
Review of divers, grebes and seaduck
distribution and abundance
in the SEA 5 area



Great Northern Diver
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Report to the DTI as part of SEA 5

CORK ♦ ECOLOGY

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Non-technical Summary

Introduction

A review of the distribution and abundance of divers, grebes and seaduck in the SEA 5 area was carried out by Cork Ecology at the request of the Department of Trade and Industry as part of the production of the SEA 5 Consultation Document. The study area was defined as the east coast of Scotland from the English border north to John O' Groats, including Orkney and Shetland, and the offshore waters in the SEA 5 area.

Divers, grebes and seaduck are primarily inshore species typically wintering in sandy bays or estuaries although some e.g. great northern divers prefer rocky shorelines. Some species are resident while others are winter visitors to Britain. This review considered thirteen species: red-throated diver, black-throated diver, great northern diver, great crested grebe, red-necked grebe, slavonian grebe, scaup, eider, long-tailed duck, common scoter, velvet scoter, goldeneye and red-breasted merganser.

Methodology

A combination of raw and published data, from land-based, aerial and ship-board counts were included to allow as complete a review as possible to be carried out. In general data from 1991 onward were considered with the aim of presenting the most recent estimates for the important sites. Earlier European Seabirds at Sea (ESAS) data (from 1979 onwards) for ship and aerial surveys were included, with average densities calculated using data from all years.

Sites that regularly hold more than 1 % of the national population of a species are deemed to be nationally important, and sites with more than 1 % of the biogeographic population are internationally important.

Key Areas

Shetland

Several sites in Shetland are internationally important for eider. Largest concentrations occur in August during the moulting period. Shetland also holds internationally important numbers of great northern diver and slavonian grebe and nationally important numbers of long-tailed duck and red-breasted merganser.

Orkney

Orkney holds internationally important concentrations of great northern diver, slavonian grebe and eider. Key areas are Scapa Flow and the Sounds around Wyre, although other areas may also hold important concentrations of these species. Other species occurring in nationally important numbers are red-throated and black-throated diver, red-necked grebe, long-tailed duck, velvet scoter, goldeneye and red-breasted merganser.

Moray Firth

The Moray Firth holds significant numbers of twelve of the thirteen species of diver, grebes and seaduck considered in this review. Slavonian grebe and eider occur in internationally important numbers, and numbers of great northern diver have exceeded the international threshold of 50 birds in some recent years. A further nine species occur in nationally important numbers.

Aberdeenshire coast

Eider are found in internationally important numbers from Donmouth to the Ythan estuary. This stretch of Aberdeenshire coast also regularly holds nationally important numbers of red-throated diver and common scoter. Red-throated diver numbers tend to peak in late spring, while concentrations of eider and common scoter peak in late summer. Nationally important numbers of red-breasted mergansers also peak in late summer, to the south of Aberdeen, at St Cyrus and Kinnaber, on the border with Angus.

Angus coast

Numbers of eider at Montrose Basin are above the internationally important threshold. In addition, red-throated divers, long-tailed duck, common scoter, velvet scoter & red-breasted merganser regularly occur in nationally important numbers off the Angus coast. Main concentrations occur in Lunan Bay, Montrose Basin, off Carnoustie and Kinnaber.

Tay/St Andrews Bay

The three major sites are the Tay estuary, St Andrew's Bay and the Eden estuary. The largest wintering flock of eider in the UK occurs at the mouth of the Tay estuary. Counts in 1995 and 1996 gave estimates of more than 12,000 birds in the area. Red-throated diver, slavonian grebe, scaup, long-tailed duck, common & velvet scoter and red-breasted merganser occur in nationally important numbers in the area.

Firth of Forth

Like the Moray Firth, the Firth of Forth holds significant numbers of twelve species of diver, grebes and seaduck. Slavonian grebe and eider occur in internationally important numbers, while counts of red-throated & black-throated divers, great crested & red-necked grebes, scaup, long-tailed duck, common & velvet scoter, goldeneye & red-breasted merganser are of national importance.

Lothian/Border coast

Recent surveys of eider along the Lothian/Border coastline reported total numbers exceeding the UK international importance threshold. Goldeneye regularly occur in nationally important numbers at the Tweed estuary in winter.

Discussion

Counts from data sources such as bird reports reviewed here were frequently found to be higher than corresponding WeBS counts, which often underestimate numbers of divers, grebes and seaduck as counts are conducted on preset dates in less than ideal conditions.

Seabird surveys using the ESAS method are most suited to assessing offshore seabird distribution, however, dedicated aerial and ship-based inshore surveys are suitable survey methods and are also useful in detecting birds not visible from land.

National population estimates for three diver species, long-tailed duck, common scoter and red-breasted merganser are based on out-of-date or incomplete data. This points to an urgent need to obtain up-to-date data using the most appropriate methodology in key areas which have been neglected e.g. Orkney.

Recommendations

Based on this review, it is recommended that:

- An all-island survey of divers, grebes and seaduck of Orkney should be conducted over the winter months, using a combination of land-based, boat-based and aerial surveys as appropriate. This would allow numbers of these species wintering in Orkney to be estimated accurately.
- Following the all-island survey of Orkney, regular monitoring of diver, grebe and seaduck numbers should be conducted at the key sites, using appropriate methodology.
- Land-based counts of wintering eider on the Tay Estuary should be carried out annually.
- Existing monitoring programmes should be continued.

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1. Introduction

Strategic Environmental Assessment (SEA) is a process of appraisal through which environmental protection and sustainable development may be considered, and factored into national and local decisions regarding government (and other) policies, plans and programmes.

The UK Department of Trade and Industry (DTI) is the principal regulator of the offshore oil and gas industry in the UK and has taken a proactive stance on the use of SEA as a means of striking a balance between promoting economic development of the UK's offshore oil and gas resources and effective environmental protection. Wind power and other renewable energy developments are now also covered by the SEA process.

A review of the distribution and abundance of divers, grebes and seaduck in the SEA 5 area was carried out by Cork Ecology at the request of the Department of Trade and Industry as part of the production of the SEA 5 Consultation Document.

The objectives of this study were:

- To review the existing knowledge of the distribution and abundance of divers, grebes and seaduck in the SEA 5 area, using all relevant data, where available
- To identify gaps in the existing knowledge
- To make recommendations for future work to address any gaps identified

1.1 Background to the SEA process

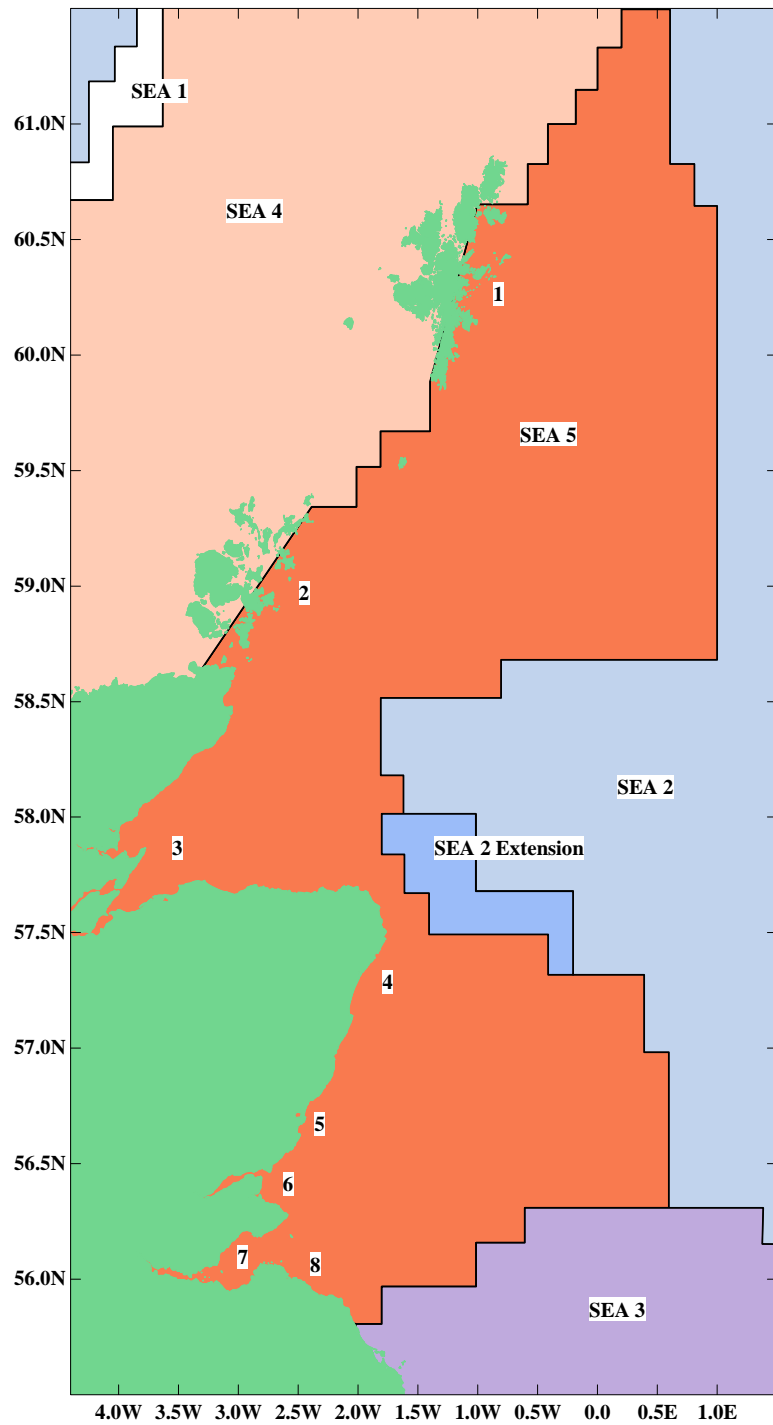
In 1999 the DTI began a sequence of sectoral SEAs considering the implications of further licensing of the UK continental shelf (UKCS) for oil and gas exploration and production. The SEAs were in line with the UK's "Greening Government" initiative, which included implementing Directive 2001/42/EC (the SEA Directive).

The DTI conducted the first UK offshore Strategic Environmental Assessment (SEA 1) in 1999/2000 in preparation for the 19th Licensing Round. This SEA addressed the deep water area along the boundary between UK and Faeroese waters (the "White Zone").

Subsequent SEAs have included SEA 2 (2001) which covered the central spine of the North Sea, where the majority of existing UK oil and gas fields are located, SEA 3 which assessed the remaining parts of the southern North Sea (2001-2002), and SEA 4 which addressed an area of the UKCS to the north and west of Orkney and Shetland (2003).

SEA 5 is addressing the UKCS east of Orkney and Shetland and the east coast of Scotland, adjacent to SEA areas 2, 3 and 4 (Figure 1). This review also included the SEA 2 extension area.

Figure 1. SEA 5 area, adjacent SEA areas and major areas for divers, seaducks & grebes



Area Key

- 1 Shetland
- 2 Orkney
- 3 Moray Firth
- 4 Aberdeenshire coast
- 5 Angus Coast
- 6 Firth of Tay/St Andrew's Bay
- 7 Firth of Forth
- 8 Lothian/Berwickshire coast

1.2 Background to divers, grebes and seaduck in the SEA5 area

Introduction

Divers, grebes and seaduck are primarily inshore species typically wintering in sandy bays or estuaries although some e.g. great northern divers prefer rocky shorelines. Some species are resident while others are winter visitors to Britain. Scotland is particularly important for all these species (e.g. Thom 1986).

Several schemes are in operation that annually monitor the numbers of these species. The Wetlands Bird Survey (WeBS) is a national monitoring scheme (e.g. Pollit *et al* 2003) but other surveys are also carried out on a regional basis in Shetland (e.g. Heubeck 2003), Scapa Flow (Williams 2001) and the Moray Firth (Evans 1998). There have been also a number of reviews compiled. In 1985, Benn published a review of seafoal in the north-east of Scotland and Orkney. The status of wintering seaduck in Britain was reviewed by Kirby *et al* 1993, while Evans (2000) reviewed numbers of wintering slavonian grebes in Britain. In addition, dedicated ship-board surveys and aerial surveys have been conducted around the coast (e.g. Stone *et al* 1995, Cronin & Webb 1998, Dean *et al* 2003).

On the basis of the available information from surveys and published reviews, population estimates for each species are derived (e.g. Kershaw and Cranswick 2003). As populations are constantly fluctuating, the problem with such estimates is that they quickly become outdated, particularly in areas where regular surveys are not carried out. In such cases data from bird reports can be very useful, as illustrated in Evans (1998).

This review attempts to collate all existing sources of information, to provide a current picture of the numbers and distribution of divers, grebes and seaduck in the SEA 5 area.

Threats to populations

Oil pollution was highlighted as a considerable potential threat to UK seaduck populations by Kirby *et al* (1993) and remains so to the 13 species considered here. Many sites within the SEA 5 area hold concentrations of divers, grebes and seaduck that are very highly vulnerable to surface pollutants such as oil throughout the year (NERC 1998). Shetland, Orkney, the Moray Firth and the Aberdeenshire coast were rated of prime importance for divers, grebes and seaduck for all months of the year. The Firth of Tay and the Firth of Forth were also important for these species in some months of the year (Tasker *et al* 1990, NERC 1998).

Commercial fisheries such as dredging for cockles and mussels or mussel farms may affect seaduck directly through removal of food and disturbance (Kirby *et al* 1993). Over-exploitation by commercial cockle and mussel fisheries was thought to be a major factor in recent mass mortality of over 20,000 eider in the Wadden Sea in the Netherlands (Pollit *et al* 2003). There are also potential conflicts with species such as eider taking mussels from commercial mussel farms (Thom 1986).

Developments such as land reclamation, tidal barrage schemes and wind farms may also have an impact on divers, grebes and seaduck, but particularly species that are strongly associated with estuaries such as scaup, eider, long tailed ducks and red-breasted mergansers where disturbance to feeding sites such as mussel beds may occur.

Greater levels of disturbance due to increased recreational activities could also displace birds from coastal feeding or roosting sites.

2. Methods

2.1 Introduction

Study area

Figure 1 shows the SEA 5 area. The study area was defined as the east coast of Scotland from the English border north to John O' Groats and included all of Orkney and Shetland. Although only the east coasts of Orkney and Shetland are part of the SEA 5 area, it was felt that an all island review would be more meaningful. Offshore waters for SEA 5 and the extension to SEA 2 were also considered and included surrounding areas to give context.

Species reviewed

Thirteen species of divers, grebes and seaduck were considered in this review, based on the species composition in the SEA 5 area, and including species considered when designating marine SPA's (Table 1). A brief overview of the most important areas for each species group is included along with individual species accounts detailing distribution and abundance, habitat use and a discussion of trends and changes in species distribution.

Table 1. Species included in SEA 5 review

Species	Latin Name
Red-throated diver	<i>Gavia stellata</i>
Black-throated diver	<i>Gavia arctica</i>
Great northern diver	<i>Gavia immer</i>
Great crested grebe	<i>Podiceps cristatus</i>
Red-necked grebe	<i>Podiceps grisegena</i>
Slavonian grebe	<i>Podiceps auritus</i>
Scaup	<i>Aythya marila</i>
Eider	<i>Somateria mollissima</i>
Long-tailed duck	<i>Clangula hyemalis</i>
Common scoter	<i>Melanitta nigra</i>
Velvet scoter	<i>Melanitta fusca</i>
Goldeneye	<i>Bucephala clangula</i>
Red-breasted merganser	<i>Mergus serrator</i>

2.2 Data sources

A combination of raw and published data, from land-based, aerial and ship-board surveys have been included to allow as complete a review as possible to be carried out. In general, data from 1991 onward were considered with the aim of presenting the most recent estimates for the important sites. Earlier data (from 1979 onwards) for ship and aerial surveys were included, with average densities calculated using data from all years.

Data were included from the following sources:

ESAS survey data

The Seabirds at Sea Team (SAST) of the Joint Nature Conservation Committee has been studying the distribution and abundance of seabirds and marine mammals in the waters around Britain since 1979 using both ship and aerial survey techniques (e.g. Tasker *et al* 1987). Data from these surveys, and from other European countries, have been incorporated into the European Seabirds at Sea (ESAS) database (e.g. Stone *et al* 1995). Data for the SEA 5 area collected between 1979 and 2000 were provided by ESAS.

JNCC aerial surveys

Recent JNCC aerial surveys have been assessing inshore areas used by divers, grebes & seaduck in the non-breeding season (Dean *et al* 2003). Relevant information from these surveys have been included in this review.

WeBS data

Data were supplied by the Wetland Bird Survey (WeBS), a joint scheme of the British Trust for Ornithology, The Wildfowl & Wetlands Trust, Royal Society for the Protection of Birds and Joint Nature Conservation Committee (the last on behalf of the Countryside Council for Wales, Department of the Environment Northern Ireland, English Nature and Scottish Natural Heritage).

The WeBS scheme monitors non-breeding waterbirds in the UK, using monthly land-based “core counts” undertaken by volunteers to annually identify population sizes, determine trends in numbers and to identify important sites for waterbirds.

WeBS counts are conducted monthly on pre-determined dates to avoid double-counting. Some sites are counted throughout the year but the winter months are prioritised. Large sites which need more than one vantage point are subdivided into count units. Divers and grebes have been counted since 1992. Full details of the count method are outlined in Gilbert *et al* 1998.

WeBS data for 57 sites (149 count units) in the SEA 5 area from June 1991 to March 2001 were received from the WWT. Appendix A summarises the count effort. Coverage varied between areas with Shetland and Orkney receiving least attention.

In some years, not all count units were counted so counts are incomplete. Also some species present were not counted in certain count units in the Forth Estuary, Tay Estuary and Montrose Basin. Eider was predominantly the species not counted in such cases, but occasionally other seaduck species were not counted.

Counts and figures from WeBS Annual reports from 1991/92 to 2000/01 were also used (Cranswick *et al* 1992, Cranswick *et al* 1995, Waters *et al* 1996, Cranswick *et al* 1997, Cranswick *et al* 1999, Pollit *et al* 2000, Musgrove *et al* 2001 & Pollit *et al* 2003).

RSPB surveys

Since the development of the Beatrice oil field in the Moray Firth in 1977, the RSPB have conducted annual surveys of wintering wildfowl (Evans 1998). Monthly count data for the Moray Firth from 1998 to 2003 were received from the RSPB.

The RSPB also provided data from surveys in Scapa Flow in Orkney for 1998/1999 and 2000/2001 (Williams 1999 & 2001).

Other data sources

Annual land-based and boat-based counts are conducted in Shetland by the Shetland Oil Terminal Environmental Advisory Group (SOTEAG). Data from 1991 to 2003 were received from the Shetland Biological Records Centre, and were also extracted from SOTEAG annual reports (Heubeck 2001, 2002 & 2003).

Data for Orkney between 1991 and 1999 were received from the Orkney Biological Records Centre.

