPA Project' or not.

Once data analysis has been concluded to try to identify important marine feeding areas for birds, consideration of these areas in relation to the guidelines for SPA site selection will need to be carried out. The JNCC SPA guidelines (see Section 4.2) will provide a starting point, but will need to be adapted for use in defining marine SPAs. Adaptation of the guidelines will be an iterative process as the consideration of methods for selection of areas likely to qualify for marine SPA status proceeds. In relation to selection of feeding sites for birds it is possible that the provisions of Stage 1 guideline 4 will need to be extended or applied flexibly.

6.3.2. Groups of birds

The list of Annex I and regularly occurring migratory species to be considered for marine SPAs (Table 4.1) consists of a number of different bird species with very different distributions and behaviours. Many of the species breed in the UK, however, a number do not and occur in UK waters only during the non-breeding season. A number of the bird species are primarily of inshore and often localised distribution, whilst others travel great distances over offshore waters. In order to attempt to identify important areas for this group of species, it must, therefore, be subdivided. The most appropriate methods for identifying important areas or aggregations of these species will depend partly on the type of data available on each, and on the type of dispersion for each species. The list presented in Table 4.1 has, therefore, been split into sub-groups of species, firstly by the nature of data available on their distribution, and secondly, by the geographical distribution of records for each species in UK waters in terms of inshore or offshore. These subgroups (described below) are not definitive, and it may be that during the course of further data analysis or data acquisition, other splits or groupings may be employed. The flow diagram presented in Figure 5.1 reflects these sub-groups.

Special conservation measures (Approach D) require further investigation for both Annex II species under the Habitats Directive, and for birds. Such measures may be required for particular activities which affect birds whilst at sea, whether or not areas qualifying as SPA can be identified by one or a combination of the following measures.

For a number of species that occur in UK waters, the European Seabirds at Sea (ESAS) database contains few records. In order for spatial analysis to work efficiently and be statistically valid, sufficient records must be included within the analysis. For those species with less than 20 records in the ESAS database, spatial analysis using ESAS data would be unreliable because of the number of zero abundance values, and other methods or data sources will need to be used. For some species with more than 20, but still few records in the database, other methods for identification of aggregations may also be more appropriate than spatial analysis.

Species for which there are few records in the database are either uncommon in UK waters, or their distribution is primarily inshore of the main survey areas covered. In order to separate this group of birds from those with an adequate number of records in the database as objectively as possible, numbers of records for all species within the

ESAS database were plotted. The resulting graph (see Annex A) was examined for 'breaks' in the frequency of records at a level above the point where an excess of zero abundance values might appear in the spatial analysis. The clearest split in the number of records in the database appeared to be at about 400 records. Those bird species with fewer than 400 records in the database (listed in Table 6.1) will be better analysed using other methods and/or alternative data, whilst those with greater than 400 records in the ESAS database (listed in Table 6.2) may be analysed using spatial analysis.

Table 6.1 Bird species with less than 400 records in the ESAS database

Common name	***Species***	***Status***	***Existing SPA(s) in UK?***	***Marine extension to breeding colony SPA likely?***
Black-throated diver	*Gavia arctica*	Ann. I	✓	
Great northern diver	*Gavia immer*	Ann. I		
Black-necked grebe	*Podiceps nigricollis*	M		
Red-necked grebe	*Podiceps griseigena*	M		
Slavonian grebe	*Podiceps auritus*	Ann. I	✓	
Cory's shearwater	*Calonectris diomedea*	Ann. I		
Great shearwater	*Puffinus gravis*	M		
Balearic shearwater	*Puffinus mauretanicus*	Ann. I		
Scaup	*Aythya marila*	M	✓	
Velvet scoter	*Melanitta fusca*	M	✓	
Goldeneye	*Bucephala clangula*	M	✓	
Surf scoter	*Melanitta perspicillata*	M		
Red-breasted merganser	*Mergus serrator*	M	✓	
Goosander	*Mergus merganser*	M	✓	
Red-necked phalarope	*Phalaropus lobatus*	Ann. I	✓	
Grey phalarope	*Phalaropus fulicaria*	M		
Pomarine skua	*Stercorarius pomarinus*	M		
Long-tailed skua	*Stercorarius longicaudus*	M		
Mediterranean gull	*Larus melanocephalus*	Ann. I	✓	✓
Sabine's gull	*Larus sabini*	M		
Ring-billed gull	*Larus delawarensis*	M		
Yellow-legged herring gull	*Larus argentatus cachinnans*	M		
Iceland gull	*Larus glaucoides*	M		
Glaucous gull	*Larus hyperboreus*	M		
Sandwich tern	*Sterna sandvicensis*	Ann. I	✓	✓
Roseate tern	*Sterna dougallii*	Ann. I	✓	✓
Little tern	*Sterna albifrons*	Ann. I	✓	✓
Black tern	*Chlidonias niger*	Ann. I		

Note: M = regularly occurring migratory species (Article 4.2, Birds Directive)
Ann. I = listed on Annex I of Birds Directive
Existing SPA(s) in UK? = Are there SPAs in the UK (Sept 2001) for which the species is a qualifying feature?

