The 1997/98 Non-Estuarine Coastal Waterbird Survey in Sweden

L. Nilsson

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Regular counts of ducks, swans, Common Coot *Fulica atra* and some other waterbird species (see Appendix) have been undertaken in Sweden since the start of the International Waterbird Census (IWC) in 1967, with more or less complete annual coverage for these species along the southernmost coast and sample counts for index calculation in other coastal and inland districts. In addition to the wildfowl counted every year, waders were also included in the counts in 1997/98 and coverage extended in some further regions as a part of the European Non-Estuarine Coastal Waterbird Survey (Europe-NEWS) project. A number of wader species were found in small numbers (see Table 1) and it can be concluded that, with the exception of Purple Sandpiper *Calidris maritima*, the Swedish coast is of negligible importance for waders. The winter population of Purple Sandpiper in Sweden, was estimated to be 1,000–5,000, compared to a previous population estimate of 2,000 (Hake *et al.* 1997).

Length of non-estuarine coast[a]	Coverage[b]	Representative of	Winter	Population estimate	Reliability
–	65.2%	South Sweden	1997/98	Expert extrapolation	Average

[a] It was not possible to calculate the total length of the non-estuarine coast of south Sweden due to numerous archipelagos.
[b] This is the coverage for regions of open coast within south Sweden.

Introduction

The entire Swedish coast can in principle be regarded as a non-estuarine coast. Tidal influence on the Swedish west coast is small and the tidal range is insignificant in relation to other changes in water level, e.g. in relation to changes in atmospheric pressure. In the Baltic tidal influences are non-existent, though water level fluctuations can be relatively marked due to weather changes. Estuarine conditions are found in river mouths on the west coast, particularly on the large river system of the Göta Älv-Nordre Älv at Gothenburg, though even this cannot be considered a typical estuary.

The Swedish coastline is characterised by both open coasts and archipelago areas. The northern parts of the Baltic coast (north of region O in Figure 1) are ice-covered in normal years at least in inshore areas. As they are of no importance for wintering waterbirds they are not considered here (or included in Swedish 'waterfowl' counts). As most parts of the coast have extensive archipelagos with a highly inundated coastline and numerous islands and skerries extending up to 50–70 km from the mainland it is impossible to give a measure for the total length of the coast (though figures are given in the tables for regions of open coasts).

The northernmost part of the Swedish west coast bordering the Skagerrak (region V in Figure 1) is an archipelago area with some fjords. The islands and skerries are mostly quite barren and the water areas are typically marine even if the salinity is somewhat lower than in the open North Sea due to the influence from the northward Baltic current.

The mid-part of the Swedish west coast (regions A and B in Figure 1), bordering the Kattegat, is an open coast with sandy beaches, moraine coasts and shore meadows. There are some rocky headlands between the bays and some small islands especially in region A. The water has a lower salinity than in region V but is still considered marine. There are vast areas with shallow water for feeding diving birds and there are extensive shores suitable for staging waders.

The southern part of the Swedish west coast (i.e. the Öresund between Sweden and Sjælland in Denmark – region C in Figure 1) has a mixture of shore-meadows, moraine coasts and some sandy beaches. Especially in the southern part there are extensive areas of shallow water with rich vegetation for feeding waterbirds. Some high quality saltmarshes remain together with good areas for staging waders. The salinity shows a marked gradient from the brackish Baltic water to the more marine water in the Kattegat.

The western part of the Swedish south coast (region D in Figure 1) is characterised by an open coast with large sandy beaches separated by moraine coast. The eastern part of the south coast (region E) is an archipelago area though is more open in character than the archipelagos further north on the east coast.

The main part of the east coast is an archipelago area (regions G, H, M and N), though the southern part (F) is transitory with moraine shores. The islands of Öland (K) and Gotland (L) differ from the mainland by their calciferous bedrock. They are characterised by open coasts, with calciferous rocks on their western shores and large areas of shore meadows and sandy beaches to the east.

The total length (including bays and headlands) of the open coast in the whole of south Sweden is 1,930 km. Lengths of open coast regions (B, C, D, K and L) are given in the tables.