Bird Reports

Several bird reports were reviewed for relevant counts and records extracted for the SEA 5 area. These included:

- Scottish Bird Reports 1992 – 2000 (SOC 2003)
- North East Scotland Bird Reports 1991 to 2002 (Webb 1992 & 1993, Reeves 1994, 1995, 1997, Phillips & Francis 1999, Thorpe *et al* 2000 & 2002, Baxter 2003)
- Highland Bird Report 2002 (McNee 2003)
- Orkney Bird Report 2001 & 2002 (Williams 2002 & 2003)
- Angus & Dundee Bird Report 2001 & 2002 (Carmichael 2002 & 2003)
- Fife Bird Report 2001 (Dickson 2002)
- Moray & Nairn Bird Report 2001 & 2002 (Cook 2002 & 2003)

Literature

A review of available relevant literature was also carried out. The last detailed review of wintering seaduck in Britain was published in 1993 and considered data from 1986/87 to 1990/91, although divers, grebes and goldeneye were not included (Kirby *et al* 1993).

Reference was made to Prater (1981), Thom (1986), Lack (1986) and Pennington *et al* (2004) for historic population and distribution trends, along with information on habitat and biology.

UK Conservation measures

Marine SPAs (mSPAs) are currently being considered for all thirteen species included in this review (Stroud *et al* 2001). Three types of mSPA around the UK are being identified. They are extensions to SPA breeding colonies, inshore areas used by birds in the non-breeding season (divers, grebes & seaduck), and marine feeding areas (Johnston *et al* 2002).

Information on current UK SPA designations is included in the individual species accounts and is based on sites selected for the UK's terrestrial SPA network, which includes sites that extend partly into marine or intertidal areas, for example, estuaries but not the wholly offshore environment (Stroud *et al* 2001).

2.3 Data analysis

2.3.1 ESAS surveys

Method

The ESAS database contains data from ship and aerial surveys using line transect methodology. Birds are counted ahead of the ship and out to the side usually in a 90° arc and a 300m transect (see Webb & Durinck 1992 for full details of the method).

Study area

As well as the SEA 5 area (section 2.1), ESAS data from surrounding areas were included to give context. Data were analysed for the area between 55.5° N and 62° N and from 5° W to 1.5° E. As only 4 birds were recorded north of 61.5° N and west of 4.5W, these points were chosen as the most northern and western limits for mapping purposes.

Effort

ESAS data analysed in this report were collected between July 1979 and September 2000 covering an area of 49,842.66km². 96 % of the surveys were ship-based. Figures 2 & 3 show the seasonal survey effort. Survey effort in inshore waters around Orkney and Shetland was generally poor, particularly in winter. 67 % of surveys took place in the summer months between April and September (Table 2).

Table 2. Seasonal survey effort

Years	Months	Total area surveyed
All available years 1979-2000	October- March	16,285.2 km ²
	April- September	33,557.46 km ²
Most recent 5 years 1996-2000	October- March	2,863.50 km ²
	April- September	7,274.82 km ²

Generally ESAS data are examined at the scale of ¼ International Council for the Exploration of the Sea (ICES) rectangles which measure 15' latitude by 30' longitude and cover an area of 800 km². As inshore areas were of primary interest for this analysis, a much smaller area of 4' latitude by 7.5' longitude totalling 53km² was chosen (Figures 2 & 3).

Figure 2. Seasonal survey effort - summer months

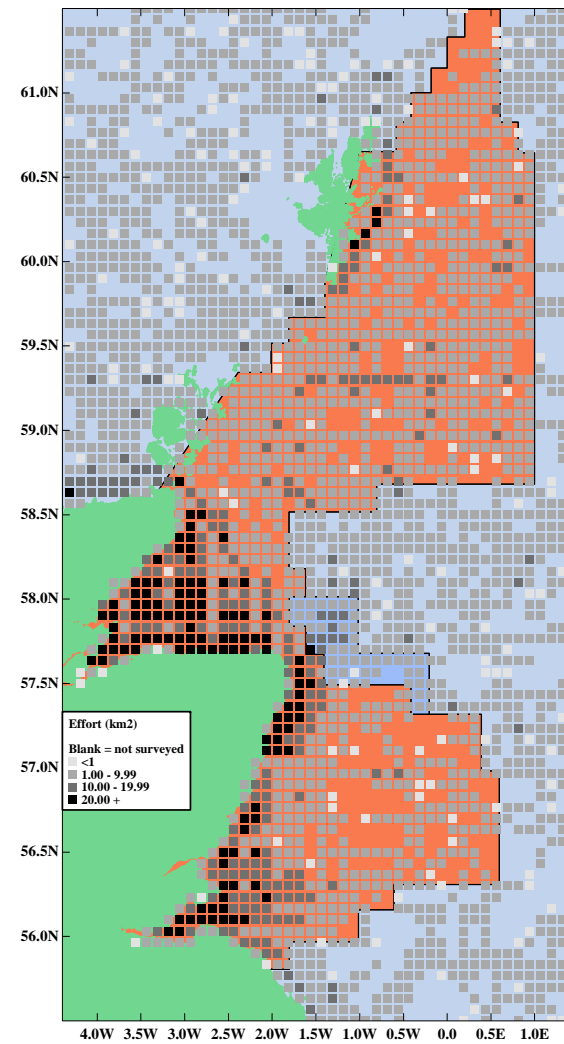
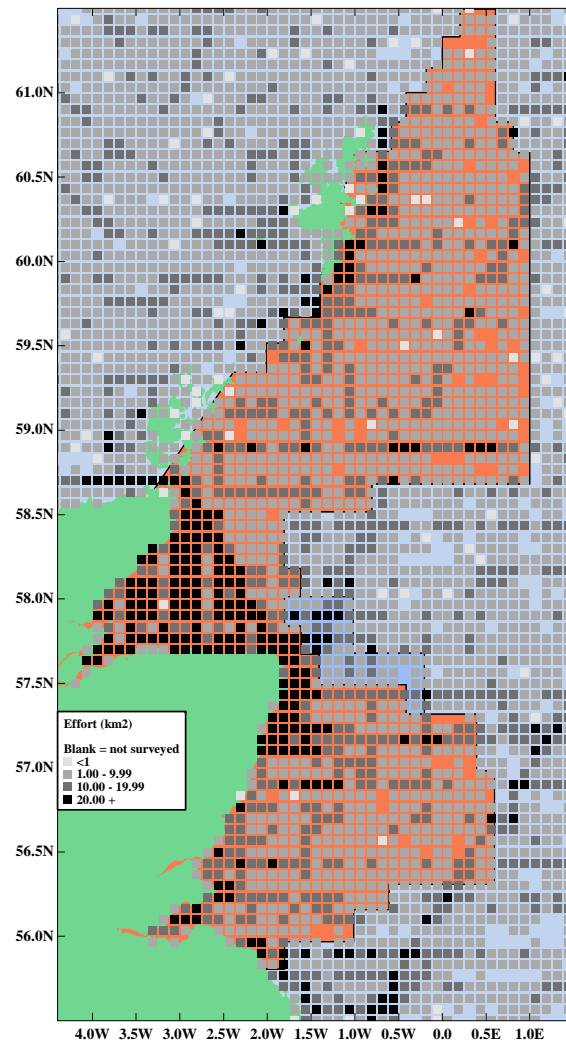


Figure 3. Seasonal survey effort - winter months

Data Analysis

A species summary table was compiled for the study area and depending on the raw numbers of each species recorded, a mapping strategy was chosen (Table 3).

Table 3. Raw numbers of divers, grebes and seaduck from ESAS database, 1979-2000

Species	Total number
Red-throated diver	710
Black-throated diver	46
Great northern diver	194
Great crested grebe	11
Red-necked grebe	4
Slavonian grebe	0
Scaup	36
Eider	11,312
Long-tailed duck	26,293
Common scoter	4,782
Velvet scoter	2,048
Goldeneye	80
Red-breasted merganser	799
Diver sp	276
Grebe sp.	3
Duck sp	53
Scoter sp.	720

Mapping strategy

Three types of maps (density, abundance and sightings) were compiled to depict species abundance and distribution, using the mapping package DMAP for Windows (Morton 2001).

Density Maps (birds/km²)

Average densities for each 4°N x 7.5°W rectangle were calculated by dividing the total number of birds within a 300m² strip by the total area surveyed (See Webb & Durinck 1992 for further details).

This type of map was utilised for the most common species, i.e. eider, long-tailed duck, common and velvet scoter. Monthly density maps were created, and depending on the distribution patterns, seasonal maps were compiled.

Abundance maps (birds/km travelled)

Abundance maps were used for less abundant species such as divers and red-breasted merganser. All data including sightings of birds outside the 300m band transect was utilised. To calculate abundance for each 4°N x 7.5°W rectangle, the total number of birds was divided by the distance travelled (See Webb & Durinck 1992 for further details).

Sightings maps

For rare species, incidental sightings were mapped. Location of sightings maps were also created for 'density map species' to show all sightings including those outside the 300m transect.

Unidentified species

Some divers and scoters were not identified to species and were recorded as scoter *sp.* and diver *sp.* On days when there were positive species identifications, the unidentified birds were apportioned out in the ratio of positively identified birds.

2.3.2 Land-based data

Some of these data were collected on boat surveys e.g. Shetland and Scapa Flow but for the purpose of distinguishing these counts from ESAS surveys, they are included here with land-based data.

Data from all sources were added to a paradox database. The WeBS season for wildfowl species runs from June to May and has been adopted in this report. For each species, the maximum count for each site was calculated for each season.

Maximum monthly counts from relevant bird reports and other sources e.g. RSPB Moray Firth surveys were compared to corresponding WeBS counts. The highest count for each site was used in calculating five-year means.

Five year means were calculated for the principal sites for each species. Incomplete counts were generally not used to calculate 5 year means.

In the case of species such as eider, scoter and red-breasted merganser which form moulting flocks after the breeding season, peak counts were examined at this time also.

To examine species distribution on a regional basis, the SEA 5 area was divided into 8 regions (Figure 1). Using the best available data, totals for each species for each region were derived and added to produce estimates for the whole SEA 5 area. These estimates were then examined in a national and international context.

Sites that regularly hold more than 1 % of the national population of a species are deemed to be nationally important, and sites with more than 1 % of the biogeographic population are internationally important.

3. Results

3.1 Species Accounts

The following species accounts give a brief outline of population and distribution within the SEA 5 area for the thirteen species considered in this report, along with a description of habitat use, population trends and current UK conservation measures.

Red-throated diver

Population and distribution

The Scottish breeding population of red-throated divers was estimated at 935 breeding pairs following the first UK national survey in 1994. Of these, approximately 430 pairs (46 %) were estimated to breed in Shetland, on freshwater lochs (Gibbons *et al* 1997). All of the birds breeding on Shetland move to the sea to feed (P Harvey *pers comm*).

An estimated 4,850 red-throated divers winter in Britain and Ireland (Danielsen *et al* 1990). Combining data from aerial, ship-based and land-based surveys produced an estimate of approximately 3,100 – 4,200 birds wintering along the coast of eastern Britain (Tasker *et al* 1987). This compares to a mid-winter population estimate for NW Europe of 44,000 birds, based on aerial, ship-based and land-based surveys (Danielsen *et al* 1990). In the non-breeding season, the biogeographic population for north-west Europe has been estimated to be between 100,000 and 1,000,000 birds (Delaney & Scott 2002).

Thom (1986) states that the prime areas for wintering red-throated divers is off eastern Scotland, especially between Donmouth and Collieston on the Aberdeenshire coast. This area is known to hold internationally important numbers of red-throated divers between October and May (Skov *et al* 1995). The Moray basin is also an important area, with a regular winter peak of around 410 birds between 1984–1995 (Evans 1998). Numbers appear to peak in the early winter, with smaller numbers in mid and late winter (Barrett & Barrett 1985). Few birds remain in Orkney and Shetland waters in winter (Thom 1986, Williams 2003).

Trends

Recent counts at important sites for red-throated divers in the SEA 5 area are shown in Table 4. The figures shown are taken from WeBS counts, other dedicated surveys and bird reports, and are the best available data. All 8 sites listed regularly hold nationally important numbers (>49 birds – Kershaw & Cranswick 2003).

Highest numbers were recorded off the Aberdeenshire coast, between Don mouth and the Ythan estuary, where internationally important numbers have been recorded in previous years e.g. 1,312 birds on 8th May 1993 (Reeves 1994). Numbers tend to peak in April and May.

Numbers appear to have declined for the Don to Ythan coast, and the Moray Firth in recent years, and comparing the two most recent sets of 5 year means also shows a decline. Numbers fluctuated at the remaining sites, although comparing mean data showed an increase in Lunan Bay and St Cyrus/Kinnaber while in the Firth of Forth, St Andrew's Bay and off Peterhead mean numbers have stayed relatively stable.

Table 4. Recent peak counts at main sites for red-throated divers in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Don mouth to Ythan mouth	350	105	182	128	384	120	184	381
Moray Firth	284	179	103	119	185	126	142	371
Lunan Bay	-	150	-	74	147	-	124	63
Firth of Forth	75	121	75	104	-	-	100	110
St Andrew's Bay	80	93	39	133	45	-	78	77
Scapa Flow	-	59	-	82	-	-	71	-
St Cyrus/ Kinnaber	50	-	50	-	-	81	66	50
Peterhead	-	112	42	59	-	45	65	68

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Numbers present in Scapa Flow were nationally important although data were only available for 2 seasons. Peak numbers were recorded in November (Williams 1999 & 2001). The previous 5 years data for Orkney were not in a suitable format for comparison.

Between 100-200 red-throated divers are estimated to winter in Shetland but numbers rise markedly in late winter (Feb-March). These are presumably returning Shetland birds and migrants heading further north (Pennington *et al* 2004).

Red-throated divers were recorded on ESAS surveys throughout the year in the SEA 5 area (Figures 4 & 5). A total of 709 birds were recorded, with 338 (47.6 %) of these in the Moray Firth. A maximum of 330 birds occurred in January while only 9 were recorded in July. Birds generally showed a coastal distribution and density was highest in the Moray Firth from January to March, and in St Andrews Bay and the Firth of Forth in January. Cronin & Webb (1998) noted that red-throated divers were generally less abundant than expected off the Aberdeenshire coast during a winter inshore boat survey. Coverage around Orkney and Shetland was incomplete in winter months. The density of birds was lower between April and September, with more birds recorded in Shetland. Red-throated diver density was moderate in the Moray Firth in April and decreased in May. Very few birds were recorded in June and July.

The Moray and Dornoch Firths were recognised as one of the most important areas for red-throated divers during recent winter inshore aerial surveys (Dean *et al* 2003).

Figure 4. Red-throated diver abundance in the SEA 5 area, from October to March (ESAS data)

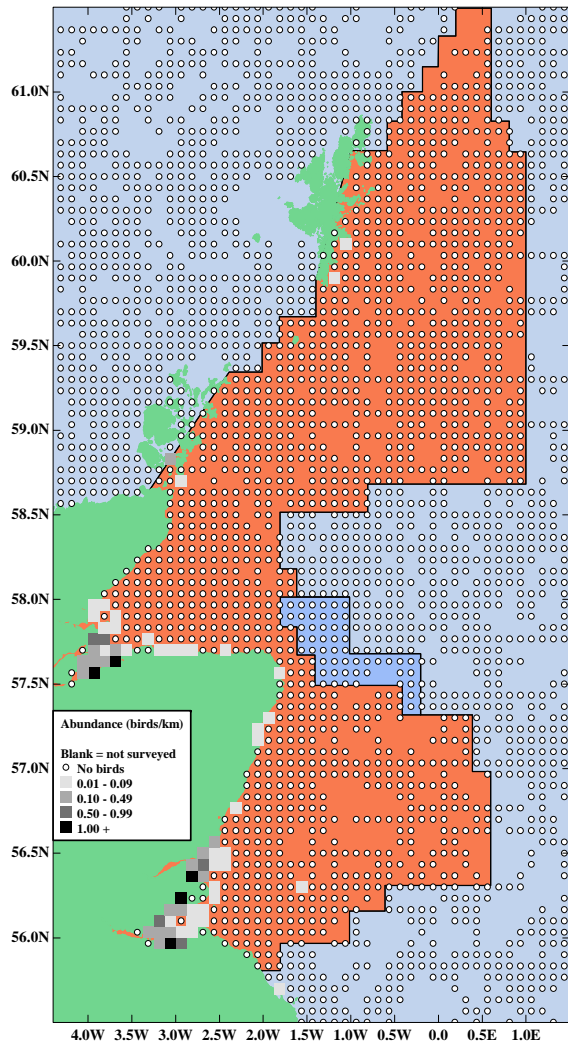
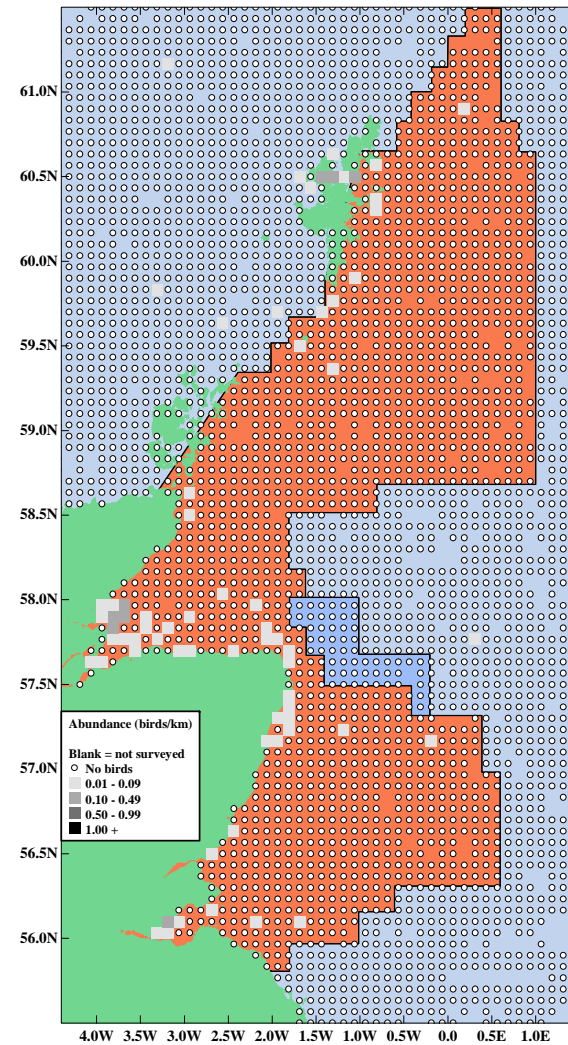


Figure 5. Red-throated diver abundance in the SEA 5 area, from April to September (ESAS data)



Habitat Use

Red-throated divers show a preference for relatively sheltered shallow waters and sandy bays along North Sea coasts in winter. Numbers may fluctuate widely in response to weather and other factors affecting the food supply of sandeels, small crustaceans, sprat and herring (Lack 1986). Breeding red-throated divers make use of sheltered inshore waters close to their nest sites (Tasker *et al* 1987, Pennington *et al* 2004).

UK Conservation measures

Ten breeding sites for red-throated divers have been selected as part of the UK's suite of Special Protection Areas (SPA) for this species. The sites are spread throughout the British breeding range and include sites on Rum, the Outer Hebrides, northern mainland Scotland, Shetland and Orkney (Stroud *et al* 2001).