Table 6.2 Bird species with greater than 400 records in the ESAS database

Common name	*Species*	*Status*	*Existing SPA(s) in UK?*	*Marine extension to breeding colony SPA likely?*
Red-throated diver	*Gavia stellata*	Ann. I	✓	
Great crested grebe	*Podiceps cristatus*	M	✓	
Fulmar	*Fulmarus glacialis*	M	✓	✓
Sooty shearwater	*Puffinus griseus*	M		
Manx shearwater	*Puffinus puffinus*	M	✓	✓
Storm petrel	*Hydrobates pelagicus*	Ann. I	✓	✓
Leach's petrel	*Oceanodroma leucorhoa*	Ann. I	✓	✓
Gannet	*Morus bassanus*	M	✓	✓
Cormorant	*Phalacrocorax carbo*	M	✓	✓
Shag	*Phalacrocorax aristotelis*	M	✓	✓
Common eider	*Somateria mollissima*	M	✓	
Long-tailed duck	*Clangula hyemalis*	M	✓	
Common scoter	*Melanitta nigra*	M	✓	
Arctic skua	*Stercorarius parasiticus*	M	✓	✓
Great skua	*Catharacta skua*	M	✓	✓
Little gull	*Larus minutus*	M		
Black-headed gull	*Larus ridibundus*	M	✓	✓
Common gull	*Larus canus*	M	✓	✓
Lesser black-backed gull	*Larus fuscus*	M	✓	✓
Herring gull	*Larus argentatus*	M	✓	✓
Great black-backed gull	*Larus marinus*	M	✓	✓
Kittiwake	*Rissa tridactyla*	M	✓	✓
Common tern	*Sterna hirundo*	Ann. I	✓	✓
Arctic tern	*Sterna paradisaea*	Ann. I	✓	✓
Guillemot	*Uria aalge*	M	✓	✓
Razorbill	*Alca torda*	M	✓	✓
Little auk	*Alle alle*	M		
Puffin	*Fratercula arctica*	M	✓	✓

Note: M = regularly occurring migratory species (Article 4.2, Birds Directive)
Ann. I = listed on Annex I of Birds Directive
Existing SPA(s) in UK? = Are there SPAs in the UK (Sept 2001) for which the species is a qualifying feature?

Using ESAS data, a preliminary examination of the proportions of records for each species in 5 km bands from shore was performed on a sample of records (see Annex A). This preliminary analysis indicated that a suitable cut-off point to split the bird species into an 'inshore' group and an 'offshore' group was at 15 km (approximately 8 nm) from the coast. A graphical view of this analysis revealed two classes of seabird species: those where the cumulative percentage of abundance increased steeply within about 15km of the coast, and those where the percentage increased more gradually. Where 50% of database records occurred at less than 15 km from the coast, these species were termed 'inshore' (groups 1A and 2A in Table 6.3 below). Where 50% of records in the ESAS database occurred at greater than 15 km from the coast, these species were termed 'offshore' (groups 1B and 2B in Table 6.3 below). For those species with less than 400 records in the ESAS database, the split into inshore and offshore species (groups 1A and 1B in Table 6.3) was performed on the limited number of records held in the ESAS database, and was supplemented by general knowledge of the distribution of the species.