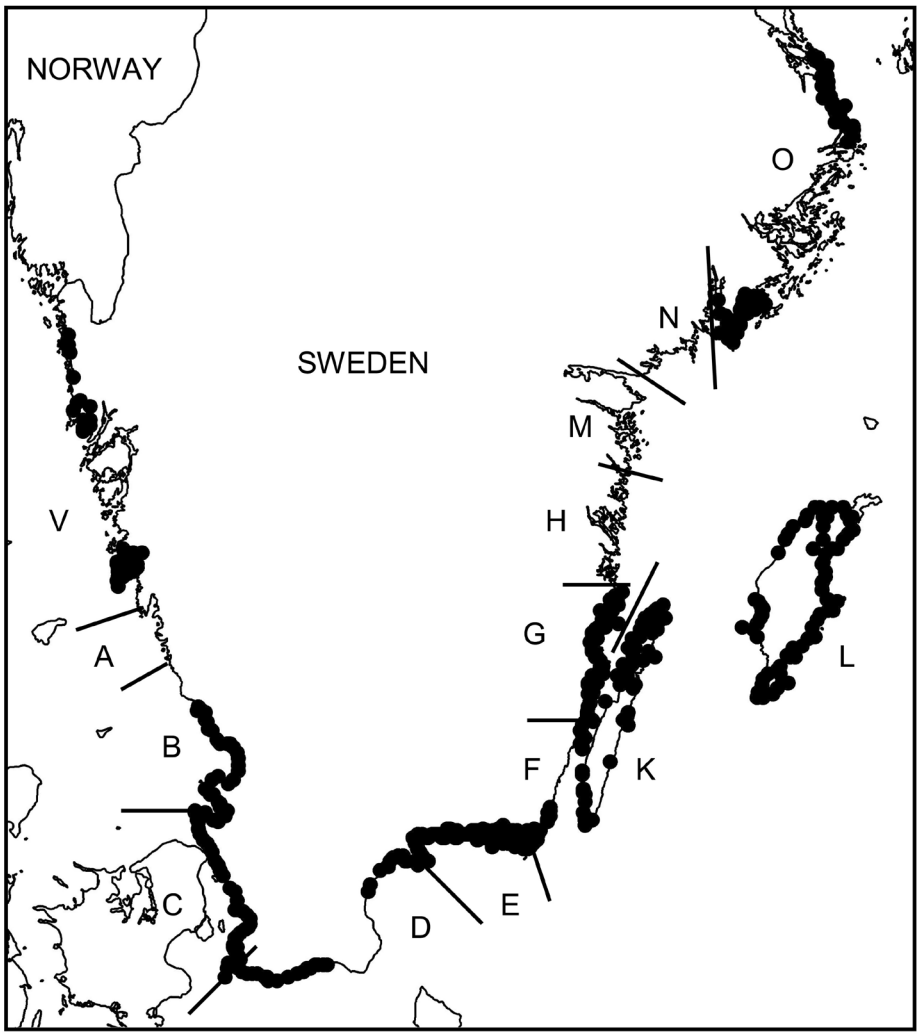

Figure 1. Map of south Sweden, showing the coverage of the non-estuarine coastal waterbird survey (NEWS) and the division of the country into regions used in the International Waterfowl Counts (IWC).

The coastal areas considered here (Figure 1) are of great importance for staging and wintering waterbirds of a number of species. The distribution and numbers of waterbirds in the area are very well known from the results of the International Waterbird Census (IWC), which have been undertaken in Sweden since January 1967. Countrywide surveys covering all inshore areas of importance were undertaken during the early seventies, between 1987 and 1989 and in 1992; counts on selected sites are undertaken annually to produce indices. During the 1960s and 1970s supplementary surveys were undertaken in September, November and March across the country with monthly counts on a number of sites. The information from these surveys have been summarised in Nilsson (1975, 1976, 1977, 1980a, 1980b, 1984, 1991), whereas information from the annual index counts is found in these publications with updates in the Swedish Publication *Fågelåret* (see also: *www.darwin.biol.lu.se/zooekologi/waterfowl/index.htm*). Swedish offshore-waters in the Baltic are also very important for a number of sea-duck species, which are only partly covered by the counts referred to above (see, however, Durinck *et al.* 1994).

Methods

The Non-Estuarine Coastal Waterbird Survey in Sweden (Sweden-NEWS) was undertaken at the same time as the annual January count of the IWC. Further coverage was obtained by recruiting counters from other parts of the Swedish coast that had taken part in the earlier countrywide surveys. In addition new counters were recruited via observers in the network and through local bird clubs.

All counts were made in January, most of them close to the international count dates of the IWC. 1997/98 was a mild winter in Sweden with only limited ice-coverage in January in the southern parts of the Baltic; only the innermost bays in the archipelagos on the east coast had ice and there was no ice on the south and west coasts. The lakes in the southernmost part of the country were free of ice, whereas lakes further north were frozen. The counts were performed in good weather conditions.

The survey was conducted as a part of the IWC. In the archipelagos, counts were mostly undertaken from separate observation points using telescopes. The same applied to the majority of open coast, as these areas didn't hold suitable wader habitats. Most areas with potential wader habitat were counted on foot. Some counts were made from boats in the west coast archipelagos.

The coast of south Sweden has long been subdivided into counting units for the IWC and the countrywide surveys. These units were used also for Sweden-NEWS but sectors which were too large for the NEWS methodology were subdivided further.

Table 1. Total numbers of waders counted in different regions (see Figure 1) of the south Swedish coast in January 1998 and the overall total for the southernmost part of the country (regions B–E).

	V	B	C	D	E	F	G	K	L	O	B–E Total
Total coast length (km)		228	170	248				384	607		
Surveyed (km)		166	134	146				185	436		
Eurasian Oystercatcher *Haematopus ostralegus*	0	5	45	0	0	0	0	0	0	0	50
Eurasian Golden Plover *Pluvialis apricaria*	0	0	0	0	0	0	0	0	16	0	0
Grey Plover *Pluvialis squatarola*	0	0	0	0	1	0	0	0	0	0	1
Northern Lapwing *Vanellus vanellus*	0	2	0	0	0	0	0	0	0	0	2
Red Knot *Calidris canutus*	0	0	25	0	0	0	0	0	0	0	25
Purple Sandpiper *Calidris maritima*	148	5	0	0	0	0	0	0	0	0	5
Dunlin *Calidris alpina*	0	0	266	0	0	0	0	6	0	0	266
Eurasian Curlew *Numenius arquata*	0	1	49	0	0	0	0	0	0	0	50
Common Redshank *Tringa totanus*	0	4	1	0	0	0	0	0	0	0	5
Total	**148**	**17**	**386**	**0**	**1**	**0**	**0**	**6**	**16**	**0**	**404**