The Firth of Forth has been selected as a non-breeding season SPA for red-throated divers (Stroud *et al* 2001). Marine SPA sites are currently being considered for red-throated divers (Johnston *et al* 2002).

Black-throated diver

Population and distribution

Black-throated divers are a rare breeding species in Britain with a breeding population of 155 - 189 pairs, although there appears to have been a recent decline (Prater 1981, Mudge *et al* 1991, Stone *et al* 1997).

Approximately 50 - 100 black-throated divers are thought to winter off the east coast of Britain, with an winter population of 700 birds for the whole of Britain (Danielsen 1990). In the non-breeding season, the biogeographic population for NW Europe has been estimated to be between 100,000 and 1,000,000 birds (Delaney & Scott 2002).

Trends

Recent 5 year mean peak counts based on WeBS counts, other dedicated surveys and bird report data show Scapa Flow in Orkney, the Moray Firth and the Firth of Forth to be the main sites for black-throated diver in the SEA 5 area, with lower numbers elsewhere (Table 5).

These three sites regularly hold nationally important numbers of black-throated divers (>7 birds – Kershaw & Cranswick 2003). The mean for Scapa Flow is based on 2 recent RSPB surveys, and is considerably higher than numbers for the Moray Firth and the Firth of Forth. Only incomplete counts are available for other years. Mean peak counts for the latter two sites appear to have decreased slightly. Within the Moray Firth, the most regular areas for black-throated divers are the Dornoch Firth and Burghead Bay.

Table 5. Recent peak counts at main sites for black-throated divers in SEA 5 area

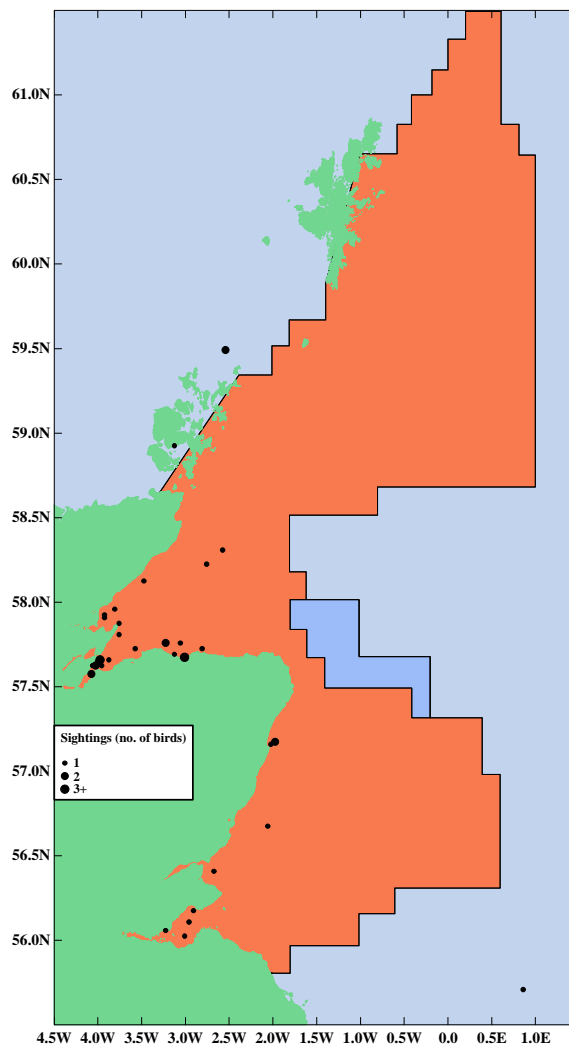
Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Scapa Flow	-	57	-	58	-	-	58	-
Moray Firth	22	20	14	17	43	18	22	37
Firth of Forth	9	10	10	5	-	-	8	11

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

A total of 46 black-throated divers have been recorded within the SEA 5 area during ESAS surveys (Figure 6). Birds were recorded in low numbers in all months except September, with a peak of 15 in February. Most sightings were inshore in the Moray Firth and Firth of Forth, with a few records elsewhere.

Figure 6. Black-throated diver sightings in the SEA 5 area (ESAS data)



Habitat Use

Black-throated divers tend to occur in sandy bays in winter, feeding on sandeels, crustaceans and flatfish although herring and sprats are also taken (Lack 1986). Breeding birds feed almost entirely on inland waters (Tasker *et al* 1987).

UK Conservation measures

11 sites have been selected as SPAs for black-throated divers in the breeding season, in the central Highlands, northern mainland Scotland and the Outer Hebrides but no sites lie within the SEA 5 area (Stroud *et al* 2001).

There are no terrestrial SPA sites for non-breeding black-throated divers (Stroud *et al* 2001), however marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Great northern diver

Population and distribution

Great northern divers tend to winter in deeper water and further offshore than the two other diver species, and as a result this species may be under-recorded by land-based surveys. Approximately 1,000-1,500 are thought to winter off Scottish coasts and the UK winter population could be in the region of 3000 birds, approximately 75% of the western Palaearctic wintering population of 5,000 (Lack 1986). This figure is still quoted as the best winter estimate for the northern Europe non-breeding population (Delaney & Scott 2002).

Previous publications state that the winter population of great northern divers is widely scattered, with the main areas being Scapa Flow in Orkney (450+ birds) and Yell Sound in Shetland (300-400 birds) (Thom 1986, Lack 1986). Smaller numbers are recorded off the east coast of Scotland. The main winter influx tends to occur in October/November with numbers remaining stable until April/May. Pre-migration moult flocks are regularly seen in Shetland in May (Thom 1986).

Trends

Recent peak counts for the most important sites for great northern divers in the SEA 5 area are shown in Table 6. The figures shown are taken from WeBS counts, other dedicated surveys and bird reports, and are the best available data.

Orkney is internationally important for great northern divers (>50 birds, Delaney & Scott 2002) with significant populations found in Scapa Flow, Deer & Shapinsay Sounds, off Tankerness and in the sounds around Wyre. Surveys have been carried out in these areas in recent years but site coverage is not complete, and figures shown here are likely to be an under-estimate. Previous 5 years data for Orkney was not in a suitable format for comparison.

Between 400 – 430 great northern divers are estimated to winter in Shetland (Pennington *et al* 2004). Internationally important numbers are regularly recorded between Lerwick and Kirkabister. Other key wintering areas include Whiteness Voe to Skelda Ness, South Havra north to Burra, Tronda and the Scalloway islands, the east and south coasts of Unst, around Bluemull Sound, from Virkie to Garth's Ness and between Lunna Holm and Kirkabister, including the west coast of Whalsay (Pennington *et al* 2004).

Diver, grebe and seaduck review for SEA 5

The Moray Firth regularly holds nationally important numbers (>30 birds – Kershaw & Cranswick 2003), and the most recent 5 year mean is just below the internationally important threshold. Birds tend to favour the more open sections of the Moray Firth, particularly the Outer Dornoch Firth, Burghead Bay and Spey Bay, although it is probably under-recorded from land (Evans 1998).

Recent counts off Rattray Head on the Aberdeenshire coast were below the nationally important threshold, although numbers appear to be increasing. Peak counts tended to be between February and May. Comparing the last two 5-year means also shows an increase in the most recent 5 year period.

Table 6. Recent peak counts at main sites for great northern divers in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Scapa Flow	-	781	-	438	-	-	610	-
Deer/Shapinsay sounds & Tankerness	330	251	375	225	239	-	284	-
Sounds around Wyre	-	-	-	130	189	-	160	-
Lerwick to Kirkabister	47	-	63	69	87	33	63	54
Moray Firth	54	19	12	38	113	60	48	28
Whiteness Voe to Skelda Ness	47	44	47	30	34	-	40	38
Virkie to Garth's Ness	11	-	15	19	30	17	20	9
Rattray Head	5	13	14	12	25	-	14	6

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

The majority of sightings of great northern divers on ESAS surveys in the SEA 5 area were in the Moray Firth where birds were found further offshore than other diver species (Figures 7 & 8). Birds were recorded at low densities between November to May primarily in the Moray Firth and the Firth of Forth.

Habitat Use

Great northern divers spend the winter at sea, off rocky headlands, coves and sandy beaches. They feed primarily on fish such as herring and codling, but also take crustaceans and flatfish in shallower waters (Lack 1986, Skov *et al* 1995). Birds tend to occur further offshore than other diver species, but still within 10km of the shore (Barrett & Barrett 1985, Mudge & Cadbury 1987).

UK Conservation measures

There are no terrestrial SPA sites for non-breeding great northern divers (Stroud *et al* 2001), however marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Figure 7. Location of all great northern diver sightings in the SEA 5 area (ESAS data)

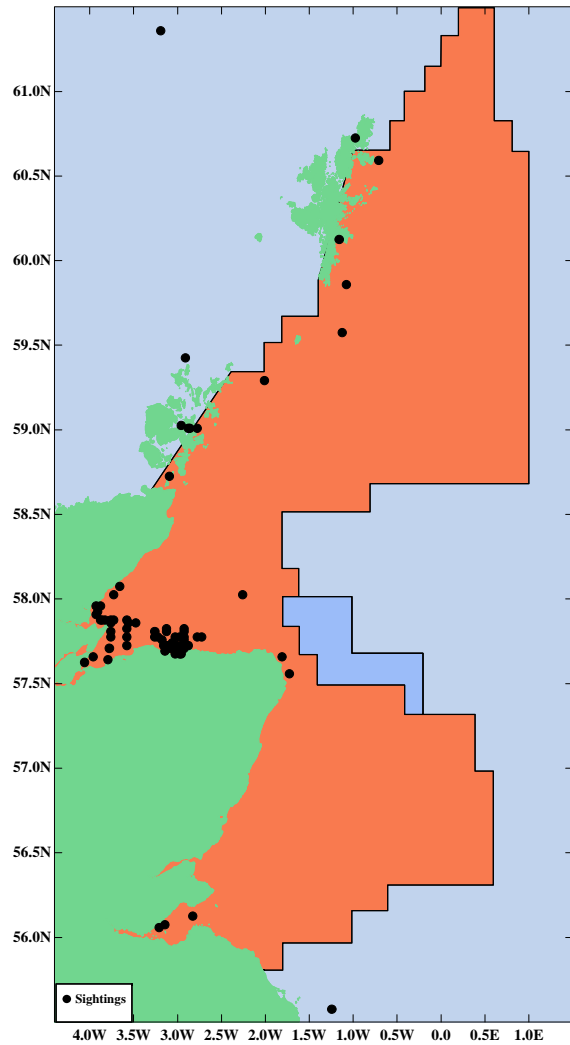
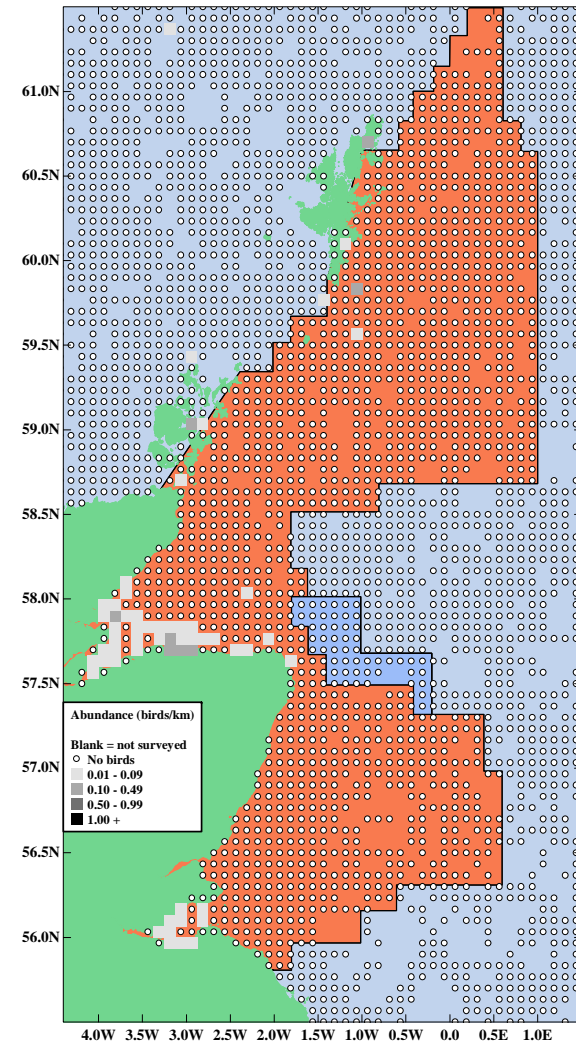


Figure 8. Great northern diver abundance in the SEA 5 area, from November to May (ESAS data)



Great crested grebe

Population and distribution

Gibbons *et al* (1993) estimated that there were around 4,000 pairs of great crested grebes breeding in the UK.

The overall UK winter population has been estimated at 15,900 birds, based on WeBS data from 1994 - 1999 (Kershaw & Cranswick 2003). An estimated 1,800 great crested grebes spend the winter in estuaries around the UK, although there are many more birds wintering at inland sites (Prater 1981). Numbers at coastal sites may increase during cold spells as inland water sources freeze up. The northwestern Europe population is estimated to be 370,000 – 580,000 birds (Delaney & Scott 2002).

Trends

In the SEA 5 area, wintering flocks of great crested grebes were historically largely confined to Tayside and the Firth of Forth, with largest concentrations in the Forth (Lack 1986, Thom 1986). Reviewing the available recent data for the SEA 5 area showed a similar picture, with the Firth of Forth the only site regularly holding nationally important numbers of great crested grebes (>159 birds - Kershaw & Cranswick 2003) (Table 7). Peak numbers appear to be declining in recent years and comparing the two most recent sets of 5 year means also shows a decline.

Table 7. Recent peak counts at main sites for great crested grebes in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Firth of Forth	491	319	297	290	-	-	399	662
Lunan Bay	-	-	14	60	-	10	28	42

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

A total of 11 great crested grebes have been recorded on ESAS surveys (Figure 9). There were 5 sightings in the Firth of Forth and St. Andrew's Bay in January 1998 on a dedicated JNCC diver and seaduck survey (Cronin & Webb 1998). All species of grebes were very much under-recorded by ESAS surveys. This is generally because birds are usually located very close to shore where it is not usually possible to survey by boat.

Habitat Use

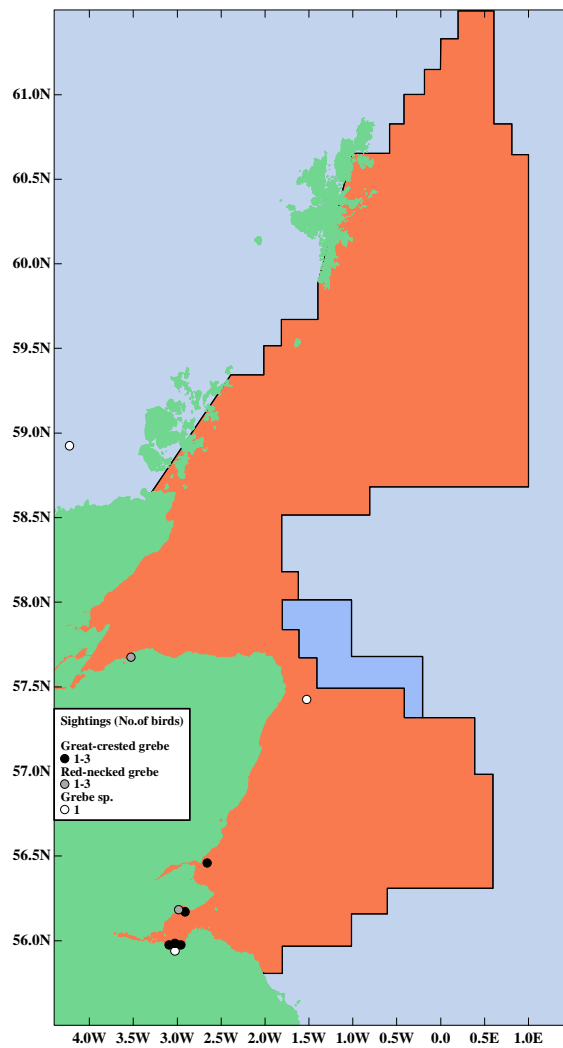
During the breeding season, great crested grebes are found in fresh water habitats, with some birds moving to estuaries and coasts in winter. The diet consists mainly of fish (Skov *et al* 1995).

UK Conservation measures

A total of 17 terrestrial sites have been selected as SPAs for great crested grebes in the non-breeding season in the UK. Only one of these, the Firth of Forth is within the SEA 5 area. It is estimated to support 6.5 % of the national wintering population (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Figure 9. Sighting of grebes in the SEA 5 area (ESAS Data)



Unidentified grebe species

Three unidentified grebes were sighted in January in the Firth of Forth and further offshore (Figure 9).

Red necked grebe

Population and distribution

Red-necked grebe is a rare breeding species in Britain. Between 1991 and 2001 up to five pairs were reported from up to ten sites but successful breeding was only confirmed for the first time at a site in southern Scotland in 2001 (Ogilvie *et al* 2003). The total European breeding population been estimated at around 5,000 pairs (Skov *et al* 1995).

Approximately 200 red-necked grebes are estimated to spend the winter around the UK, mostly on the east and south coasts and on inland reservoirs in southeast England (Lack 1986, Kershaw & Cranswick 2003). Numbers may increase during cold spells over Europe as birds move west to ice-free waters. The non-breeding biogeographic population is estimated to be between 25,000 – 100,000 (Delaney & Scott 2002).

Trends

In the SEA 5 area, the Firth of Forth, Scapa Flow and the Moray Firth regularly hold nationally important for the species (>2 birds - Kershaw & Cranswick 2003) (Table 8). Birds can be present from July to April (Thom 1986). Peak counts in the last 5 years in the Firth of Forth occurred in August and September. Individual birds are recorded occasionally elsewhere in the region.

Comparing the two most recent sets of 5 year means for the Firth of Forth shows that peak numbers have remained stable. Although no direct comparison with earlier years was possible, numbers in Scapa Flow declined in 2000/01 compared to 1998/99 (Williams 2001).

Table 8. Recent peak counts at main sites for red-necked grebes in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Firth of Forth	64	41	67	29	-	-	49	48
Scapa Flow	26	23	-	10	-	-	20	-
Moray Firth	3	4	1	1	4	1	2	3

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

On ESAS surveys, three birds were recorded in Largo Bay in the Firth of Forth in January and an individual bird was recorded near Burghead in the Moray Firth in February (Figure 9). Both sightings were recorded during a JNCC inshore survey in 1998 (Cronin & Webb 1998).

Habitat Use

Red-necked grebes breed on freshwater lakes and winter in coastal waters and inland reservoirs. Their main food is aquatic arthropods and insects during summer and predominantly small fish in the winter months (Lack *et al* 1986, Skov *et al* 1995).

UK Conservation measures

There are no terrestrial SPA sites for red-necked grebes (Stroud *et al* 2001), however marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Slavonian grebe

Population and distribution

A total of 40 confirmed pairs bred at 18 localities in Scotland in 2001. Numbers have gradually declined since 1992, when there were 72 confirmed pairs (Ogilvie *et al* 2003).