Table 6.3 Split of bird species into 'inshore' and 'offshore' groups

Common name	*Species*	*Status*	*Existing SPA(s) in UK?*	*Marine extension to breeding colony SPA likely?*
1A Species of primarily INSHORE distribution. Less than 400 records in ESAS database therefore no spatial analysis by modified Skov *et al.* 1995 methodology. Use of additional data and other methods required.				
Black-throated diver	*Gavia arctica*	Ann. I	✓	
Great northern diver	*Gavia immer*	Ann. I		
Red-necked grebe	*Podiceps grisegena*	M		
Slavonian grebe	*Podiceps auritus*	Ann. I	✓	
Black-necked grebe	*Podiceps nigricollis*	M		
Scaup	*Aythya marila*	M	✓	
Surf scoter	*Melanitta perspicillata*	M		
Velvet scoter	*Melanitta fusca*	M	✓	
Goldeneye	*Bucephala clangula*	M	✓	
Red-breasted merganser	*Mergus serrator*	M	✓	
Goosander	*Mergus merganser*	M	✓	
Ring-billed gull	*Larus delawarensis*	M		
Sandwich tern	*Sterna sandvicensis*	Ann. I	✓	✓
Little tern	*Sterna albifrons*	Ann. I	✓	✓
1B Species of primarily OFFSHORE distribution. Less than 400 records in ESAS database therefore no spatial analysis by modified Skov *et al.* 1995 methodology. Use of additional data and other methods required.				
Cory's shearwater	*Calonectris diomedea*	Ann. I		
Great shearwater	*Puffinus gravis*	M		
Balearic shearwater	*Puffinus mauretanicus*	Ann. I		
Red-necked phalarope	*Phalaropus lobatus*	Ann. I	✓	
Grey phalarope	*Phalaropus fulicaria*	M		
Pomarine skua	*Stercorarius pomarinus*	M		
Long-tailed skua	*Stercorarius longicaudus*	M		
Mediterranean gull	*Larus melanocephalus*	Ann. I	✓	✓
Sabine's gull	*Larus sabini*	M		
Yellow-legged herring gull	*Larus argentatus cachinnans*	M		
Iceland gull	*Larus glaucoides*	M		
Glaucous gull	*Larus hyperboreus*	M		
Roseate tern	*Sterna dougallii*	Ann. I	✓	✓
Black tern	*Chlidonias niger*	Ann. I		
2A Species of primarily INSHORE distribution (more than 50% of records in ESAS within 15 km of coast), adequately represented in ESAS database, therefore spatial analysis by modified Skov *et al.* 1995 methods to be performed, plus use of other data as appropriate.				
Red-throated diver	*Gavia stellata*	Ann. I	✓	
Great crested grebe	*Podiceps cristatus*	M	✓	
Cormorant	*Phalacrocorax carbo*	M	✓	✓
Shag	*Phalacrocorax aristotelis*	M	✓	✓
Common eider	*Somateria mollissima*	M	✓	
Long-tailed duck	*Clangula hyemalis*	M	✓	
Common scoter	*Melanitta nigra*	M	✓	
Little gull	*Larus minutus*	M		
Black-headed gull	*Larus ridibundus*	M	✓	✓
Common gull	*Larus canus*	M	✓	✓
2B Species of primarily OFFSHORE distribution (less than 50% of records in ESAS within 15 km of coast), adequately represented in ESAS database, therefore spatial analysis by modified Skov *et al.* 1995 method is primary analysis tool to identify aggregations.				
Fulmar	*Fulmarus glacialis*	M	✓	✓
Sooty shearwater	*Puffinus griseus*	M		
Manx shearwater	*Puffinus puffinus*	M	✓	✓
Storm petrel	*Hydrobates pelagicus*	Ann. I	✓	✓
Leach's petrel	*Oceanodroma leucorhoa*	Ann. I	✓	✓
Gannet	*Morus bassanus*	M	✓	✓
Arctic skua	*Stercorarius parasiticus*	M	✓	✓
Great skua	*Catharacta skua*	M	✓	✓
Lesser black-backed gull	*Larus fuscus*	M	✓	✓
Herring gull	*Larus argentatus*	M	✓	✓
Great black-backed gull	*Larus marinus*	M	✓	✓
Kittiwake	*Rissa tridactyla*	M	✓	✓
Common tern	*Sterna hirundo*	Ann. I	✓	✓
Arctic tern	*Sterna paradisaea*	Ann. I	✓	✓
Guillemot	*Uria aalge*	M	✓	✓
Razorbill	*Alca torda*	M	✓	✓
Little auk	*Alle alle*	M		
Puffin	*Fratercula arctica*	M	✓	✓

Note: M = regularly occurring migratory species (Article 4.2, Birds Directive)
Ann. I = listed on Annex I of Birds Directive
Existing SPA(s) in UK? = Are there SPAs in the UK (Sept 2001) for which the species is a qualifying feature?

The above groupings of bird species are represented in the flow diagram (Figure 5.1) presenting data analysis and processes for wide ranging marine species. The following sections outline possible approaches to identification of important feeding areas for each of the groups of birds shown in Table 6.3.