In regions B to E counts of more or less the entire shoreline were undertaken in the areas marked on the map, though no counts were made in one small part of sector D where only small numbers of waterbirds are found. The coverage in these sectors has been the same since 1971, with the exception that waders were added to the counts this time. The totals given in the tables for this part of Sweden can be considered representative for the populations of nearly all inshore species using the area, as the uncovered parts of D are mostly taken up by extensive sandy beaches with very small number of waterbirds. The only inshore species occurring in any numbers away from these beaches is Common Goldeneye *Bucephala clangula* but experience from the countrywide surveys shows that the numbers here are less than 500, i.e. within the counting error of the total estimate for the species and thus no corrections have been undertaken.

Coverage of both Öland (K) and Gotland (L) was incomplete. For the latter, the numbers for wildfowl reported by Nilsson (1975, 1991) provide better estimates of the island's waterbird populations. In the archipelagos (regions F, G, O and V) only sites within the IWC index scheme were counted. The results from these sites are shown here to give comparative data on the occurrence of different species.

Results

The total area of open coast in regions B, C, D, K and L is 1,637 km, of which 1,067 km were actually covered by the Sweden-NEWS counts (see Table 1 for regional values). Moreover all areas of importance for waterbirds in the archipelago region E were counted. As stated above the counts for region B to E are considered as representative for the region.

The totals of the different species of wader counted in the regions surveyed are summarised in Table 1 together with totals for the southernmost part of the country (regions B to E in Figure 1) which were considered adequately covered for all inshore species. Distribution maps for all species together (including the four species of seabird counted) and for all waders are shown in Figures 2 and 3 respectively.

In the southernmost part of Sweden, 108,911 waterbirds (divers, grebes, cormorants, herons, wildfowl, rails and waders) were counted in January 1998. The dominant species were wildfowl. The results for these and species other than waders are reported in the Appendix.

Waders are normally uncommon in Swedish coastal areas in winter. In all, 404 waders of eight species were found in the southernmost part of Sweden during the Sweden-NEWS counts. The majority of these waders were found on two sites in the Öresund region, the Falsterbo peninsula and Lundåkrabukten, well-known staging areas for waders in winter and spring.

The only waders seen in the two island regions were five Dunlin *Calidris alpina* at Ottenby on Öland and 16 Eurasian Golden Plover *Pluvialis apricaria* on Gotland.

No waders were found in the east coast archipelagos, though 148 Purple Sandpipers *Calidris maritima* were found on the few suitable west coast skerries included in the counts. Coverage was too small and unrepresentative to permit an estimate of the total population but it is certainly much above 1,000 and it could well be that several thousand winter on the Swedish west coast (see discussion).

Discussion

Systematic counts of wintering waders have not been performed on a national scale before. It is clear, however, that Sweden's coast is of little importance for wintering waders with the exception of Purple Sandpiper. Some very rough population estimates for other species can be made based on general bird reports (gathered in the annual publication *Fågelåret*, published by the Swedish Ornithological Society).

The following species winter in the country during mild winters, single individuals also in some colder winters (estimated totals in brackets): Eurasian Oystercatcher *Haematopus*

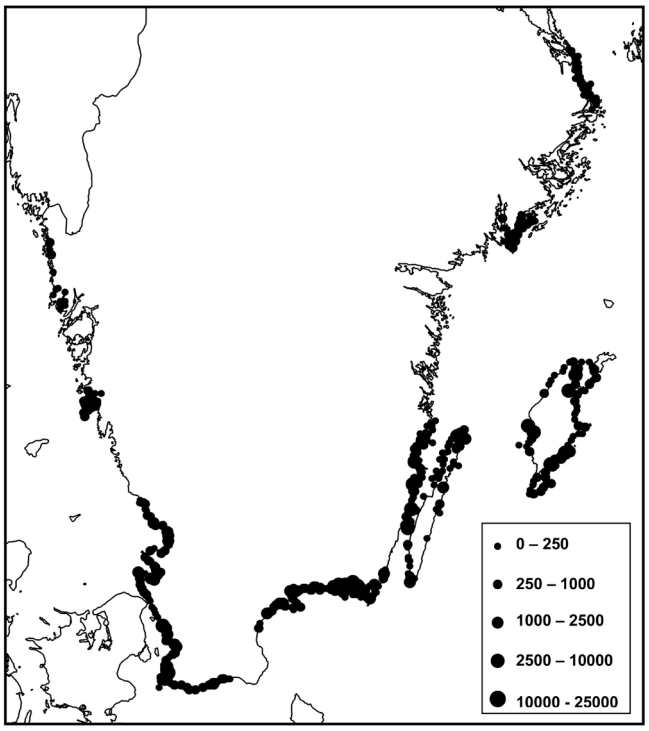

Figure 2. Distribution of all waterbirds counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998. (Note these figures include counts of four species of seabird.)