The UK population wintering in coastal waters has been estimated to be 648 birds (Evans 2000). Their distribution is more coastal than either red-necked or great crested and birds are widespread in small numbers. Within the north-west Europe biogeographic region, the wintering total is estimated to be 2,600 – 4,100 birds (Delaney & Scott 2002).

Trends

Scapa Flow, the Moray Firth, the Firth of Forth and Whiteness Voe to Skelda Ness in Shetland are internationally important sites for slavonian grebes as they regularly hold more than 1% of north-west Europe biogeographic population (>35 birds - Kershaw & Cranswick 2003) (Table 9).

These sites hold an estimated 48.6 % of the UK wintering population based on recent population estimates and using 5 year means from recent peak counts. The mean for Scapa Flow is based on 2 recent RSPB surveys in 1998/99 and 2000/01. The importance of Scapa Flow for wintering slavonian grebes should be monitored on a regular basis. Other areas of Orkney may also be important as several sites outside Scapa Flow also hold lower numbers of birds in winter.

Total numbers of slavonian grebes wintering in Shetland are estimated to be between 80 – 100 birds (Pennington *et al* 2004). The coast between Lerwick and Kirkabister regularly holds nationally important numbers of birds. A count of 13 birds off Fetlar was made in March 2002, but no other counts were available for this site.

Table 9. Recent peak counts at main sites for slavonian grebes in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Scapa Flow	-	124	-	141	-	-	133	-
Moray Firth	163	98	29	86	86	69	74	86
Firth of Forth	75	57	67	44	-	-	70	58
Whiteness Voe to Skelda Ness	43	33	30	43	29	55	38	33
Eden Estuary	33	-	23	27	18	-	25	30
Lerwick to Kirkabister	0	-	15	28	20	17	20	8
Sullom Voe	3	0	0	8	8	6	4	4

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Numbers in the Moray Firth and the Firth of Forth appear to show a decline in recent years. It is thought that weather conditions in the west Baltic may influence the numbers wintering in the Firth of Forth (Thom 1986).

Slavonian grebe has not been recorded on ESAS surveys.

Habitat Use

Breeding birds are found on small, shallow, eutrophic lakes with sparse vegetation, while wintering birds prefer sheltered coastal waters. In winter, the main food sources are crustaceans and small fish (Cramp & Simmons 1977).

UK Conservation measures

The Firth of Forth has been selected as a terrestrial SPA for wintering slavonian grebes within the SEA 5 area. A second SPA site, Loch Ashie, lies approximately 10km south of Inverness and is an important moulting and spring gathering area prior to breeding (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Scaup

Population and distribution

Scaup are rare and sporadic breeders in Britain with between zero and three breeding pairs between 1989-1993 (Stone *et al* 1997). The estimated north-west European biogeographic population is 310,000 birds (Delaney & Scott 2002).

The wintering population of Scaup in the UK has been estimated at around 7,560, with the majority of birds in Scotland (Kershaw & Cranswick 2003). Several sites in Scotland regularly hold nationally important numbers of Scaup but numbers have decreased since the late 1960's when very large flocks (over 30,000 in some winters) were recorded in the Firth of Forth (Thom 1986, Kirby *et al* 1993, Stroud *et al* 2001). Largest numbers of wintering birds now occur in the Danish part of the Baltic, the Wadden Sea and the Ijsselmeer in the Netherlands. Many scaup from Iceland winter in the UK but birds ringed in mainland Europe and USSR have also been recorded (Kirby *et al* 1993).

Trends

Recent peak counts at the main sites for Scaup in the SEA 5 area are shown in Table 10. The Moray Firth and the Firth of Forth were the two most important areas, along with St Andrew's Bay and the Eden Estuary. All four sites hold nationally important numbers of scaup (>79 birds - Kershaw & Cranswick 2003) although numbers fluctuate considerably at the latter two sites.

Table 10. Recent peak counts at main sites for scaup in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Moray Firth	406	409	510	605	615	1,218	671	414
Firth of Forth	300	390	157	240	-	-	471	268
St Andrew's Bay	500	0	2	20	15	-	107	57
Eden Estuary	-	-	15	240	9	-	88	-

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

The main sites within the Firth of Forth are in Largo Bay off Methil and Leven, on the north shore of the firth. The Moray Firth wintering population is found almost exclusively in the Dornoch, Cromarty and Inverness Firths, where concentrations are associated with distillery and sewage outfalls (Evans 1998) (Table 11). Although peak numbers fluctuate between years, comparing the two most recent sets of 5 year means shows an overall increase in the Inner Moray Firth (Inverness & Beaully Firths) and a slight decrease in the Cromarty Firth. Numbers recorded in the Dornoch Firth have dropped considerably in recent years, presumably reflecting a change in the available food source.

Table 11. Recent peak counts of scaup at sites within the Moray Firth

Site	95-96	96-97	97-98	98-99	99-00	00-01	Mean ¹	Mean ²
Inner Moray Firth	517	332	416	392	480	313	387	178
Cromarty Firth	279	115	45	132	480	424	239	314
Dornoch Firth	219	122	38	11	0	56	45	117

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

The main influx occurs in December, followed by a peak in January, after which numbers tend to drop fairly rapidly (Thom 1986, Kirby *et al* 1993). There may be influxes to the UK following periods of cold weather on the continent.

There is only one record of scaup in the ESAS database. A single flock of 36 birds was located in Largo Bay, Firth of Forth during an inshore JNCC survey in February 1998 (Cronin & Webb 1998).

Habitat Use

Scaup mainly feed at night, in water 4-10m deep and spend the day in quite dense flocks, often close to the feeding grounds. In some localities, regular dawn and dusk flights between resting and feeding areas have been observed (Lack 1986). The diet consists mainly of blue mussels *Mytilus edulis*, and human-related food sources such as waste grain or worms around sewage outfalls. In winter, scaup show a preference for soft-shore coasts, often in brackish waters (Owen *et al* 1986). Some scaup regularly winter on freshwater, for example the freshwater lochs of Stenness and Harray on Orkney hold nationally important flocks (Thom 1986, Williams 2002, Pollit *et al* 2003).

UK Conservation measures

Three sites have been selected as non-breeding SPA's for scaup within the SEA 5 area. Two of these, the Cromarty Firth and Inner Moray Firth hold the largest concentration of scaup in northern Scotland. The Firth of Forth is the third SPA for scaup in the SEA 5 area (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Eider

Population and distribution

The eider is the commonest species of seaduck in the UK, with a mainly sedentary breeding population of around 31,000 pairs (Gibbons *et al* 1993). Breeding birds are found on open-sea coasts and islands along the northeastern coasts of Britain, including Orkney and Shetland (Thom 1986). Many breeding birds from the Ythan estuary (Aberdeenshire) and Northumberland winter in the Tay and Forth estuaries (Thom 1986, Lack 1986).

Eider distribution in the SEA 5 area varies throughout the year. Large flocks gather to moult in July and August, and these flocks later move to wintering areas by mid October. The east coast of Scotland holds a large proportion of the UK winter population, which is estimated at around 73,000 birds, with a further 12,000-13,500 birds found on Shetland and Orkney (Kershaw & Cranswick 2003, Delaney & Scott 2002). Delaney & Scott (2002) considered the Orkney and Shetland birds to be part of a separate population of the *Somateria mollissima faroensis* sub-species. However, other studies considered that there is little evidence to support this population delimitation and consider the UK population of eider to be part of a discrete Baltic, Denmark, Netherlands, Britain & Ireland population of the nominate *S. m. mollissima* race (Stroud *et al* 2001).

Trends

Large numbers of eider congregate at the Ythan estuary to breed in the summer months and large moulting flocks gather from July onwards at coastal sites free from disturbance, when birds are flightless for a time. Recent count data from the main moulting areas is shown in Table 12. Largest flocks occur in Shetland, off the Aberdeenshire coast between Donmouth and Balmedie, the Ythan Estuary, Montrose Basin and in the Firth of Forth. The stretch of coast between Port Seton and the Bass Rock on the south side of the Firth of Forth traditionally holds high numbers of moulting birds (Thom 1986). There are few birds at regular wintering sites at this time.

Table 12. Recent peak counts at main moulting sites for eider in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Firth of Forth	6,937	7,171	6,283	8,893	-	-	7,690	8,180
Shetland	6,300				5,700	5,900	5,800	6,250
Ythan Estuary	3,366	3,321	3,944	3,585	3,295	-	3,502	3,608
Don mouth to Ythan mouth	2,159	1,400	634	8,900	1,200	3,500	3,127	3,835
Montrose Basin	2,030	3,365	1,923	2,500	-	-	2,384	1,274

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

In Shetland, the whole moulting population of eider is currently monitored by carrying out a full survey of the moulting areas in August. Surveys are carried out for two consecutive years followed by a gap of two years. Numbers have decreased considerably since the late 1970's when a total of 17,000 birds were recorded, and are apparently still declining (Heubeck 2002).

Major wintering sites for eider are shown in Table 13. The largest wintering flock in the UK occurs at the mouth of the Tay estuary, usually in October or November (Thom 1986, Pollit *et al* 2003). Several counts made at the Tay in recent years have been incomplete as coverage of the site is problematic, requiring counts to be made at a precise point in the tidal cycle (Pollit *et al* 2003).

Nationally important winter flocks also occur regularly at the Montrose Basin, the Ythan estuary and Scapa Flow in Orkney (Pollit *et al* 2003). Numbers in the Moray Firth are also high in winter where the most important areas are between Helmsdale and the Dornoch Firth in East Sutherland, and between Nairn and Kingston in Morayshire (Evans 1998).

Several sites are important for eider during both the summer and winter months. The Firth of Forth, the Ythan Estuary and the Montrose Basin hold nationally important numbers in both seasons, although totals are lower in the winter months.

Table 13. Recent peak counts at main wintering sites for eider in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Tay Estuary	9,500	6,030	-	9,500	8,000	-	8,258	12,238
Firth of Forth	6,039	4,891	5,927	5,295	-	-	5,841	7,683
Montrose Basin	2,163	2,180	2,214	2,730	-	3,051	2,544	1,999
Scapa Flow	-	2,308	-	1,980	-	-	2,144	-
Gullane to Berwick	1,100	1,962	3,322	-	-	-	1,884	2,200
Ythan Estuary	1,646	1,244	1,812	1,238	1,435	-	1,475	1,136
Moray Firth	291	1,695	963	1,524	1,565	1,037	1,357	1159
Sounds around Wyre	-	-	-	-	1,349	-	1,349	-

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Five-year means for the main sites for eider in the SEA 5 area were compared between the two seasons (Table 20). The total mean number of birds present at the main wintering sites was 24,812 birds, compared to a total mean number of 21,660 birds at the summer/moulting sites. Although these calculations are based on estimates from the main sites, and such figures should be treated with caution, they still provide a baseline figure for the number of eider likely to occur in the SEA 5 area.

Eider were recorded in ESAS surveys in all months, totalling 11,312 birds (Figures 10 & 11). Maximum numbers were recorded in January (8,236) with a minimum of 2 birds in July. Only 26 birds were recorded on ESAS surveys during July and August. It is clear that moulting eider flocks have been overlooked by ESAS surveys.

ESAS data shows that wintering eider were widespread in the Moray Firth and also recorded along the Angus and Aberdeenshire coasts (Figure 11). Highest densities were recorded in the mouth of the Tay, which mirrors land-based count data. Few birds were recorded in Orkney and Shetland but this is probably due to poor coverage in the inshore water of these areas during winter months.

Hope Jones & Kinnear (1979) suggested that some eider from Orkney may travel to Shetland to moult. Offshore sightings of eider on ESAS surveys east of Orkney in October may be birds returning from Shetland (Figure 11).

The Tay estuary, St Andrews Bay and the Firth of Forth were highlighted as the most important areas for eiders during recent winter inshore aerial surveys (Dean *et al* 2003).

Habitat Use

Eiders are found exclusively in shallow coastal waters, in the mouths of major estuaries or areas with sandy or rocky substrates, where blue mussels, molluscs and crustaceans are abundant (Owen *et al* 1986, Tasker *et al* 1987, Webb & Tasker 1988). In estuaries, birds feed at all stages of the tide but may be influenced by the time of day (Kirby *et al* 1993).

UK Conservation measures

Four sites have been selected as non-breeding SPA's for eider within the SEA 5 area. These are the Ythan estuary & sands of Forvie, the Firth of Forth, the Firth of Tay & Eden estuary and the Montrose Basin, all on the east coast of Scotland (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Figure 10. Location of all eider sightings in the SEA 5 area (ESAS data)

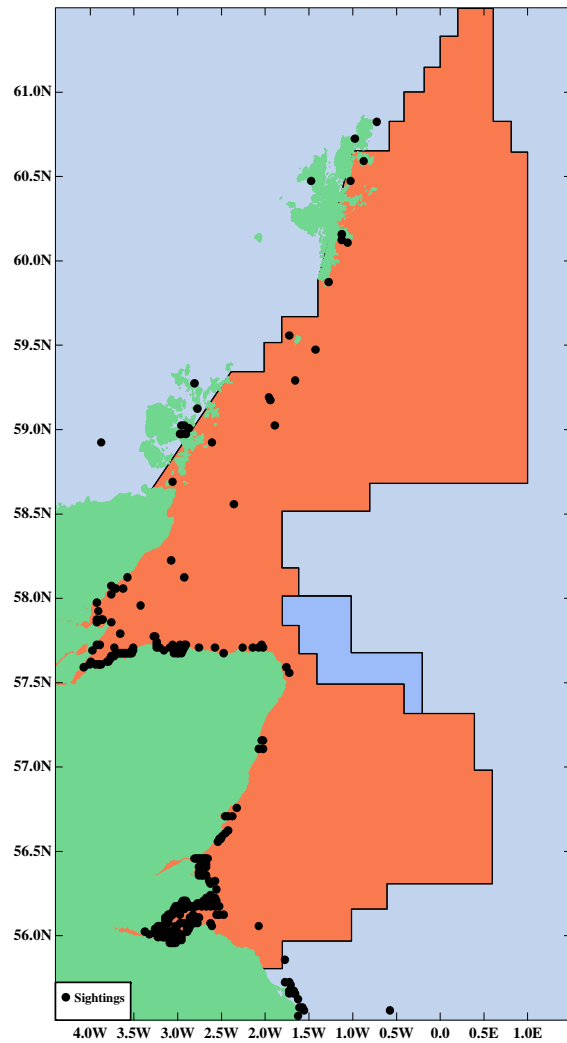
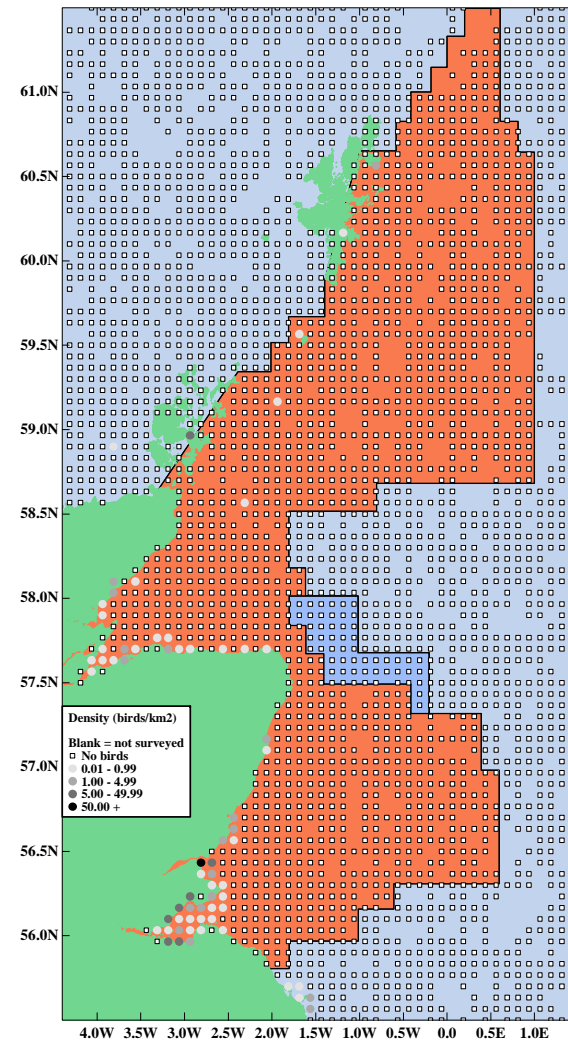


Figure 11. Eider density in the SEA 5 area, from September to March (ESAS data)



Long-tailed duck

Population and distribution

An estimated 16,000 long-tailed ducks winter around the coast of the UK, with the majority of these in Scotland, particularly in Shetland, Orkney, the Moray Firth and the Firth of Forth (Lack 1986, Kershaw & Cranswick 2003, Pollit *et al* 2003). Numbers tend to peak in late December/early January, remaining high until mid-February, then declining sharply (Prater 1981, Lack 1986, Thom 1986).

Birds wintering around Britain are thought to originate from the Iceland/Greenland breeding population of 150,000 birds, although some birds from the western Siberia/north-west Europe population (some 4,600,000) which winters primarily in the Baltic, may also winter in UK waters (Stroud *et al* 2001).

As well as occurring inshore, long-tailed ducks may be present offshore in large numbers and so may be under-recorded during land-based counts. Surveys in the Baltic in the 1990's showed that most birds were found in the open sea, several kilometres from land (Musgrove *et al* 2001). A combination of day-time counts and roost counts were used to estimate the wintering population in the Moray Firth but in some winters this methodology may not have surveyed all sections adequately (Evans 1998).

Trends

The most important wintering areas for long-tailed ducks in the SEA 5 area are Shetland, Orkney, the Moray Firth, the Firth of Forth and the Eden Estuary (Table 14). A total of 1,474 birds were recorded in Scapa Flow in 2000/01, which was 9.3% lower than in a similar survey carried out in 1998/99 (Williams 2001). Other recent counts from Orkney show that the sounds around Wyre, Wide Firth, Bay of Firth, and Eynhallow Sound all regularly hold nationally important numbers of long-tailed ducks (>160 birds – Kershaw & Cranswick 2003).

Figures from Scapa Flow and elsewhere in Orkney indicate that a considerable number of long-tailed ducks are present during the winter. However, the national wintering estimate was put together using a figure of 6,000 birds for Orkney, which is based on studies carried out in the 1970's (Musgrove *et al* 2001). There is a need for regular dedicated surveys around Orkney and the other important wintering areas to determine the current UK wintering population, particularly as numbers in the Moray Firth have decreased.

Recent counts from the Moray Firth have declined considerably from counts in the early 1980's. Between 1981 and 1983 three sites (Burghead Bay, Spey Bay & Brora) held peak totals of c18,000 birds each winter (Thom 1986, Evans 1998). During the 1990's the mean 5 year count was around 8,700 birds, compared to the most recent 5 year mean from 1998/99 to 2002/03 of 2,967 birds, from RSPB & WeBS surveys.

Previous studies in the Moray Firth found large numbers feeding offshore and flying to deep water inshore roosts at dusk. These daily movements were very variable (Thom 1986). A similar pattern was observed in studies in Scapa Flow (Lea 1980, Williams 1999).