6.3.2.1. Inshore species, not adequately represented in ESAS database

Refer to Table 6.3 for the list of species included within this group (Group 1A). Aggregations or concentrations of birds adjacent to existing SPAs will be covered, for the two species that breed at coastal colonies in the UK (sandwich tern and little tern), by the Marine SPA Project under possible seaward extensions to breeding colony SPAs. Some of the other species in this group may be covered by the Marine SPA Project under the category of 'inshore areas used by birds in the non-breeding seasons'. Spatial analysis to identify feeding areas will not be appropriate for this group, due to the lack of records for these species in the ESAS database. Alternative sources of data other than the ESAS database will need to be used to try to identify feeding areas for these species. For some species where data on their distribution at sea are sparse, but a reasonable amount is known about their foraging behaviour (e.g. terns) it may be most appropriate to use a radius-based approach to define extensions to breeding colony SPAs generically for UK colonies. Alternatively, it may be best to use data from the individual colony studies from which the radius approach was derived, to define colony-specific radii. Existing data on important habitats for birds (Approach C), and results of other site-specific studies, may help in identifying areas important for feeding birds of this group of species. It may also be very useful to find out what approaches have been considered by other Member States.

6.3.2.2. Offshore species, not adequately represented in ESAS database

Refer to Table 6.3 for the list of species included within this group (Group 1B). Identification of areas that may qualify as SPAs for this group of species, many of which are comparatively rare in UK waters, will be difficult due to a lack of suitable data. Examination of the geographic locations of records over a suitable period of time may indicate that although rare, occurrences have followed an aggregated distribution pattern. If this is the case, it may be possible to identify important feeding areas for some species for consideration as SPAs, but if not, then it is unlikely that SPAs can be identified for such species in UK waters. For the two of these species which breed in the UK, extensions to breeding colony SPAs will also be considered, although such extensions may not cover important feeding areas.

6.3.2.3. Inshore species, fully represented in ESAS database

Refer to Table 6.3 for the list of species included within this group (Group 2A). Most of these species will fall within the Marine SPA Project category of 'inshore areas used by birds in the non-breeding seasons'. Such areas will be identified using aerial survey and WeBS core counts, possibly supplemented by spatial analysis of ESAS data. For several of these species, extensions to breeding colony SPAs will also be considered. Consideration of inshore SPAs for breeding red-throated divers (*Gavia stellata*) will also be necessary.

6.3.2.4. Offshore species, fully represented in ESAS database

Refer to Table 6.3 for the list of species included within this group (Group 2B). The ESAS database is the primary source of data on wide ranging species offshore. Therefore,

for this group of species, spatial analysis of data to identify aggregations is the only suitable method by which important areas might be identified. General distribution patterns of seabird densities in UK waters can be established using field data and spatial modelling techniques. Essentially, spatial modelling investigates the inter-relationships between density values across the region being investigated. Approach B (Section 5.2.2) briefly outlines two methods of modelling spatial distribution of birds.

Examination and testing of several variations of spatial analysis is likely to be the best first step to identifying important feeding areas for this group of birds. For all those of this group of species which also breed in the UK, extensions to breeding colony SPAs will also be considered. There are several technical difficulties that will need to be examined before any areas of elevated bird densities identified by spatial analysis techniques can be considered as possible SPAs:

- In using either of these spatial analysis techniques (Approach B), the boundaries of areas identified are determined by statistical parameters, and will change if details of the analyses of the data are changed or disputed.

- Important Bird Areas identified in Skov *et al.* (1995) applied only to the North Sea; to be applicable to selection of areas that may qualify as SPAs under the Birds Directive, data will need to be analysed, by whatever spatial analysis method is selected, for the whole of the UK Continental Shelf waters, rather than just North Sea waters.

- If the Skov *et al.* (1995) approach were used, further consideration would need to be given to the ecological justification of 3000 km^2 as a 'scaling parameter' for site selection (A in the MCC formula reproduced in Section 5.2.2). For example, Skov *et al.* (1995) used 3000 km^2 as a scaling parameter for all species and all seasons. For the purposes of marine SPA selection it might be considered appropriate to identify scaling parameters for individual species and/or seasons.

- Stroud *et al.* (2001) clearly recognises that many thinly dispersed and wide ranging species i.e. raptors, seabirds and many migrants in general are difficult to represent in an SPA site series using 1% as a selection level (see Section 4.2). This affects the possible use of the MCC formula to identify possible SPAs. Stroud *et al.* (2001) further caution that (terrestrial) SPA which have been selected are distinct in habitat and/or ornithological importance from the surroundings and have definable and recognisable character - a situation which is complicated and difficult to address in many seabirds away from their breeding grounds.

- On land, SPA guidelines are defined with some reference to absolute numbers of birds. The European Seabirds at Sea (ESAS) data (and those from the Joint Cetacean Database) are, however, relative abundances. The Stage 2 JNCC Guideline for selecting SPAs based on population density states that 'areas holding or supporting more birds than others and/or holding birds at higher concentrations are favoured for selection (see Section 4.2), therefore use of relative numbers rather than absolute numbers may be justified.