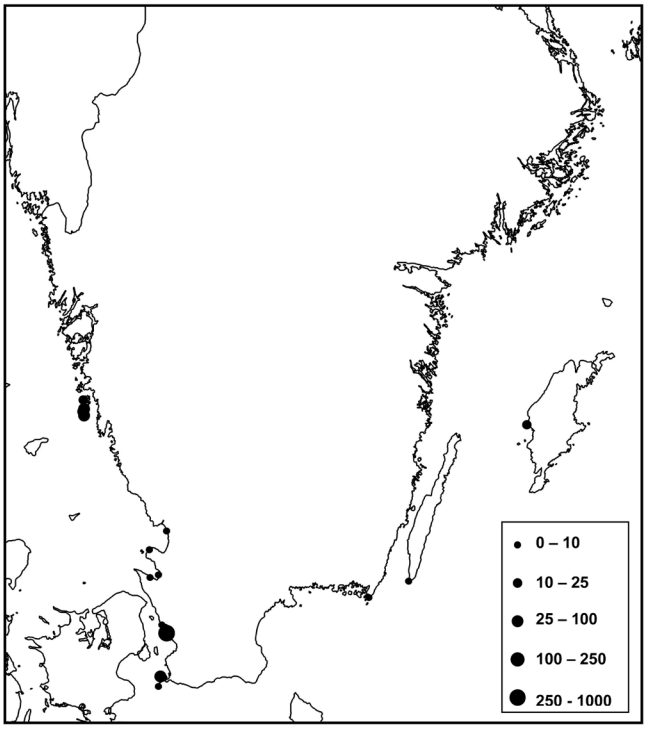

Figure 3. Distribution of waders counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998.

ostralegus (0–100), Eurasian Golden Plover (0–300), Grey Plover *Pluvialis squatarola* (0–5), Northern Lapwing *Vanellus vanellus* (0–300), Red Knot *Calidris canutus* (0–50), Sanderling *C. alba* (0–5), Dunlin (100–3,000), Jack Snipe *Lymnocryptes minimus* (10–50), Common Snipe *Gallinago gallinago* (10–200), Eurasian Curlew *Numenius arquata* (50–200), Common Redshank *Tringa totanus* (20–100), Ruddy Turnstone *Arenaria interpres* (0–5) and Grey Phalarope *Phalaropus fulicarius* (0–3). The estimates for Dunlin are particularly accurate as the species occurs on only a few sites in the south-west that are covered by surveys (Falsterbo bird observatory), though numbers vary due to the severity of winters.

Purple Sandpipers are well distributed on the west coast and can also be found on the east coast archipelagos. Relatively large flocks are found all along the west coast archipelagos on the outer skerries. Observations during aerial surveys of wintering waterbirds revealed relatively large flocks on many sites, though it was not possible to get accurate counts or estimates. A minimum estimate is well above one thousand and it would be realistic to give an estimate of 1,000–5,000. Hake *et al.* (1997) gave an estimate of 2,000 for the Swedish population, with 75% in the outer archipelago of the west coast.

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Leif Nilsson, Dept of Animal Ecology, University of Lund, Ecology Building, S-223 62, Lund, Sweden. email: *Leif.Nilsson@zooekol.lu.se*

APPENDIX

Totals of other waterbirds counted during the Non-Estuarine Coastal Waterbird Survey in Sweden (Sweden-NEWS) in January 1998

Results

The totals for other species of waterbirds, together with four species of seabird – Common Murre (Guillemot) *Uria algae*, Razorbill *Alca torda*, Black Guillemot *Cepphus grylle* and Dovekie (Little Auk) *Alle alle* – are summarised in Table 2 together with totals for the southernmost part of the country (regions B to E in Figure 1) which are considered adequately covered for all inshore species. Distribution maps for selected species are shown in Figures 4 to 7.

In the southernmost part of Sweden (Regions B to E, Figure 1), the most common species recorded were Tufted Duck *Aythya fuligula* with 38,555 individuals and Mallard *Anas platyrhynchos* with 23,137. Other common species along this coast were Common Coot *Fulica atra* (9,395 individuals), Common Goldeneye (9,345) and Mute Swan *Cygnus olor* (4,819). One common species that is hardly covered by these counts is Long-tailed Duck *Clangula hyemalis*, several tens of thousands wintering in the offshore waters of especially region D (and further east in the Baltic), but this species is hardly seen from the shore.

Mute Swan, Mallard, Tufted Duck, Common Goldeneye and Common Merganser (Goosander) *Mergus merganser* dominate the wildfowl populations of the islands of Öland and Gotland. A number of Long-tailed Duck were found on the islands but up to one million individuals are found in the offshore areas east of Gotland (Durinck *et al.* 1994).

In the east coast archipelagos, the dominant species was Tufted Duck. Good numbers of Mute Swan, Common Goldeneye and Common Merganser (Goosander) were also found. In the west coast archipelagos, in contrast, Common Eider *Somateria mollissima* dominated, but high counts of Mallard and Common Goldeneye were also reported, whereas there were relatively few Tufted Duck.