Diver, grebe and seaduck review for SEA 5

Between 1,500 – 2,000 long-tailed duck are estimated to winter in Shetland (Pennington *et al* 2004). At least three areas in Shetland, Hascosay, Colgrave and Bluemull Sounds, South Yell Sound and Lerwick to Kirkabister regularly hold nationally important numbers of long-tailed duck in winter (Table 14). These areas are regularly surveyed as part of the SOTEAG ornithological monitoring programme.

Table 14. Recent peak counts at main sites for long-tailed duck in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Moray Firth	2,006	2,482	1,389	3,991	3,388	3,585	2,967	4,466
Scapa Flow	-	1,582	-	1,474	-	-	1,528	-
Sounds around Wyre	-	-	-	-	984	-	984	-
Firth of Forth	660	1,000	783	319	-	-	811	985
Wide Firth/Bay of Firth	-	-	-	600	-	-	650	-
Eden Estuary	192	238	476	920	480	-	461	-
Eynhallow Sound	355	-	329	205	-	-	269	360
Hascosay, Colgrave & Bluemull Sounds	383	305	-	169	201	-	265	350
South Yell Sound	270	191	339	222	136	108	199	236
Lerwick to Kirkabister	131	-	303	171	298	127	225	174
Carnoustie	350	-	-	-	100	-	225	110

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Nationally important numbers of long-tailed ducks are also regularly recorded off the east coast of Scotland in the Firth of Forth, Eden Estuary and Carnoustie. Smaller numbers are also present off the Aberdeen coast in winter but these numbers tend to be below the nationally important threshold.

ESAS data shows that long-tailed ducks were recorded primarily over the winter between October and May with 2 birds recorded in June and 1 in September. The most important months were between November and April with a peak in December (Figures 12 & 13).

The Moray Firth area was the most important wintering area. Nearly all birds were concentrated in the inner Moray Firth in December and highest densities were recorded here throughout the winter (Figure 13). Outside the Moray Firth area, almost all sightings in open sea occurred in May and October and were probably birds on passage (Figure 12).

Figure 12. Location of all long-tailed duck sightings in the SEA 5 area (ESAS data)

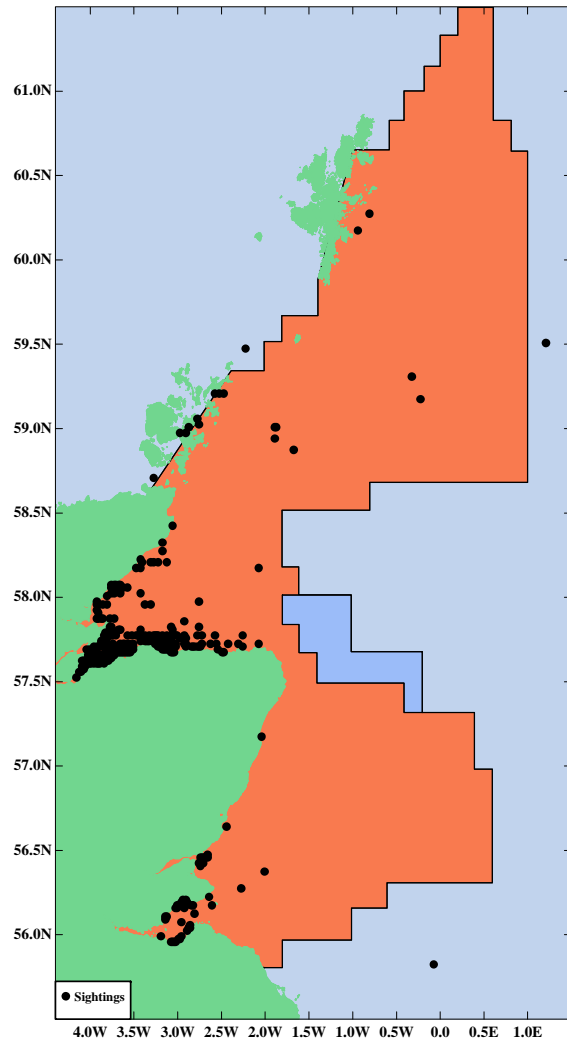
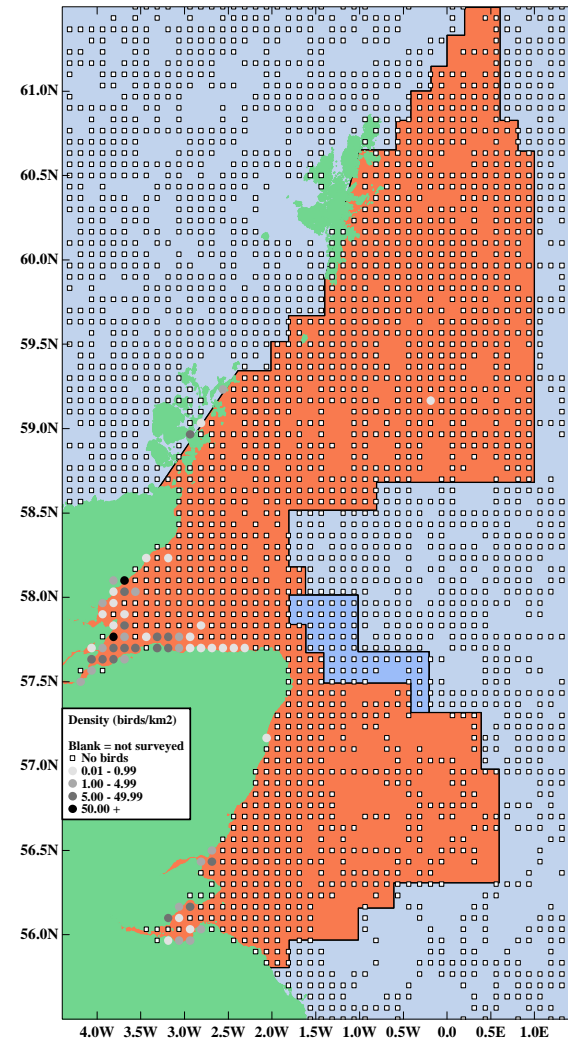


Figure 13. Long-tailed duck density in the SEA 5 area, from November to April (ESAS data)



ESAS distribution data is influenced by the amount of survey coverage achieved each month. The species was most widespread in February, when survey coverage was highest. A dedicated survey of seaduck and divers conducted by JNCC in January & February 1998 in the Moray Firth, Firth of Forth and St Andrew's Bay found long-tailed ducks to be abundant in all areas with the largest concentration over the Riff Bank in the Moray Firth (Cronin & Webb 1998). Long-tailed ducks were widespread in the Firth of Forth in January and were present in St Andrew's Bay in November and January, but coverage was incomplete in other months. Almost 94 % of the birds were on the water, highlighting their vulnerability to surface pollutants.

Low to moderate densities were recorded around Orkney in February and March although coverage generally was poor. Flocks occasionally associated with other species, particularly common and velvet scoter.

During recent winter inshore aerial surveys between 2000 and 2002, largest numbers of long-tailed ducks were recorded in February in the Moray Firth and the Firth of Tay/St Andrews Bay (Dean *et al* 2003).

Habitat Use

Long-tailed ducks prefer marine areas with extensive shallows and soft substrates, although they also occur off rocky coasts or brackish coastal lochs. The main food is thought to be blue mussels, crustaceans and small fish. Birds forage in water at least 30m deep, often several km offshore (Lack 1986, Kirby *et al* 1993). On ESAS surveys, most birds were recorded within 10 miles of the coast.

Feeding groups tend to be small and widely dispersed by day, gathering to roost at night in large flocks. It is presumed that most flights from roosts takes place before dawn (Thom 1986).

UK Conservation measures

All three of the UK's terrestrial SPAs where long-tailed ducks have been listed as a qualifying species are within the SEA 5 area. The sites are the Firth of Forth, the Firth of Tay & Eden estuary and the Moray & Nairn coast. These three sites hold an estimated 3.5 % of the British wintering population (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Common scoter

Population and distribution

The UK breeding population of common scoter has declined by more than 50% in the last 25 years (UKBAP 2001). Breeding pairs are now restricted to Scotland, with an estimated 2-33 pairs in 2001 (Ogilvie *et al* 2003). The biogeographic population is currently estimated at 1,600,000 individuals (Delany & Scott 2002). There would appear to be long and short term fluctuations in numbers recorded at known sites. Several flocks occur during the summer, particularly off the east coast of Scotland (Thom 1986). These flocks were thought to be moulting flocks although recent casual observations of birds in Aberdeenshire suggest that only a small proportion of birds are moulting their flight feathers (Cranswick in press).

Most of the UK winter population tends to be found in a few large flocks off the mouths of major estuaries around the coast of Britain. Previous estimates calculated a total of around 23,500 birds wintering around Britain, although a current review of numbers for the UK and recent survey work at key sites suggests that the number of wintering common scoter is likely to be in the region of 50,000 birds (Kershaw & Cranswick 2003). Most wintering birds are thought to come from Fennoscandia and western Siberia (Kirby *et al* 1993). The main influx of scoter occurs in October & November with a peak between December and early February (Lack 1986). Common and velvet scoters often occur together in mixed flocks, and may be some distance offshore, which can cause identification problems during land-based counts.

Trends

Nationally important sites (>500 birds - Kershaw & Cranswick 2003) for common scoter within the SEA 5 area include the Moray Firth, the Firth of Forth, Carnoustie, St Andrew’s Bay and Murcar, north of Aberdeen (Thorpe 2000, Thorpe 2002, Baxter 2003, Pollit *et al* 2003) (Tables 15 & 16).

In previous studies, the main areas in the Moray Firth were the outer Dornoch Firth, Culbin Sands, Burghead Bay and Spey Bay, and numbers showed a peak in the winter months (Evans 1998). Recent totals appear to show an increase in the number of birds occurring in the Moray Firth, and comparing the two most recent 5 year means also indicates an increase (Table 15).

Table 15. Recent peak counts at main wintering sites for common scoter in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Moray Firth	2,061	3,543	2,661	3,848	3,381	8,333	4,353	2,604
Firth of Forth	1,205	1,663	3,764	783	-	-	1,915	2,712
St Andrew’s Bay/ Eden Estuary	2,771	1,105	620	2,500	790	-	1,557	2,997
Carnoustie	-	-	500	500	-	1,000	667	2,100
Lunan Bay	-	-	300	1,000	76	-	459	-
Don mouth to Ythan mouth	130	155	112	-	140	-	107	337

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Numbers of common scoter in the Forth show a peak in the early months of the year, between January and April. Totals in St Andrew's Bay/Eden Estuary tend to occur during mid-winter, but high numbers are also present in late summer. Comparing the most recent 5 year means for both sites shows a drop in numbers in recent years.

Smaller numbers have been recorded off Carnoustie and in Lunan Bay, on the Angus coast in recent years. Numbers off Carnoustie peaked in winter while numbers in Lunan Bay showed no clear pattern, occurring in both summer and winter months. Low numbers are recorded in Orkney and Shetland.

The flock in Aberdeenshire, off Murcar, tends to peak in July/August with a recent count of 4,300 birds in August 2002 being the largest flock since 1993 (Baxter 2003) (Table 16). This site shows the biggest difference in numbers between summer and winter, with few birds recorded in recent winters (Reeves 1997, Phillips & Francis 1999, Baxter 2003).

Table 16. Recent peak counts at main summer sites for common scoter in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Don mouth to Ythan mouth	1,200	1,500	2,690	3,600	3,500	4,300	3,118	2,395
Firth of Forth	880	1,009	2,717	346	-	-	1,454	1,698
St Andrew's Bay/ Eden Estuary	506	850	1,100	2,500	900	-	1,171	714
St Cyrus/ Kinnaber	-	-	-	372	600	500	491	-
Lunan Bay	220	-	250	500	400	507	414	610

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Data from ESAS surveys shows that common scoter were recorded primarily in inshore areas of the SEA 5 area (Figure 14). Peak densities were recorded in January and February in the Moray Firth, St Andrew's Bay and the Firth of Forth (Figure 15). Moderate densities were recorded in St Andrew's Bay between March and May, but were lower elsewhere. High densities were recorded off the Aberdeen coast in July, but few birds were present by August. There were scattered offshore records throughout the SEA 5 area, mostly between August and November. Few birds were recorded around Orkney and Shetland.

Large numbers of common scoters were recorded in the Moray Firth, the Firth of Tay/St Andrew's Bay and the Firth of Forth during recent winter inshore aerial surveys between 2000 and 2002 (Dean *et al* 2003).

Habitat Use

Common scoter are usually found in shallow waters, usually associated with sandy substrates where they feed actively by day mainly on blue mussels, crustaceans and small fish such as sandeels. Birds are presumed to roost in or close to their daytime feeding areas (Lack 1986, Kirby *et al* 1993).

Figure 14. Location of all common scoter sightings in the SEA 5 area (ESAS data)

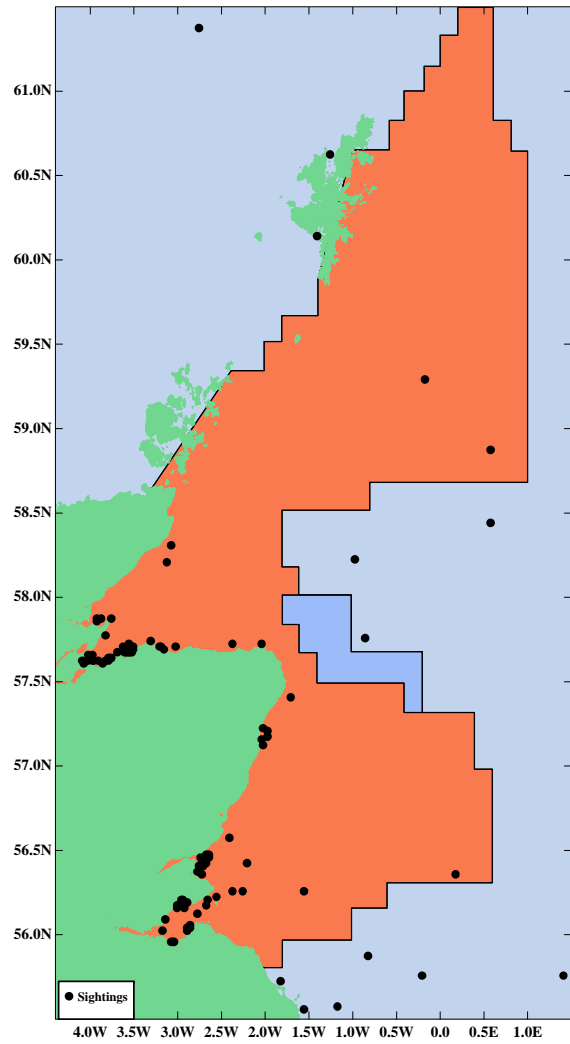
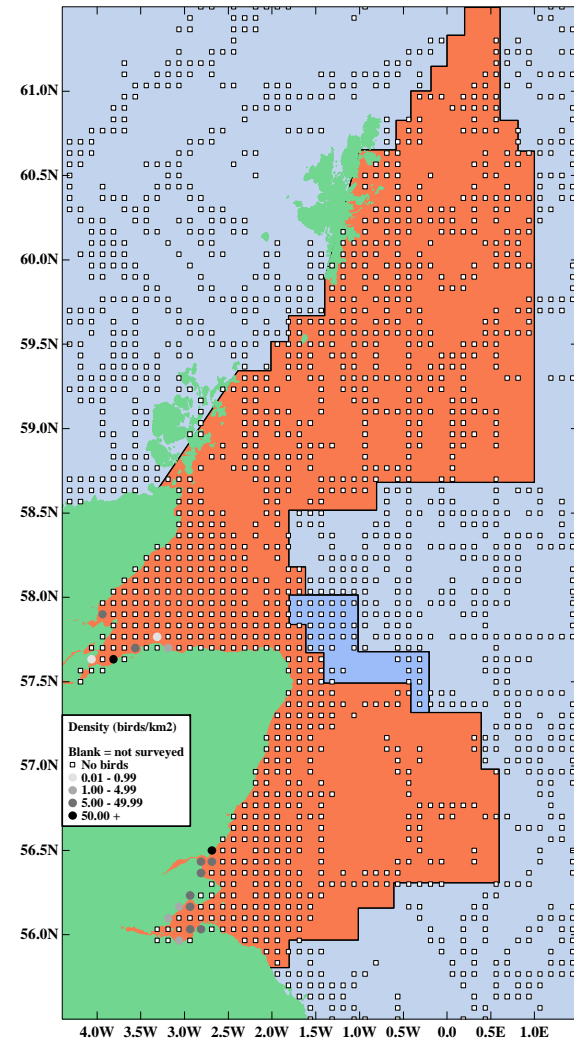


Figure 15. Common scoter density in the SEA 5 area, in January and February (ESAS data)



UK Conservation measures

Three of the UK's terrestrial non-breeding SPAs for common scoter are within the SEA 5 area. The sites are the Firth of Forth, the Firth of Tay & Eden estuary and the Moray & Nairn coast (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

An Action Plan for common scoter has been drawn up as part of the UK Biodiversity Action Plan, as the breeding population has declined by more than 50% in the last 25 years (UKBAP 2001). Amongst other recommendations, the following proposed actions on the various UK country agencies have relevance for the SEA 5 area:

- To ensure that licensing of offshore developments does not detrimentally affect important wintering, moulting or feeding sites of Common Scoters.
- To conduct regular surveys of breeding, wintering and moulting Common Scoters

Velvet scoter

Population and distribution

Velvet Scoter are the least abundant of the major wintering seaduck species in Britain and are usually found in amongst flocks of common scoters at most sites (Lack 1986). Peak numbers vary annually but tend to peak in March/April, when numbers may be higher than common scoter (Thom 1986, Mudge & Cadbury 1987). Birds wintering in Britain are thought to come from Scandinavia and west Siberia and possibly further to the east (Owen *et al* 1986). No sites outside Scotland support regular flocks of more than 50 birds (Kirby *et al* 1993). A recent review of scoter numbers estimated that around 3,000 velvet scoter were likely to winter in the UK (Kershaw & Cranswick 2003). The northwest Europe and western Siberia population has been estimated at 1,000,000 birds (Delany & Scott 2002).

Trends

The main sites for velvet scoter in the SEA 5 area include the Moray Firth, St Andrew's Bay/Eden Estuary and the Firth of Forth. These three sites have been identified as the main UK wintering sites for velvet scoter, and are of national importance (>30 birds - Kershaw & Cranswick 2003), with up to 1,000 birds recorded (Pollit *et al* 2003, Cranswick in press). Recent counts are shown in Table 17. Peak numbers occur in mid-winter in the Moray Firth and St Andrew's Bay/Eden Estuary, and in March/April in the Firth of Forth.

Table 17. Recent peak counts at main wintering sites for velvet scoter in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Moray Firth	804	1,508	401	744	1,083	2,574	1,262	802
St Andrew's Bay/Eden Estuary	2,000	840	845	1,870	500	-	1,211	1,198
Firth of Forth	528	477	751	542	-	-	633	527

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Diver, grebe and seaduck review for SEA 5

Small numbers of velvet scoter are present in flocks of common scoter at several coastal sites in late summer and total numbers at this time of year were estimated to be only a few hundred (Kirby *et al* 1993). Recent counts of national importance are shown in Table 18. Three sites regularly hold nationally important numbers of velvet scoter at this time of year. Around 200 to 400 birds are present off the coast between Donmouth and the Ythan, north of Aberdeen in July /August in most years although the highest count recorded was 910 birds in July 1994 (Reeves 1995). Counts in Lunan Bay and around St Cyrus/Kinnaber also tend to peak in late summer.

Table 18. Recent peak counts at main late summer sites for velvet scoter in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Lunan Bay	-	238	150	1,500	600	400	578	650
Don mouth to Ythan mouth	138	200	220	510	400	660	398	325
St Cyrus/Kinnaber	-	300	-	40	-	343	228	284

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

At least four sites in Orkney have held nationally important numbers in recent years, although surveys have not been carried out regularly (Table 19). Numbers are lower than elsewhere in the UK but more detailed surveys would be required to fully determine the numbers present.

Table 19. Recent peak counts for velvet scoter in Orkney

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Wide Firth	-	-	-	63	54	-	59	-
Rerwick Head	13	-	-	55	41	-	48	-
Inganess Bay	39	28	60	38	-	55	45	47
Sounds around Wyre	-	-	-	-	37	-	37	-

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

ESAS survey data for the SEA 5 area shows a coastal distribution for velvet scoter, with most sightings of birds from the Moray Firth, St Andrew's Bay and the Firth of Forth (Figure 16). Highest densities were recorded in January and February in these three areas (Figure 17). Moderate densities were recorded in the Moray Firth in May, and low numbers of birds were recorded during other months.

In both winters of recent inshore aerial surveys, highest numbers of velvet scoter were recorded in the Firth of Forth, although not all scoter were identified to species (Dean *et al* 2003).

Habitat Use

Velvet scoter are found in similar habitats as common scoter and their diet is also similar but may be more varied. Birds feed at depths of less than 10m and generally feed closer to shore than common scoter (Cramp & Simmons 1987).

UK Conservation measures

Three of the UK's four terrestrial non-breeding SPAs for velvet scoter are within the SEA 5 area. The sites are the Firth of Forth, the Firth of Tay & Eden estuary and the Moray & Nairn coast. All three sites are multi-species SPAs and are important for a range of other species (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Figure 16. Location of all velvet scoter sightings in the SEA 5 area (ESAS data)

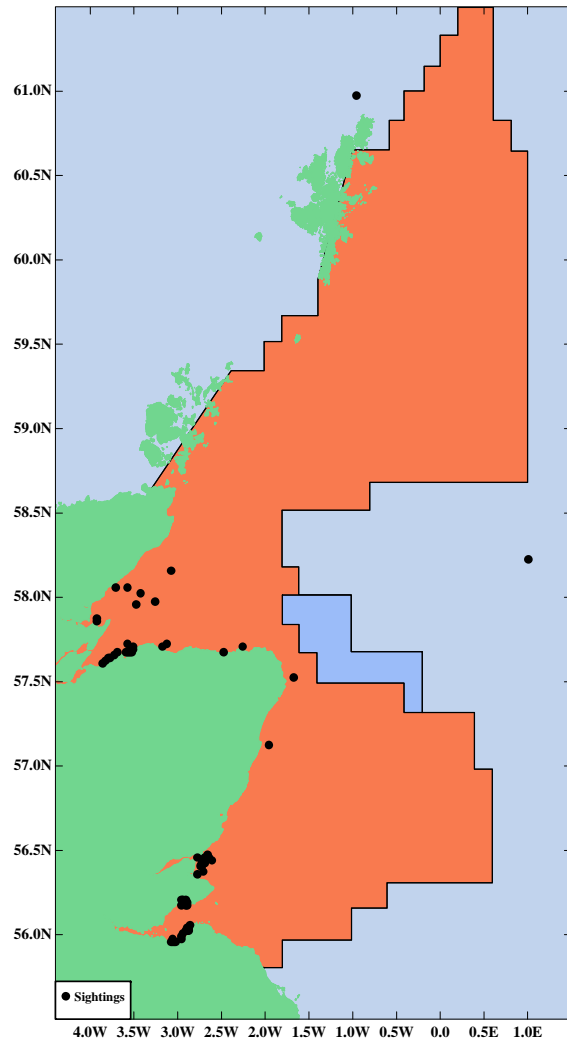
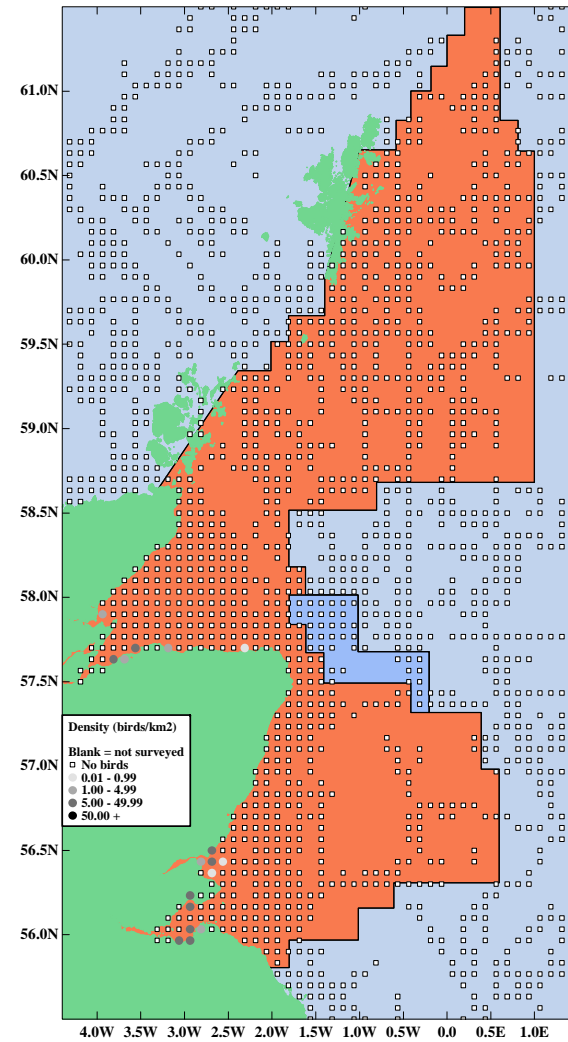


Figure 17. Velvet scoter density in the SEA 5 area, in January and February (ESAS data)



Goldeneye

Population and distribution

The British breeding population of goldeneye was estimated to be between 83-109 pairs from 1989-1992 (Stone *et al* 1997). Breeding is confined to Scotland although the number of birds summering in England is increasing (Ogilvie *et al* 2003).

The wintering population of goldeneye in Britain are largely of Scandinavian in origin, and numbers reach their peak in mid-winter, remaining high until April as goldeneye tend to leave for their breeding grounds later than other wintering duck species (Thom 1986). Wintering birds tend to be very dispersed. An estimated 24,900 goldeneye are thought to winter in Britain each year, although not all of these birds will be at coastal sites (Kershaw & Cranswick 2003). These birds form part of the north-west and central European biogeographic population, currently estimated at 400,000 birds (Delaney & Scott 2002).

Trends

The Firth of Forth holds the largest numbers of wintering goldeneye in Britain and is nationally important for the species (>249 birds - Kershaw & Cranswick 2003) (Table 20). Flocks are present on both coasts of the Forth although numbers have declined since the 1970's (Thom 1986, Pollit *et al* 2003). Recent counts highlight the Levenmouth/Largo Bay area of the Forth as holding the main concentration of birds. Nationally important flocks also regularly winter in the inner Moray Firth, the Tweed estuary and Scapa Flow, although the latter two sites hold fewer birds (Pollit *et al* 2003). Recent counts of the Tay estuary are below the nationally important threshold, but numbers were higher here historically.

In Shetland, between 500 – 700 goldeneye are estimated to winter each year (Pennington *et al* 2004).

Table 20. Recent peak counts at main sites for goldeneye in SEA 5 area

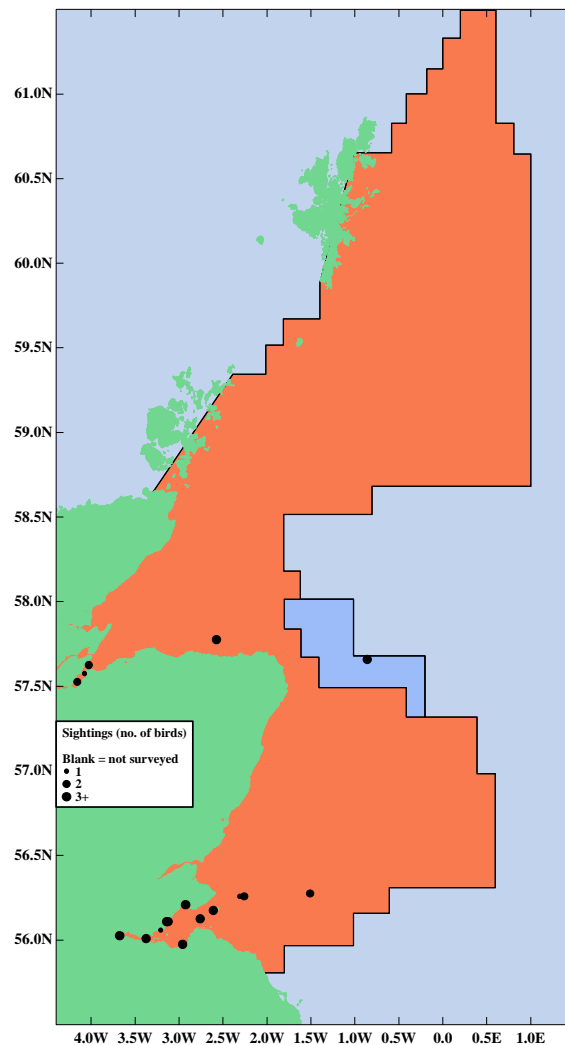
Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Firth of Forth (total)	4,864	2,445	1,653	2,414	-	-	2,915	2,377
Leven/Largo	4,425	2,000	1,300	-	135	-	1,965	2,217
Moray Firth (total)	1,251	883	1,190	1,554	1,765	898	1,258	996
Inner Moray Firth	895	964	894	1,141	-	-	963	690
Tweed Estuary	570	585	302	151	-	-	482	515
Scapa Flow	-	282	-	254	-	-	268	-
Tay Estuary	155	52	122	186	-	-	103	287

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Only 80 goldeneye were recorded during ESAS surveys in the SEA 5 area, reflecting the inshore distribution of this species. The majority of birds were recorded between October and April, in the Moray Firth and the Firth of Forth. Birds were seen further offshore on a few occasions (Figure 18).

Figure 18. Goldeneye sightings in the SEA 5 area (ESAS data)



Habitat Use

Goldeneye feed by day, often moving to roosting sites at dusk. In winter, birds feed predominantly on small invertebrates such as crabs and bivalves, small fish and some plants, as well as around sewage outfalls (Lack 1986, Owen *et al* 1986). Goldeneye are generally restricted to sheltered inshore waters less than 10m in depth (Skov *et al* 1995).

UK Conservation measures

The inner Moray Firth, the Firth of Forth and the Firth of Tay & Eden estuary have been selected as non-breeding SPAs for goldeneye. All three sites are multi-species SPAs and are important for a range of other species (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Red breasted merganser

Population and distribution

An estimated 2,300 pairs of red-breasted mergansers breed in Britain, with some 1,200-1,700 of these occurring in Scotland (Thom 1986, RSPB 2004). The north-western and central European biogeographic population is estimated at 170,000 birds (Delaney & Scott 2002). Most of the birds that breed in Britain are thought to be resident.

Numbers build up in coastal areas from May onwards as birds form moulting flocks, peaking in late August. Moulting flocks begin to disperse to the wintering grounds from mid-September, and these birds are joined by immigrants from Iceland (Thom 1986).

Around 85-90% of wintering red-breasted mergansers are found on the coast, mainly in estuaries in small flocks of less than 30 birds (Owen *et al* 1986; Thom 1986, Lack 1986). Influxes of birds from the continent during periods of cold weather have also been recorded (Prater 1981). The wintering population in Britain has been estimated to be 9,840 birds (Kershaw & Cranswick 2003). Numbers tend to peak in December and decline from March onwards (Lack 1986).

Trends

Seven sites in the SEA 5 area regularly hold nationally important numbers of red-breasted mergansers (>98 birds - Kershaw & Cranswick 2003) (Table 18).

Numbers in the Firth of Forth tend to peak in September and October, whereas recent peak counts from Scapa Flow and the Moray Firth were in mid-winter. Sullom Voe counts also peaked between November and February while peak counts from St Cyrus/Kinnaber, the Eden Estuary and the Montrose Basin were predominantly in late summer and early autumn.

Table 18. Recent peak counts at main sites for red-breasted merganser in SEA 5 area

Site	97-98	98-99	99-00	00-01	01-02	02-03	Mean ¹	Mean ²
Firth of Forth	675	622	601	459	-	-	614	650
Scapa Flow	-	628	-	488	-	-	558	-
Moray Firth	633	611	302	295	374	222	361	1340
St Cyrus/ Kinnaber	-	352	75	303	-	297	342	-
Eden Estuary	121	180	148	196	293	-	188	91
Montrose Basin	204	113	100	120	124	152	122	143
Sullom Voe	133	110	53	103	114	-	103	82

¹ Mean of most recent 5 years, where available. A more detailed breakdown of data and data sources is shown in Appendix B

² Mean of previous 5 years, where available

Comparing the most recent 5-year mean to the previous 5-year mean shows a considerable drop in the mean peak number of red-breasted merganser in the Moray Firth. This decline would appear to be real, as actual counts from the last 5 years are lower than counts from the early 1990's.

Numbers of red-breasted mergansers wintering in Shetland are estimated to be between 600 – 700 birds (Pennington *et al* 2004).

ESAS surveys in the SEA 5 area recorded a total of 799 red-breasted mergansers in the Moray Firth, Firth of Tay and the Firth of Forth, primarily between November and April. The south shore of the Firth of Forth, Largo Bay and the Inner Moray Firth held the highest abundance of birds (Figures 19 & 20). January was the peak month with a total of 277 birds recorded.

Highest numbers of red-breasted mergansers were recorded in the Beaully and Inverness Firths and the Firth of Forth during recent winter inshore aerial surveys (Dean *et al* 2003).

Habitat Use

Red-breasted mergansers feed mainly on fish but also small crustaceans, hunting in shallow water usually less than 4m deep. Groups of birds may hunt together (Cramp & Simmons 1988; Owen *et al* 1986). Birds were rarely more than 2km from the coast during JNCC surveys (Webb *et al* 1990).

UK Conservation measures

The Inner Moray Firth, Cromarty Firth, Firth of Forth, Firth of Tay & Eden estuary and Moray & Nairn coast have been selected as non-breeding SPAs for red-breasted mergansers. All 5 sites are multi-species SPAs and are important for a range of other species (Stroud *et al* 2001).

Marine SPA sites are currently under consideration for this species (Johnston *et al* 2002).

Figure 19. Location of all red-breasted merganser sightings in the SEA 5 area (ESAS data)

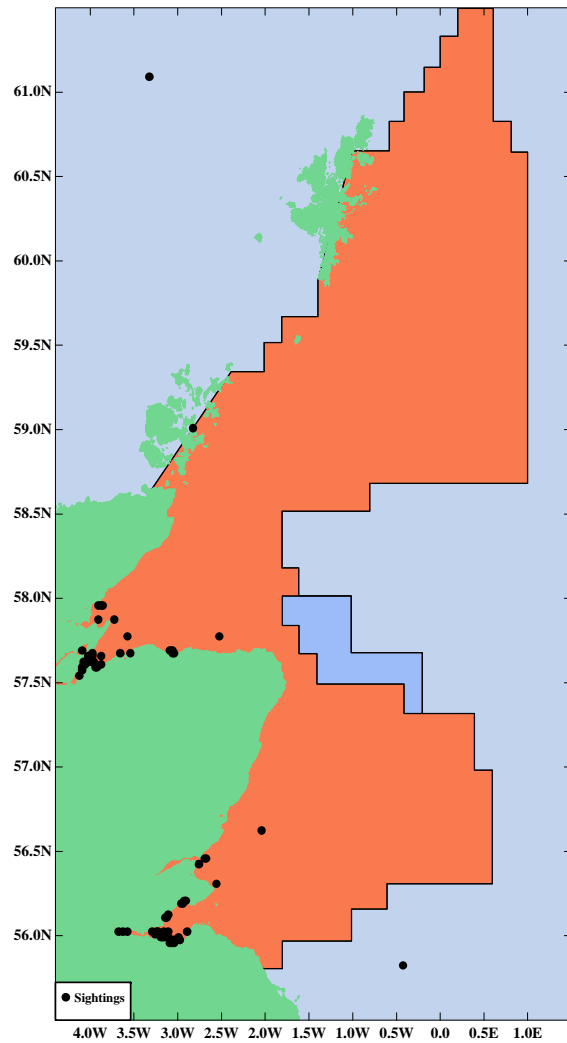
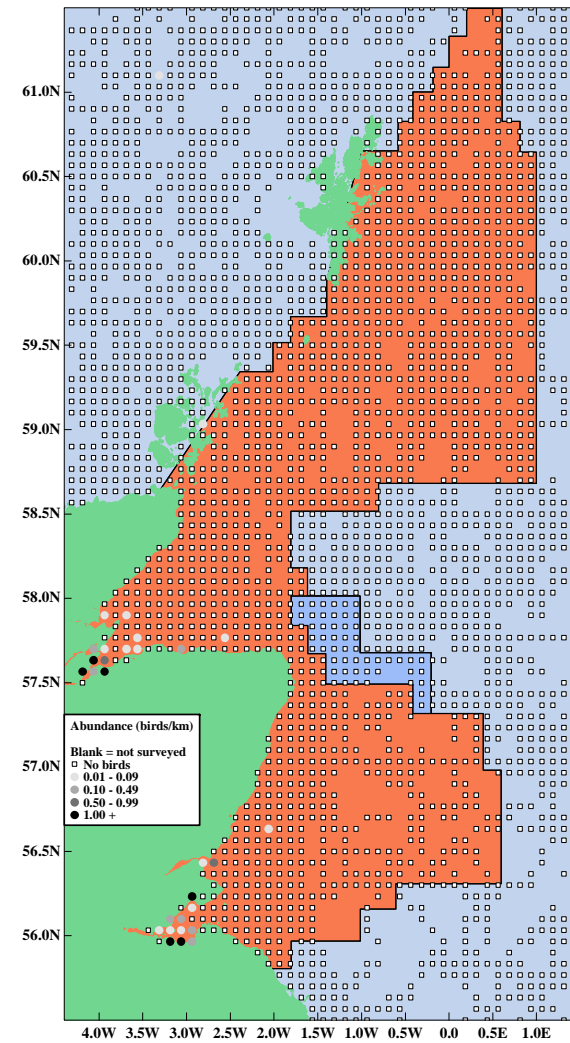


Figure 20. Red-breasted merganser abundance in the SEA 5 area, from November to April (ESAS data)



3.2 Important regions within the SEA 5 area

A summary of the estimated totals for each species of diver, grebe and seaduck in the 8 most important regions within the SEA 5 area is shown below (Tables 19 & 20). Numbers are based on most recent five year means where available. Numbers for Shetland are taken from Pennington *et al* (2004).