Discussion

The results obtained from Sweden-NEWS give a good representation of the distribution and numbers of waterbirds in the areas covered (for example, compared to the IWC results presented by Nilsson 1975, 1991 and unpublished). With the limited coverage north of the southernmost part of the country, however, it is not possible to make any countrywide population estimates. For most coastal wildfowl the Sweden-NEWS results do not indicate that the population estimates given in Nilsson (1991) need to be revised to any large extent. One exception is Eurasian Wigeon *Anas penelope*, which in recent years has started to winter in south-west Sweden in larger numbers than before and now has a winter population of up to nearly 5,000 individuals in some years. Some populations have shown high indices in recent mild winters, but a major revision of the estimates of the national wintering populations of different waterbird species will be undertaken when the results of the latest country-wide survey undertaken in January–February 2004 have been analysed. This survey is the first with full coverage of the Baltic archipelagos since the 1970s.

In the southernmost part of the country (regions B to E, Figure 1) the coverage has been the same since 1969. The overall waterbird population (excluding waders and seabirds) in this area has in most years fluctuated around 60,000 individuals for inshore species (Figure 8). Lower totals were noted in the coldest winters of 1979 and 1982, but not in the cold winters of 1985 and 1987. The reaction on cold winters is very dependent on the ice-situation and the availability of open water. The total numbers counted increased during the mild winters of the 1990s and more than 100,000 waterbirds were counted in January 1996, 1997 and 1998.

Some examples of the species trends for this area are shown in Figures 9 to 15. Great Cormorant *Phalacrocorax carbo* increased markedly during the latter part of the period as a result of a general increase in the breeding population. Mute Swan, in contrast, had a more fluctuating pattern with around 3,000 wintering in the region during the first years of the IWC, then low numbers around 1978 to 1982 and another increase to about 4,000 during the latter part of the period. The national population is estimated to be between 10,000 and 13,000.

As already mentioned, Eurasian Wigeon started to winter regularly in the southernmost part of Sweden from 1988. Mallard previously had a rather stable population of between 10,000 and 15,000 birds, but with the start of the mild winters after 1987 there was an increase to the present level of around 20,000 or more.

The two most common diving ducks did not show any trends in this part of the country. Tufted Duck fluctuated around a level in most years of between 20,000 and 30,000 birds with the lowest count being just over 10,000 in one of the winters with high ice cover and the highest count of 50,000 occurring in a mild winter. The national wintering population is estimated to be somewhat more than 100,000. There was no trend in the numbers of Common Goldeneye for this region either, although there is a general increasing trend in the national population indices. The population normally fluctuates between 6,000 and 8,000 in this part of the country with occasional peaks of up to 12,000. The national population estimate is between 30,000 and 40,000.

For Common Coot, both the national indices and the counts in the southernmost part of the country showed increases in the late 1970s, after which there was a population crash related to a very severe winter in 1979, then low numbers for several years before a more recent increase.

(Table 2 and Figures 4–15 . . .)

Table 2. Total numbers of other waterbirds and seabirds counted in different parts (see Figure 1) of the south Swedish coast in January 1998 and the overall total for the southernmost part of the country (regions B–E).

	V	B	C	D	E	F	G	K	L	O	B–E Total
Total coast length (km)		228	170	248				384	607		
Surveyed (km)		166	134	146				185	436		
Red-throated Loon (Diver) *Gavia stellata*	4	37	0	0	2	0	0	0	28	1	39
Arctic Loon (Black-throated Diver) *Gavia arctica*	1	2	0	2	4	0	0	1	27	0	8
Little Grebe *Tachybaptus ruficollis*	1	0	2	2	0	0	0	0	0	1	4
Great Crested Grebe *Podiceps cristatus*	0	7	47	104	103	3	0	1	123	0	261
Red-necked Grebe *Podiceps grisegena*	0	6	1	6	3	0	1	0	5	0	16
Horned (Slavonian) Grebe *Podiceps auritus*	0	7	0	0	0	0	0	0	1	0	7
Great Cormorant *Phalacrocorax carbo*	1,120	1,173	227	265	939	20	16	6	929	332	2,604
Grey Heron *Ardea cinerea*	126	38	47	21	38	13	16	2	200	4	144
Mute Swan *Cygnus olor*	715	286	2,653	755	1,125	740	849	1,018	4,217	419	4,819
Tundra (Bewick's) Swan *Cygnus columbianus*	0	0	0	0	0	0	0	0	7	0	0
Whooper Swan *Cygnus cygnus*	247	110	190	224	255	62	0	46	294	114	779
Common Shelduck *Tadorna tadorna*	1	52	136	37	2	2	0	25	30	0	227
Eurasian Wigeon *Anas penelope*	0	135	4,431	6	1	0	0	92	39	0	4,573
Gadwall *Anas strepera*	0	1	1	0	1	2	0	0	3	0	3
Common Teal *Anas crecca*	0	15	25	0	0	0	0	0	7	0	40
Mallard *Anas platyrhynchos*	1,493	6,882	8,712	3,905	3,638	3,595	1,411	2,201	8,015	1,019	23,137
Northern Pintail *Anas acuta*	0	2	18	0	1	0	0	0	0	0	21
Common Pochard *Aythya ferina*	16	2	37	195	577	16	12	410	243	0	811
Tufted Duck *Aythya fuligula*	246	415	3,280	1,780	33,080	5,546	8,853	7,305	12,300	4,595	38,555
Greater Scaup *Aythya marila*	0	0	113	1	10	26	3	115	3,186	1	124
Common Eider *Somateria mollissima*	3,730	5,369	387	91	38	351	27	73	197	81	5,885
Steller's Eider *Polysticta stelleri*	0	0	0	0	0	0	1	0	0	0	0
Long-tailed Duck *Clangula hyemalis*	9	28	170	1,030	143	72	82	4,293	2,298	4,248	1,371
Black (Common) Scoter *Melanitta nigra*	1	1,795	0	55	1	0	0	0	8	34	1,851
White-winged (Velvet) Scoter *Melanitta fusca*	0	1,237	2	28	0	0	1	16	39	0	1,267
Common Goldeneye *Bucephala clangula*	2,843	1,268	2,405	3,979	1,693	1,569	354	2,779	5,644	1,115	9,345
Smew *Mergellus albellus*	44	7	13	44	302		14	126	533	2	366
Red-breasted Merganser *Mergus serrator*	820	285	274	1,020	311	116	39	141	317	9	1,890
Common Merganser (Goosander) *Mergus merganser*	176	16	74	203	672	760	495	378	3,919	814	965
Common Coot *Fulica atra*	67	21	4,040	1,730	3,604	0	140	114	1,116	82	9,395
Common Murre (Guillemot) *Uria algae*	2	30	2	1	0	0	0	0	2	0	33
Razorbill *Alca torda*	2	12	0	0	0	0	0	0	0	0	12
Black Guillemot *Cepphus grylle*	0	0	0	7	1	0	0	0	5	2	8
Dovekie (Little Auk) *Alle alle*	0	73	0	0	0	1	0	0	0	0	73
Total	**11,664**	**19,311**	**27,287**	**15,491**	**46,544**	**12,894**	**12,314**	**19,142**	**43,732**	**12,873**	**108,633**