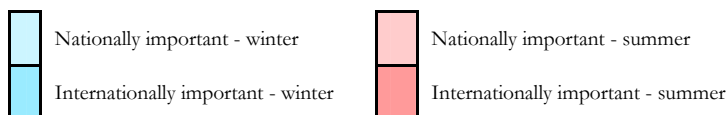
Table 19. Estimated totals of divers and grebes for the 8 principal regions in the SEA 5 area

Area	Red throated Diver	Black throated Diver	Great northern Diver	Great crested Grebe	Red necked Grebe	Slavonian Grebe
National threshold ¹	49	7	30	159	2	7
International threshold ²	10,000	10,000	50	4,800	1,000	35
Shetland ³	99		415			90
Orkney	71	58	1,073		17	133
Moray Firth	142	22	48	1	2	74
Aberdeenshire coast	315	2	14			
Angus coast	124	2		28		
Tay/St Andrews	78					29
Firth of Forth	83	8	5	399	49	70
Lothian/Borders		4				
Minimum Estimate for SEA 5 Area	912	96	1,555	428	68	396
% GB Total in SEA 5 Area	18.8	13.7	51.8	2.7	34.0	60.9

1 Kershaw & Cranswick 2003

2 Delaney & Scott 2002

3 Pennington *et al* 2004



All species occur in nationally important numbers within the SEA 5 area. Numbers of eider are internationally important throughout the year while great northern divers and slavonian grebes occur in internationally important numbers in winter. The Moray Firth and Firth of Forth are key areas, holding important numbers of 12 out of the 13 species reviewed.

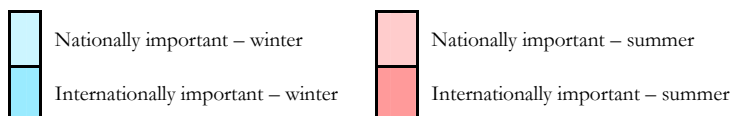
Table 20. Estimated totals of seaduck for the 8 principal regions in the SEA 5 area

Area	Scaup	Eider (winter)	Eider (summer)	Long tailed Duck	Common Scoter	Velvet Scoter	Golden-eye	Red breasted Merganser
National threshold ¹	76	730	730	160	500	30	249	98
International threshold ²	3,100	750	750	20,000	16,000	10,000	4,000	1,700
Shetland			5,700	1,750			600	650
Orkney		3,493		3,431 *		96	268	605
Moray Firth	671	1,317		2,967	4,353	1,262	1,258	361
Aberdeenshire coast	17	1,475	3,502	118	107	398		42
					3,118			371
Angus coast	42	2,544	2,384	290	959	578		122
Tay/St Andrews	195	8,258		492	1,557	1,211	103	251
Firth of Forth	471	5,841	7,690	811	1,915	633	2,915	614
Lothian/Borders		1,884					482	
Minimum Estimate for SEA 5 Area	1,396	24,812	21,660	9,859	8,891 Winter	3,202 Winter	5,626	2,230 Winter
% GB Total in SEA 5 Area	18.4	34.0	29.6	61.6	17.8	100	22.6	22.7

1 Kershaw & Cranswick 2003

2 Delaney & Scott 2002

* Incomplete count



3.3 Regional summary

Shetland

Several sites in Shetland are internationally important for eider. Largest concentrations occur in August during the moulting period. Major concentrations occur in the Scalloway Islands, around Papa Stour, the Out Skerries and around Noss and Bressay (Heubeck 2003).

Shetland also holds internationally important numbers of great northern diver and slavonian grebe and nationally important numbers of long-tailed duck and red-breasted merganser. Regular annual monitoring of key areas is carried out by Shetland Oil Terminal Environmental Advisory Group (SOTEAG), as part of their ornithological monitoring programme.

Orkney

Orkney holds internationally important concentrations of great northern diver, slavonian grebe and eider. Key areas are Scapa Flow and the Sounds around Wyre, although other areas may also hold important concentrations of these species. Other species occurring in nationally important numbers are red-throated and black-throated diver, red-necked grebe, long-tailed duck, velvet scoter, goldeneye and red-breasted merganser.

Surveys have been carried out in Scapa Flow and the sounds around Wyre in recent winters using boats but coverage is not complete. There is a need for regular annual monitoring of key areas and surveys of areas that could hold concentrations of birds.

Moray Firth

The Moray Firth holds significant numbers of twelve of the thirteen species of diver, grebes and seaduck considered in this review. Slavonian grebe and eider occur in internationally important numbers, and numbers of great northern diver have exceeded the international threshold of 50 birds in some recent years. A further nine species occur in nationally important numbers.

Regular winter monitoring of the main areas of the Moray Firth is currently carried out by the RSPB. Monitoring of this coastline has been going on since 1981, as part of the Beatrice Oilfield Environmental Programme (Addy 1987). WeBS monitoring of wildfowl and waders is also carried out on a monthly basis.

The Inner Moray Firth, Cromarty Firth and Moray & Nairn coast have been selected as non-breeding multi-species SPAs for scaup, long-tailed duck, common scoter, velvet scoter, goldeneye and red-breasted merganser (Stroud *et al* 2001).

Aberdeenshire coast

Eider are found in internationally important numbers from Donmouth to the Ythan estuary. This stretch of Aberdeenshire coast also regularly holds nationally important numbers of red-throated diver and common scoter. Red-throated diver numbers tend to peak in late spring, while concentrations of eider and common scoter peak in late summer.

Nationally important numbers of red-breasted mergansers also peak in late summer, to the south of Aberdeen, at St Cyrus and Kinnaber, on the border with Angus.

WeBS monitoring of wildfowl and waders is carried out at the main sites on a monthly basis.

The Ythan Estuary & Sands of Forvie area has been selected as a non-breeding SPA for eider (Stroud *et al* 2001).

Angus coast

Numbers of eider at Montrose Basin are above the internationally important threshold. In addition, red-throated divers, long-tailed duck, common scoter, velvet scoter and red-breasted merganser regularly occur in nationally important numbers off the Angus coast. Main concentrations occur in Lunan Bay, Montrose Basin, off Carnoustie and Kinnaber.

WeBS monitoring of wildfowl and waders is carried out at some sites such as Montrose Basin on a monthly basis, although the majority of counts used in this review were taken from the Angus Bird Report and the Scottish Bird Report.

Montrose Basin has been selected as a non-breeding SPA for eider (Stroud *et al* 2001).

Tay/St Andrews Bay

Several species occur in nationally important numbers in this section. The three major sites are the Tay estuary, St Andrew's Bay and the Eden estuary. The largest wintering flock of eider in the UK occurs at the mouth of the Tay estuary, although coverage of this site is problematic, resulting in incomplete counts in recent years (Pollit *et al* 2003). Counts in 1995 and 1996 gave estimates of more than 12,000 birds in the area. Numbers are above the internationally important threshold of 750 birds.

Red-throated diver, slavonian grebe, scaup, long-tailed duck, both species of scoter and red-breasted merganser also occur in nationally important numbers in the area.

Regular WeBS counts are carried out monthly at several sites. There is a need for regular monitoring of numbers of wintering eider in the Tay estuary.

The Firth of Tay & Eden estuary area has been selected as a non-breeding multi-species SPA for eider, long-tailed duck, common scoter, velvet scoter, goldeneye and red-breasted merganser (Stroud *et al* 2001).

Firth of Forth

Like the Moray Firth, the Firth of Forth holds significant numbers of twelve species of diver, grebes and seaduck. Slavonian grebe and eider occur in internationally important numbers, while counts of red-throated and black-throated divers, great crested and red-necked grebes, scaup, long-tailed duck, common and velvet scoter, goldeneye and red-breasted merganser are of national importance.

Regular WeBS counts are carried out monthly at several sites around the Firth of Forth.

The Firth of Forth has been selected as a non-breeding multi-species SPA for red-throated diver, great crested grebe, slavonian grebe, scaup, eider, long-tailed duck, common scoter, velvet scoter, goldeneye and red-breasted merganser (Stroud *et al* 2001).

Lothian/Border coast

Recent surveys of eider along the Lothian/Border coastline reported total numbers exceeding the UK international importance threshold although no information was available about individual sites (SBR 2000). Goldeneye regularly occur in nationally important numbers at the Tweed estuary in winter.

Regular monthly WeBS counts are carried out at a few sites along the Lothian/Border coastline.

4. Discussion

It is well known that the east coast of Scotland, Orkney and Shetland are extremely important for divers, grebes and seaduck (e.g. Benn 1986, Thom 1986, Kirby *et al* 1993). All species occur in nationally important numbers in the SEA 5 area and three species occur in internationally important numbers. However for the three diver species, long-tailed duck, common scoter and red-breasted merganser the national population estimates are based on out-of-date or incomplete data (e.g. Kershaw & Cranswick 2003). This impacts on the conservation status of these species because sites are considered nationally important if they regularly support 1% or more of the national population.

Similarly, for several species of divers and grebes, accurate counts of the biogeographic populations are not available and instead a range of estimates are presented and the 1% international threshold set using the maximum value (Delaney & Scott 2002). This is the case for red-throated and black-throated divers, and red-necked and great-crested grebes. For example, a range of 25,000 to 100,000 is suggested for red-necked grebes and the 1% threshold set at 1,000 birds. For other species with better known populations, where a range of estimates is given, the mid-point has been used to determine the 1% value.

Best estimates for species within the SEA 5 area produced in the course of this review have highlighted that coverage in Orkney is largely out of date and incomplete. Elsewhere, monitoring and coverage of sites on a regular basis is generally better.

4.1 Survey Methods

Land-based counts

WeBS counts tend to underestimate numbers of divers, grebes and seaduck as counts are conducted on preset dates which frequently do not coincide with the good weather and calm sea conditions required to obtain accurate counts of these species (Evans 2000).

Conducting counts in less than ideal conditions affects count accuracy as distant flocks will be much harder to count in heavy rain and/or strong winds. Counts from other data sources such as bird reports reviewed here were frequently found to be higher than corresponding WeBS counts. For example, counts from WeBS data for sites on the Aberdeenshire coast were significantly lower than counts published in the North East Scotland Bird Report, especially for red-throated divers and common scoter.

There may also be problems covering large sites resulting in incomplete counts, incomplete geographical coverage and reduced coverage of non-estuarine habitat types e.g. rocky shores. In addition, some species were not always counted during certain WeBS counts e.g. eiders in the Tay Estuary.

At-sea surveys

Seabird surveys using the ESAS method are most suited to assessing offshore seabird distribution and tend to under-record inshore species such as divers, grebes and seaduck (Pollock *et al* 1997). However, dedicated inshore surveys, both aerial (Dean *et al* 2003) and ship-based (Cronin & Webb 1998), are suitable survey methods and are also useful in detecting birds too far out to sea for land-based counts. Combinations of these two techniques should be used depending on the species and area to be surveyed.

Some species such as grebes, scaup and goldeneye are best counted from land as they are found too close to shore for boat surveys and grebes may dive in response to aerial surveys (Cronin & Webb 1998, Dean *et al* 2003). Divers are best surveyed from land or boat as it is more difficult to identify birds to species level in aerial surveys (Dean *et al* 2003). Divers, grebes and long-tailed ducks may fly away from approaching ships, so binoculars should be used to scan ahead of the survey track to detect birds in advance of any disturbance (Cronin & Webb 1998, Webb & Durinck 1992). Generally, aerial surveys are suitable for counting seaduck species (Dean *et al* 2003).

4.2 Monitoring

Existing monitoring programmes

JNCC currently conduct annual winter aerial surveys of the Moray Firth, the Tay Estuary and the Firth of Forth as part of the Marine Natura 2000 project, identifying inshore areas as potential marine SPAs. This monitoring was first carried out in the winters of 2000/01 and 2001/02 and is likely to continue on an annual basis (JNCC *pers comm*).

Regular monthly land-based counts of Aberdeen Beach (from Donmouth to Collieston) commenced in February 2004, and will be carried out monthly with additional counts in April, May, July, August, and September. Surveys are funded by Scottish Natural Heritage (SNH) and will continue at least until March 2005 (A Webb *pers comm*).

Regular winter land-based counts of the Moray Firth are currently conducted by the RSPB, under a funding agreement with Talisman Energy Ltd (owners of the Beatrice Oilfield and Nigg Oil Terminal on the Cromarty Firth) as part of their environmental monitoring programme. Counts are made during November, December and January each winter and the current monitoring programme is planned to cover the winter of 2004/05 at least.

SOTEAG conducts regular winter counts of diving seabirds and seaduck and a regular census of eider moulting areas in Shetland. Eider are monitored for two consecutive years, followed by a gap of two years. The next surveys are scheduled for 2005 and 2006 (Heubeck 2003).

Monthly WeBS counts are conducted by volunteers at many sites in the SEA 5 area, although divers, grebes and seaduck can be under-recorded on these surveys.

Areas requiring regular monitoring

Benn (1985) highlighted that little or no systematic coverage had been carried out in Orkney since the late 1970's. Recent winter surveys in Scapa Flow and in the sounds around Wyre showed both areas are still of international importance for great northern diver, slavonian grebe and eider and national importance for red-throated and black-throated diver, red-necked grebe, long-tailed duck, velvet scoter, goldeneye and red-breasted merganser. However, little or no up-to-date information was available for other areas of Orkney. Scottish Natural Heritage have no plans to carry out repeat survey work in the winter of 2004/05, due to insufficient funds (G Churchill *pers comm*).

A combination of land-based, boat-based and aerial surveys would be required on a regular basis to adequately monitor populations of diver, grebe and seaduck in Orkney.

There is a need for regular monitoring of numbers of wintering eider in the Tay estuary. This would best be conducted by the local WeBS co-ordinator and volunteers.

5. Recommendations

Based on this review, it is recommended that:

- An all-island survey of divers, grebes and seaduck of Orkney should be conducted over the winter months, using a combination of land-based, boat-based and aerial surveys as appropriate. This would allow numbers of these species wintering in Orkney to be estimated accurately.
- Following the all-island survey of Orkney, regular monitoring of diver, grebe and seaduck numbers should be conducted at the key sites, using appropriate methodology.
- Land-based counts of wintering eider on the Tay Estuary should be carried out annually.
- Existing monitoring programmes should be continued.

6. Conclusions

Divers, grebes and seaduck are found in important numbers in the SEA 5 area, predominantly in inshore waters. They tend to form flocks in key areas, making them highly vulnerable to surface pollution caused by oil spills. Regular monitoring of these populations is necessary to ensure important sites are adequately protected and long-term trends are determined. This is especially important in the context of contingency plans in the event of oil spills and also in light of future windfarm developments which may have an impact on these species. There is an urgent need to obtain up-to date data using the most appropriated methodology in key areas which have been neglected e.g. Orkney. At an international level, there is a need for censuses to determine the biogeographic populations particularly of divers and grebes.

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APPENDIX A

Summary Of WeBS Effort

Diver, grebe and seaduck review for SEA 5

Area	WeBS site name	No. of years with counts	
		91/92 - 95/96	96/97 - 00/01
Shetland	Pool of Virkie	1	3
	Boddam Voe		2
	Loch of Strom		2
	Houb of Haggriester		2
	Houb of Urafirth		2
	Melby		2
	Hamna Voe (Papa Stour)		1
	West Voe (Papa Stour)		1
	Culla Voe (Papa Stour)		1
	The Houb (Whalsay)		2
	Burra Firth (Unst)		2
	Nor Wick & Skaw		2
	Harold's Wick		2
	Balta Sound		2
	Uyea Sound		2
	Easting/Sand Wick		1
	Lunda Wick		2
Loch of Vaa		2	
Burra Voe (Yell)		1	
Orkney	Widewall Bay	5	5
	Newark Bay	4	5
	Water Sound	4	5
Moray Firth	FRASERBURGH TO ROSEHEARTY	4	
	Moray Coast (consolidated)	5	5
	Lossie Estuary	3	5
	SPEY MOUTH	2	
	Hilton to Shandwick	5	5
	Tarbat Ness to Rockfield	5	5
	Inner Moray Firth	5	5
	Cromarty Firth	5	5
	Dornoch Firth	5	5
Loch Fleet Complex	5	5	
Aberdeenshire coast	Aberdeen Beach	4	2
	Don Estuary	5	5
	Ythan Estuary	5	4
	Nigg Bay to Cove Bay	1	5
	DEVERON EST	4	5
	Dee Estuary (Scotland)	5	5
	Don Mouth to Ythan Mouth	5	5
	BOEE R.DEE & GIRDLENESS		
	Ythan to Collieston	3	1
Angus coast	ARBROATH COASTLINE	3	4
	CARNOUSTIE TO WESTHAVEN	1	
	EAST HAVEN TO ELLIOT BURN	2	
	Montrose Basin	5	5
	CARNOUSTIE TO EASTHAVEN	2	

Diver, grebe and seaduck review for SEA 5

Area	WeBS site name	No. of years with counts	
		91/92 - 95/96	96/97 - 00/01
Firth of Tay/St Andrews Bay	Eden Estuary	5	5
	St Andrews Bay	4	5
	Tay Estuary	5	5
Firth of Forth	Forth Estuary	5	5
	Earlsferry Links to Chapel Ness	1	
	Chapel Ness to Ardross Farm	1	
	Ardross Farm to Pittenweem	1	
	Pittenweem to Anstruther Easter	1	
	Anstruther Bay	5	5
Lothian/Borders	Barns Ness		4
	Tynninghame Estuary	5	5

APPENDIX B

Species Counts 1991 - 2003

Diver, grebe and seaduck review for SEA 5

Red-throated Diver

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Don mouth to Ythan mouth	156 ¹	1,312 ¹	162 ²	640 ¹	200 ¹	554 ¹	350 ¹	105 ¹	182 ¹	128 ²	384 ²	120 ²	184	381
Moray Firth	248 ³	350 ³	411 ³	815 ¹	124 ¹	220 ¹	284 ³	179 ³	103 ³	119 ³	185 ³	126 ³	142	371
Lunan Bay	-	-	-	76 ¹	-	50 ¹	-	150 ¹	-	74 ⁴	147 ⁴	-	124	63
Firth of Forth	170 ¹	77 ¹	83 ⁵	124 ¹	98 ⁵	124 ⁵	75 ⁵	121 ⁵	75 ⁵	104 ⁵	-	-	100	110
St Andrew's Bay	-	54 ¹	112 ¹	56 ¹	122 ¹	43 ¹	80 ¹	93 ¹	39 ¹	133 ¹	45 ⁶	-	78	77
Scapa Flow	-	-	-	-	-	-	-	59 ³	-	82 ³	-	-	71	-
St Cyrus/ Kinnaber	-	-	-	-	-	-	50 ¹	-	50 ¹	-	-	81 ²	66	50
Peterhead	-	-	-	46 ²	103 ²	56 ²	-	112 ²	42 ²	59 ²	-	45 ²	65	68

Black-throated Diver

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Scapa Flow	-	-	-	-	-	-	-	57 ³	-	58 ³	-	-	58	-
Moray Firth	20 ³	13 ³	53 ³	35 ³	(6) ⁵	(6) ⁵	22 ³	20 ⁵	14 ³	17 ³	43 ³	18 ³	22	37
Firth of Forth	-	6 ⁵	9 ⁵	9 ⁵	19 ⁵	8 ¹	9 ¹	10 ⁵	10 ¹	5 ⁶	-	-	8	11

Diver, grebe and seaduck review for SEA 5

Great Northern Diver

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Scapa Flow	-	-	-	-	-	-	-	781 ³	-	438 ³	-	-	610	-
Deer/Shapinsay Sounds & Tankerness	-	-	-	-	-	393 ⁷	330 ⁷	251 ¹	375 ¹	225 ⁸	239 ⁸	-	284	-
Sounds around Wyre	-	-	-	-	-	-	-	-	-	130 ⁸	189 ⁸	-	160	-
Lerwick to Kirkabister	66 ⁹	45 ⁹	39 ⁹	-	-	75 ⁹	47 ⁹	-	63 ¹⁰	69 ¹⁰	87 ¹⁰	33 ⁹	63	54
Moray Firth	17 ³	40 ³	17 ³	14 ³	(3) ⁵	(8) ⁵	54 ³	19 ⁵	12 ⁵	38 ³	113 ³	60 ³	48	28
Whiteness Voe to Skelda Ness	55 ⁹	29 ⁹	30 ⁹	-	39 ¹⁰	53 ¹⁰	47 ¹⁰	44 ¹⁰	47 ¹⁰	30 ¹⁰	34 ¹⁰	-	40	38
Virkie to Garth's Ness	-	-	-	-	-	7 ¹⁰	11 ¹⁰	-	15 ¹⁰	19 ¹⁰	30 ¹⁰	17 ¹⁰	20	9
Rattray Head	11 ²	-	6 ²	11 ²	5 ²	3 ²	5 ²	13 ¹	14 ²	12 ²	25 ²	-	14	6

Great crested Grebe

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Firth of Forth	678 ⁵	923 ⁵	671 ⁵	627 ⁵	411 ⁵	597 ⁵	491 ⁵	319 ⁵	297 ⁵	290 ⁵	-	-	399	662
Lunan Bay	-	-	-	-	33 ¹	50 ¹	-	-	14 ¹	60 ¹	-	10 ⁴	28	42

Diver, grebe and seaduck review for SEA 5

Red-necked Grebe

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Firth of Forth	32 ⁵	22 ⁵	44 ⁵	89 ⁵	52 ¹¹	44 ⁵	64 ⁵	41 ⁵	67 ¹	29 ⁵	-	-	49	48
Scapa Flow	-	-	-	-	-	(9) ¹²	26 ¹	23 ³	-	10 ³	-	-	20	-
Moray Firth	1 ¹	1 ⁵	1 ⁵	3 ⁵	2 ⁵	4 ¹	3 ¹	4 ¹	1 ⁵	1 ⁵	4 ¹³	1 ¹³	2	3

Slavonian Grebe

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Scapa Flow	-	-	-	-	-	-	-	124 ³	-	141 ³	-	-	133	-
Moray Firth	57 ³	60 ³	53 ³	66 ³	(8) ⁵	(60) ¹	163 ³	98 ³	29 ⁵	86 ⁵	86 ³	69 ³	74	86
Firth of Forth	17 ⁵	32 ⁵	53 ⁵	78 ⁵	108 ¹¹	107 ⁵	75 ⁵	57 ⁵	67 ⁵	44 ⁵	-	-	70	58
Whiteness Voe to Skelda Ness	-	-	26 ⁹	47 ¹	5 ¹⁰	46 ¹	43 ¹⁰	33 ¹⁰	30 ¹⁰	43 ¹⁰	29 ¹⁰	55 ⁹	38	33
Eden Estuary	-	-	-	16 ¹	36 ¹	38 ¹	33 ¹	-	23 ¹	27 ¹	18 ⁶	-	25	30
Lerwick to Kirkabister	8 ⁹	14 ⁹	5 ⁹	-	-	5 ⁹	0 ¹⁰	-	15 ¹⁰	28 ¹⁰	20 ¹⁰	17 ⁹	20	8
Sullom Voe	4 ⁹	11 ⁹	5 ⁹	7 ⁹	0 ⁹	3 ⁹	3 ¹⁰	0 ¹⁰	0 ¹⁰	8 ¹⁰	8 ¹⁰	6 ⁹	4	4

Diver, grebe and seaduck review for SEA 5

Scaup

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Moray Firth	399 ⁵	374 ⁵	310 ⁵	448 ⁵	537 ⁵	389 ⁵	406 ⁵	409 ³	510 ⁵	605 ⁵	615 ³	1,218 ³	671	414
Firth of Forth	185 ⁵	188 ⁵	135 ⁵	77 ⁵	753 ¹¹	1,270 ¹	300 ¹	390 ¹	157 ⁵	240 ⁵	-	-	471	268
St Andrew's Bay	-	100 ⁵	0 ⁵	0 ⁵	156 ⁵	31 ⁵	500 ¹	0 ⁵	2 ¹	20 ⁶	15 ⁶	-	107	57
Eden Estuary	-	-	-	-	-	-	-	-	15 ¹	240 ⁶	9 ⁶	-	88	-
Inner Moray Firth	228 ⁵	41 ⁵	14 ³	90 ⁵	517 ⁵	332 ⁵	416 ³	392 ³	480 ⁵	313 ⁵	-	-	387	178
Cromarty Firth	211 ⁵	293 ⁵	381 ³	406 ⁵	279 ⁵	115 ⁵	45 ⁵	132 ⁵	480 ⁵	424 ⁵	-	-	239	314
Dornoch Firth	140 ⁵	98 ³	42 ³	85 ³	219 ⁵	122 ⁵	38 ⁵	11 ⁵	0 ⁵	56 ⁵	-	-	45	117

Diver, grebe and seaduck review for SEA 5

Eider (moulting sites)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Firth of Forth	6,672 ⁵	8,031 ⁵	9,698 ⁵	8,964 ⁵	7,533 ⁵	9,166 ⁵	6,937 ⁵	7,171 ⁵	6,283 ⁵	8,893 ⁵	-	-	7,690	8,180
Shetland		6,687 ¹⁰	6,527 ¹⁰			6,200 ¹⁰	6,300 ¹⁰				5,700 ¹⁰	5,900 ¹⁰	5,800	6,250
Ythan Estuary	2,586 ⁵	4,324 ²	3,648 ²	3,150 ⁵	3,700 ⁵	3,216 ⁵	3,366 ⁵	3,321 ¹	3,944 ⁵	3,585 ²	3,295 ²	-	3,502	3,608
Don mouth to Ythan mouth	4,000 ²	3,000 ²	3,500 ⁵	8,800 ²	3,500 ¹	1,215 ⁵	2,159 ⁵	1,400 ¹	634 ⁵	8,900 ¹	1,200 ²	3,500 ²	3,127	3,835
Montrose Basin	1,150 ⁵	1,100 ⁵	1,420 ⁵	1,200 ⁵	1,500 ⁵	2,100 ⁵	2,030 ⁵	3,365 ⁵	1,923 ⁵	2,500 ⁵	-	-	2,384	1,274

Eider (wintering sites)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Tay Estuary	(5,000) ⁵	(251) ⁵	-	(4,200) ⁵	12,250 ¹¹	12,225 ⁷	9,500 ⁷	6,030 ⁵	-	9,500 ⁶	8,000 ⁴	-	8,258	12,238
Firth of Forth	6,039 ⁵	9,408 ⁵	6,955 ⁵	6,250 ⁵	9,764 ⁵	7,055 ⁵	6,039 ⁵	4,891 ⁵	5,927 ⁵	5,295 ⁵	-	-	5,841	7,683
Montrose Basin	1,898 ⁵	1,316 ⁵	1,537 ⁵	2,120 ⁵	2,100 ⁵	2,077 ⁵	2,163 ⁵	2,180 ⁵	2,214 ⁵	2,730 ⁴	-	3,051 ⁴	2,544	1,999
Scapa Flow	-	-	-	-	-	-	-	2,308 ³	-	1,980 ³	-	-	2,144	-
Gullane to Berwick	-	-	-	2,200 ¹		1,152 ¹	1,100 ¹	1,962 ¹	3,322 ¹	-	-	-	1,884	2,200
Ythan Estuary	2,236 ⁵	1,066 ⁵	1,042 ⁵	1,230 ⁵	1,330 ⁵	1,013 ²	1,646 ⁵	1,244 ⁵	1,812 ²	1,238 ²	1,435 ²	-	1,475	1,136
Moray Firth	1,567 ⁵	1,253 ⁵	3,063 ⁵	900 ⁵	586 ⁵	957 ⁵	291 ⁵	1,695 ³	963 ⁵	1,524 ³	1,565 ³	1,037 ³	1,357	1159
Sounds around Wyre	-	-	-	-	-	-	-	-	-	-	1,349 ⁸	-	1,349	-

Diver, grebe and seaduck review for SEA 5

Long-tailed duck

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Moray Firth	9,300 ³	11,246 ³	10,115 ³	3,742 ³	2,000 ¹	(735) ⁵	2,006 ³	2,482 ³	1,389 ³	3,991 ⁵	3,388 ³	3,585 ³	2,967	4,466
Scapa Flow	-	-	-	-	-	-	-	1,582 ³	-	1,474 ³	-	-	1,528	-
Sounds around Wyre	-	-	-	-	-	-	-	-	-	-	984 ⁸	-	984	-
Firth of Forth	640 ⁵	491 ⁵	942 ⁵	1,057 ⁵	1,796 ⁵	1,292 ¹	660 ⁵	1,000 ¹	783 ⁵	319 ⁵	-	-	811	985
Wide Firth/Bay of Firth	-	-	-	-	750 ¹	700 ¹²	-	-	-	600 ⁸	-	-	650	750
Eden Estuary	-	-	-	-	-	106 ¹	192 ¹	238 ¹	476 ¹	920 ⁶	480 ⁶	-	461	-
Eynhallow Sound	-	370 ¹²	-	350 ¹	-	185 ¹²	355 ¹	-	329 ¹	205 ⁸	-	-	269	360
Hascosay, Colgrave & Bluemull Sounds	790 ⁹	828 ⁹	483 ¹⁰	147 ¹⁰	-	421 ¹⁰	383 ¹⁰	305 ¹⁰	-	169 ¹⁰	201 ¹⁰	-	265	470
South Yell Sound	209 ⁹	198 ⁹	241 ⁹	208 ⁹	304 ⁹	157 ¹⁰	270 ¹⁰	191 ¹⁰	339 ⁹	222 ¹⁰	136 ¹⁰	108 ⁹	199	236
Lerwick to Kirkabister	358 ⁹	208 ⁹	260 ⁹	125 ⁹	-	179 ⁹	131 ⁹	-	303 ¹⁰	171 ⁹	298 ⁹	127 ⁹	225	174
Carnoustie	-	-	-	100 ¹	120 ¹	-	350 ¹	-	-	-	100 ⁴	-	225	110

Diver, grebe and seaduck review for SEA 5

Common Scoter (summer)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Don mouth to Ythan mouth	4,000 ²	1,500 ²	810 ²	4,750 ²	3,513 ¹	1,700 ¹	1,200 ¹	1,500 ¹	2,690 ¹	3,600 ¹	3,500 ²	4,300 ²	3,118	2,395
Firth of Forth	3,400 ⁵	1,141 ⁵	540 ⁵	1,724 ⁵	1,686 ⁵	2,320 ⁵	880 ⁵	1,009 ⁵	2,717 ⁵	346 ⁵	-	-	1,454	1,698
St Andrew's Bay/ Eden Estuary	-	1,500 ⁵	300 ⁵	200 ⁵	529 ⁵	1,040 ⁵	506 ⁵	850 ¹	1,100 ¹	2,500 ¹	900 ⁶	-	1,171	714
St Cyrus/ Kinnaber	-	-	-	40 ²	-	-	-	-	-	372 ¹	600 ⁴	500 ²	491	-
Lunan Bay	-	-	-	-	1,000 ¹	-	220 ¹	-	250 ¹	500 ¹	400 ⁴	507 ⁴	414	610

Common Scoter (winter)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Moray Firth	9,933 ³	2,197 ³	2,988 ³	2,764 ³	(644) ⁵	(609) ⁵	2,061 ³	3,543 ³	2,661 ³	3,848 ⁵	3,381 ³	8,333 ³	4,353	2,604
Firth of Forth	1,330 ⁵	1,773 ⁵	1,128 ⁵	7,304 ⁵	2,023 ¹¹	2,160 ⁵	1,205 ⁵	1,663 ⁵	3,764 ⁵	783 ⁵	-	-	1,915	2,712
St Andrew's Bay/ Eden Estuary	-	-	4,420 ¹⁴	1,410 ⁵	2,000 ¹	4,159 ¹	2,771 ⁵	1,105 ⁵	620 ¹	2,500 ⁶	790 ⁶	-	1,557	2,997
Lunan Bay	-	-	-	-	-	-	-	-	300 ¹	1,000 ¹	76 ⁴	-	459	-
Carnoustie	-	-	-	2,100 ¹	-	-	-	-	500 ¹	500 ¹	-	1,000 ⁴	667	2,100
Don mouth to Ythan mouth	100 ²	1,500 ²	6 ⁵	108 ⁵	10 ⁵	61 ²	130 ⁵	155 ²	112 ²	-	140 ²	-	107	337

Diver, grebe and seaduck review for SEA 5

Velvet Scoter (summer)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Lunan Bay	-	-	-	-	650 ¹	-	-	238 ¹	150 ¹	1,500 ¹	600 ⁴	400 ⁴	578	650
Don mouth to Ythan mouth	250 ²	60 ²	200 ²	910 ²	-	50 ²	138	200 ¹	220 ¹	510 ¹	400 ²	660 ²	398	325
St Cyrus/ Kinnaber	-	-	-	67 ²	-	500 ¹	-	300 ¹	-	40 ¹	-	343 ⁴	228	284

Velvet Scoter (winter)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Moray Firth	487 ³	1,039 ³	1,063 ³	540 ³	(189) ³	(81) ⁵	804 ³	1,508 ³	401 ³	744 ³	1,083 ³	2,574 ³	1,262	802
St Andrew's Bay/ Eden Estuary	-	2,200 ¹⁵	1,568 ¹⁵	280 ⁵	1,000 ⁵	942 ¹	2,000 ¹	840 ¹	845 ¹	1,870 ¹	500 ⁶	-	1,211	1,198
Firth of Forth	300 ⁵	290 ⁵	510 ⁵	485 ⁵	1,051 ¹¹	868 ⁵	528 ⁵	477 ¹	751 ⁵	542 ⁵	-	-	633	527

Diver, grebe and seaduck review for SEA 5

Velvet Scoter (Orkney)

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Wide Firth	-	-	-	-	-	-	-	-	-	63 ⁸	54 ⁸	-	59	-
Rerwick Head	-	-	-	-	-	-	13 ¹²	-	-	55 ⁸	41 ⁸	-	48	-
Inganess Bay	-	-	-	-	-	55 ⁵	39 ⁵	28 ⁵	60 ⁵	38 ⁵	-	55 ⁸	45	47
Sounds around Wyre	-	-	-	-	-	-	-	-	-	-	37 ⁸	-	37	-

Goldeneye

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Firth of Forth (total)	2,451 ⁵	2,167 ⁵	2,771 ⁵	2,369 ⁵	2,125 ¹¹	3,200 ¹	4,864 ⁵	2,445 ⁵	1,653 ⁵	2,414 ⁵	-	-	2,915	2,377
Leven/Largo	-	-	-	1,350 ¹	2,100 ¹	3,200 ¹	4,425 ¹	2,000 ¹	1,300 ¹	-	135 ⁶	-	1,965	2,217
Moray Firth (total)	1,017 ⁵	1,281 ⁵	743 ⁵	826 ⁵	854 ⁵	1,307 ⁵	1,251 ⁵	883 ³	1,190 ⁵	1,554 ⁵	1,765 ³	898 ³	1,258	996
Inner Moray Firth	743 ³	820 ³	552 ³	757 ³	579 ³	921 ⁵	895 ³	964 ¹⁶	894 ³	1,141 ³	-	-	963	690
Tweed Estuary	590 ⁵	329 ⁵	540 ⁵	498 ⁵	617 ⁵	804 ⁵	570 ⁵	585 ⁵	302 ⁵	151 ⁵	-	-	482	515
Scapa Flow	-	-	-	-	-	-	-	282 ³	-	254 ³	-	-	268	-
Tay Estuary	667 ⁵	274 ⁵	121 ⁵	157 ⁵	208 ⁵	-	155 ⁵	52 ⁵	122 ⁵	186 ⁵	-	-	103	287

Diver, grebe and seaduck review for SEA 5

Red-breasted Merganser

Site	91-92	92-93	93-94	94-95	95-96	96-97	97-98	98-99	99-00	00-01	01-02	02-03	Recent 5yr Mean	Previous 5yr Mean
Firth of Forth	459 ⁵	726 ⁵	348 ⁵	1,053 ⁵	665 ⁵	715 ⁵	675 ⁵	622 ⁵	601 ⁵	459 ⁵	-	-	614	650
Scapa Flow	-	-	-	-	-	-	-	628 ³	-	488 ³	-	-	558	-
Moray Firth	510 ⁵	734 ⁵	3,007 ⁵	1,716 ⁵	378 ⁵	967 ⁵	633 ⁵	611 ³	302 ⁵	295 ⁵	374 ³	222 ³	361	1340
St Cyrus/ Kinnaber	-	-	-	-	-	-	-	352 ¹	75 ¹	303 ¹	-	297 ²	342	-
Eden Estuary	20 ⁵	96 ⁵	64 ⁵	147 ⁵	79 ⁵	68 ⁵	121 ¹	180 ¹	148 ¹	196 ¹	293 ⁶	-	188	91
Montrose Basin	29 ⁵	36 ⁵	45 ⁵	79 ⁵	220 ⁵	168 ¹	204 ⁵	113 ⁵	100 ⁵	120 ⁵	124 ⁴	152 ⁴	122	143
Sullom Voe	-	100 ⁹	64 ⁹	-	-	-	133 ¹⁰	110 ¹	53 ¹⁰	103 ¹	114 ¹⁰	-	103	82

Data Sources

1	Scottish Bird Report	9	Shetland Biological Records Centre
2	North East Scotland Bird Report	10	Shetland Oil Terminal Environmental Advisory Group (SOTEAG)
3	Royal Society for the Protection of Birds (RSPB)	11	Wildfowl & Wetlands Trust (WWT)
4	Angus Bird Report	12	Orkney Biological Records Centre
5	WeBS data	13	Moray & Nairn Bird Report
6	Fife Bird Report	14	WeBS Report 1995/96
7	WeBS Report 2000/01	15	WeBS Report 1993/94
8	Orkney Bird Report	16	WeBS Report 1995/96