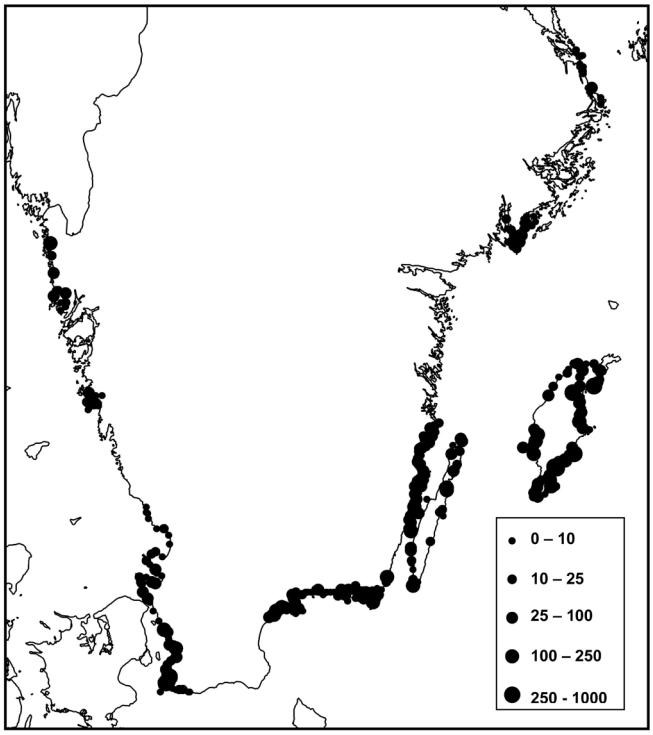

Figure 4. Distribution of Mute Swan *Cygnus olor* counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998.

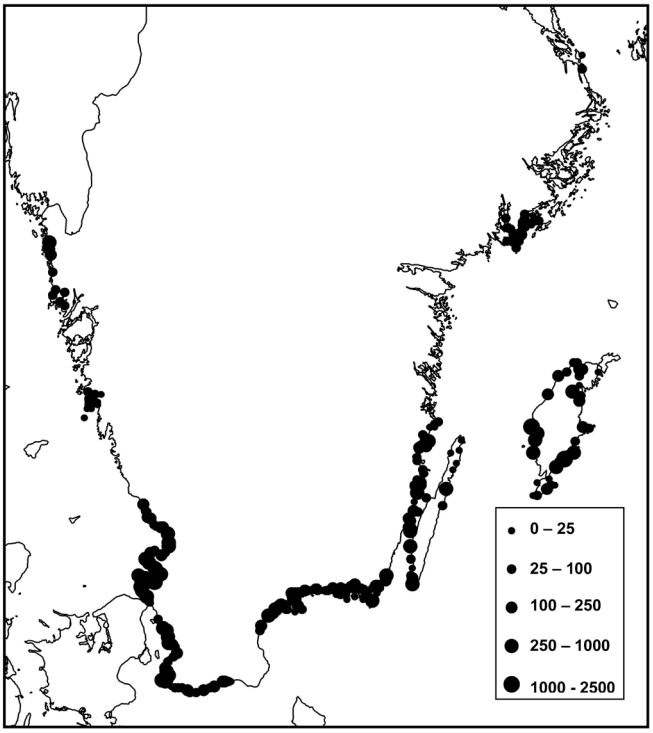

Figure 5. Distribution of Mallard *Anas platyrhynchos* counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998.

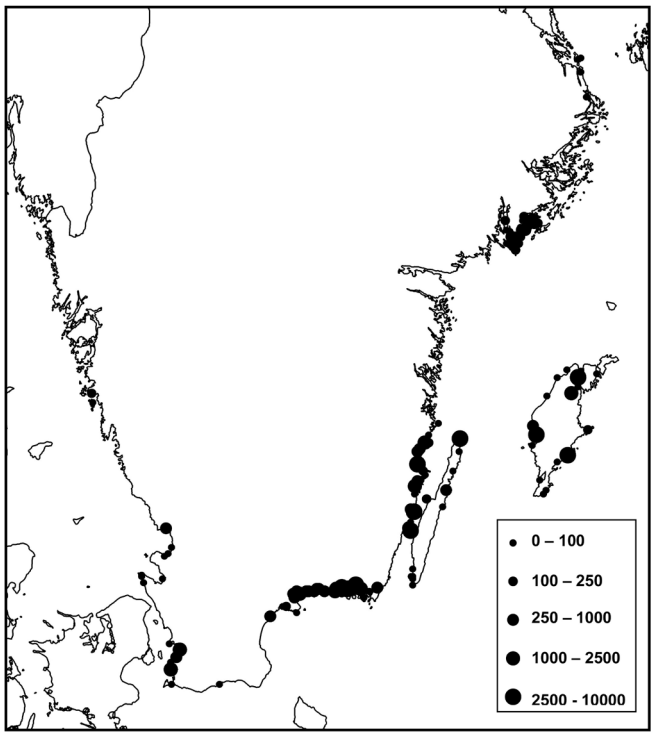

Figure 6. Distribution of Tufted Duck *Aythya fuligula* counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998.

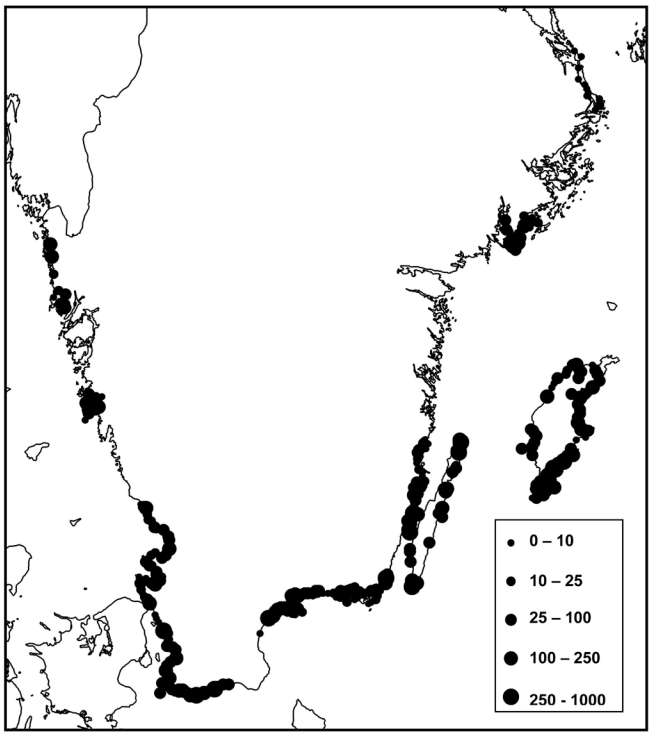

Figure 7. Distribution of Goldeneye *Bucephala clangula* counted during the non-estuarine coastal waterbird survey (NEWS) in south Sweden in January 1998.

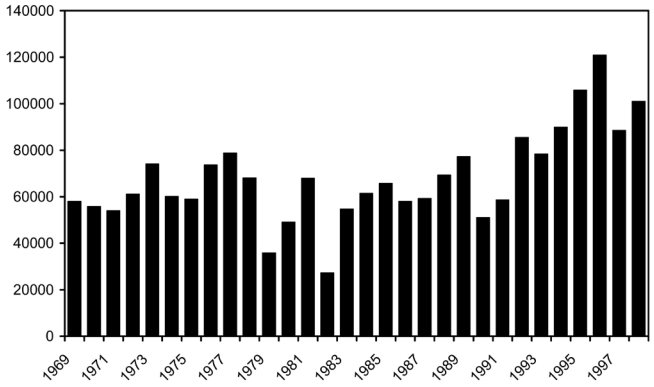

Figure 8. Total numbers of all waterbird species counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

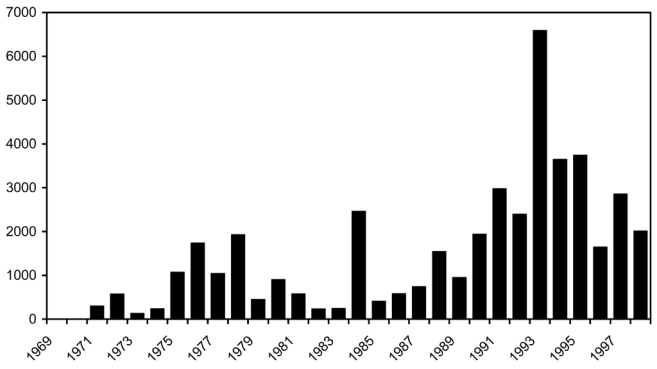

Figure 9. Numbers of Cormorant *Phalacrocorax carbo* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

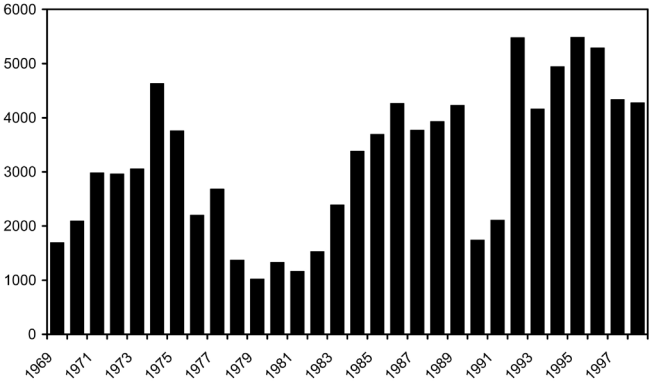

Figure 10. Numbers of Mute Swan *Cygnus olor* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

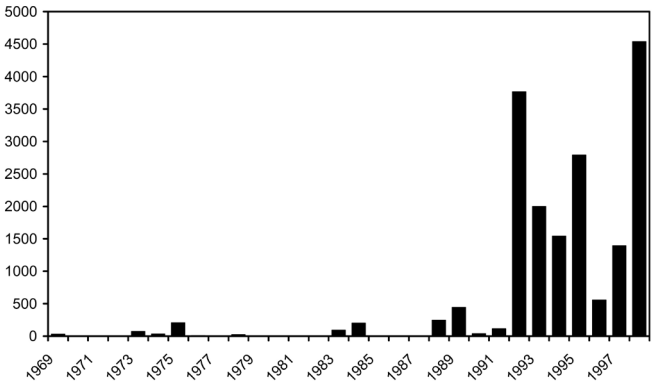

Figure 11. Numbers of Wigeon *Anas penelope* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

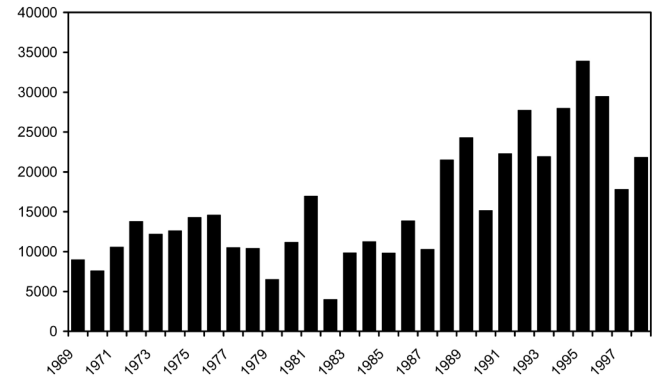

Figure 12. Numbers of Mallard *Anas platyrhynchos* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

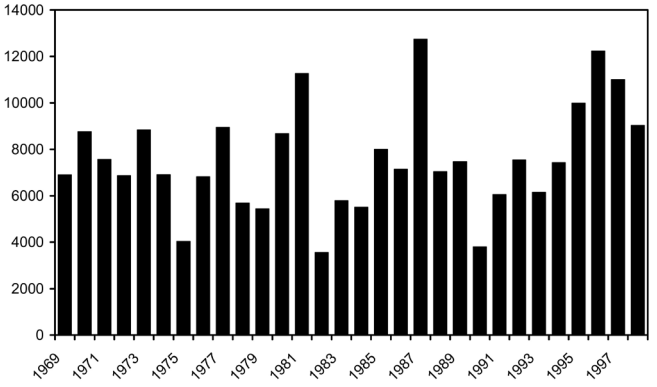

Figure 13. Numbers of Tufted Duck *Aythya fuligula* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

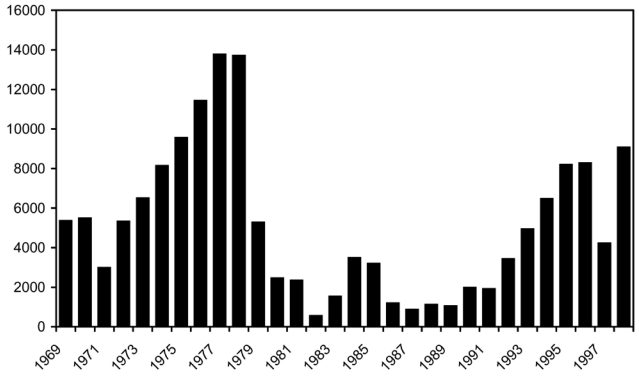

Figure 14. Numbers of Goldeneye *Bucephala clangula* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.

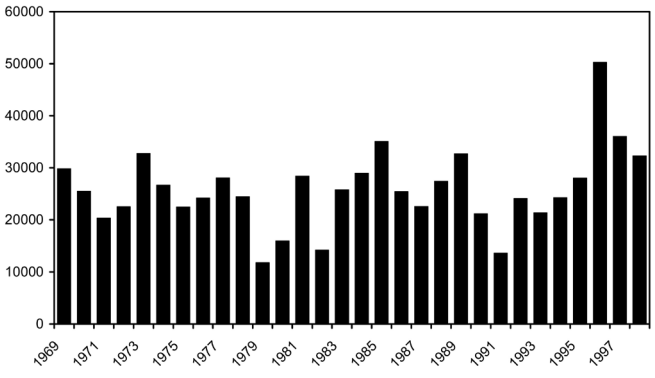

Figure 15. Numbers of Coot *Fulica atra* counted in inshore waters of the southernmost part of Sweden (regions B to E in Figure 1) between January 1969 and January 1998.