

RESEARCH PAPER

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Changes in numbers and distribution of wintering waterbirds around Gotland 1969–2020

Förändringar i antal och utbredning av övervintrande sjöfåglar runt Gotland 1969–2020

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See Berg & Abrahamsson (2021): Clas Hermansson in memoriam (<https://doi.org/10.34080/os.v31.23214>)

THE COASTAL AREAS of the island of Gotland in the center of the Baltic Sea is an important wintering site for waterbirds in Sweden. Gotland offers extensive areas of shallow feeding grounds and, due to its location, some open waters remain available even during harsh winters. Wintering waterbirds have been counted annually on the island since the start of the international waterbird counts in 1967, with full coverage of all the inshore areas around the main island obtained during the years 1969–1978 and 2013–2020. Between these two periods, the mean total number of wintering waterbirds increased from 32,000 to 111,500. The most numerous species were Mallard *Anas platyrhynchos*, Tufted Duck *Aythya fuligula*, and Common Goldeneye *Bucephala clangula*. Some species such as Eurasian Wigeon *Mareca penelope*, Eurasian Teal *Anas crecca*, and Gadwall *Mareca strepera* started to winter during the second period. Marked increases were also found for Smew *Mergellus albellus* and Greater Scaup *Aythya marila*, likely related to progressively milder winters in recent years.

Keywords: Baltic Sea | population increase | midwinter count | Anatidae | ducks | survey



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Introduction

The island of Gotland in the center of the Baltic Sea has since long been known as an important area for wintering waterbirds in Sweden (Högström 1965), with extensive areas of shallow coastal waters providing suitable feeding areas for various species of waterbirds, especially ducks. Moreover, the Baltic Sea buffers heat, thereby providing ice-free coastal areas even in cold winters, when otherwise large parts of the inshore parts of the Baltic Sea are covered by ice.

The International Midwinter Counts started in 1967 in order to survey waterbird populations in Europe, but it was from 1969 that the entire mainland coast of the island Gotland was covered in the counts (Högström 1980). The complete counts continued for 10 years, until 1978, and was followed by smaller, stratified sample of sites covered annually to be included in the national (and international) midwinter indices for waterbirds (Nilsson 1975, 2008, Nilsson & Haas 2016). Almost full coverage of the coast was also obtained in connection with planned countrywide surveys in 1987–1989 and from the first all-Baltic survey in 1992/1993 (Durinck *et al.* 1994) as well as in the second total survey of the

Baltic (SOWBAS) in 2007–2009 (Skov *et al.* 2011). In recent years (2013–2020) counts with full coverage of the inshore areas of the Gotland coast have been organized by one of the authors (CH).

In the present paper, we analyze the counts of wintering waterbirds along the shores of Gotland focusing on the two periods with complete counts (i.e. 1969–1978 and 2013–2020) to elucidate changes in the numbers and distributions of wintering waterbirds in the area.

Study area

Gotland is a large island with a total shore length of about 800 km excluding smaller islands (Figure 1). In the northern parts of the island's western coast the shore consists mainly of steep limestone cliffs, whereas most of the other coasts have a flat profile (Figure 2). In the north lies Fårö, an island separated from the main island by a narrow sound. To the west of mainland Gotland lies Stora Karlsö and Lilla Karlsö, two cliff islands renowned for their large colonies of Common Murres *Uria aalge* and Razorbills *Alca torda*. Apart from these

larger islands, the remaining islands are very small, found mainly along the southwestern and eastern coasts of Gotland.

The differences between steeper coasts in the northwestern part, and a shallow coastline on the eastern part of the island provides varying habitats suitable for different waterbird species. At the former, the narrow strip of shallow water offers good feeding opportunities for diving ducks with a rich epifauna of blue mussels *Mytilus edulis* and various crustaceans in the *Fucus* wrack region of the shore (Pettersson 2007). In the latter habitat, particularly along the east coast and in the southwest, the depth

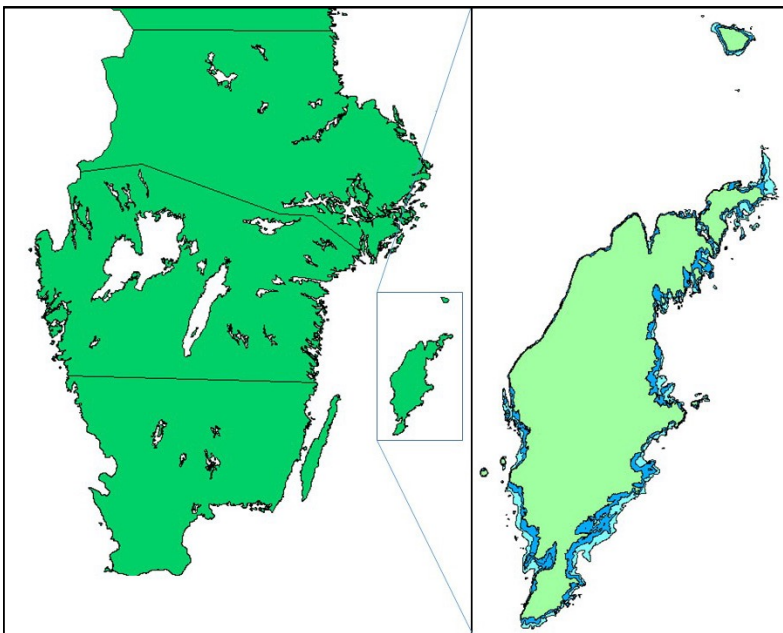


FIGURE 1. Map of south Sweden with the island of Gotland inset. Blue areas show water with a depth of less than 10 m.

— Karta över Sydsvrige med Gotland infällt. Blå områden har ett vattendjup om mindre än 10 m.

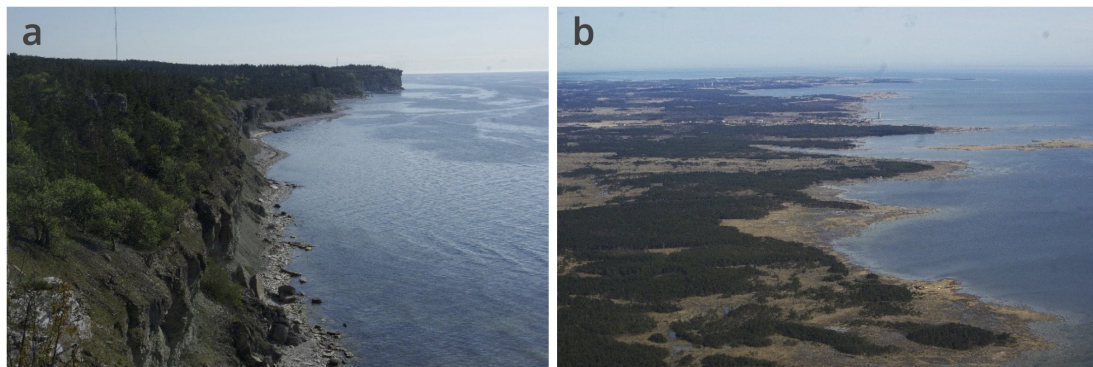


FIGURE 2. Example of the two main coast types on Gotland. **(a)** Limestone cliff coast in the northwest part of the island. **(b)** Lower coastal profile with vast areas of shallow water, mostly found on the east coast and in the southwest.
 — Exempel på två typer av kustlinje på Gotland. **(a)** Klippkust av kalksten på den nordvästra delen av ön. **(b)** Låg kustprofil med stora grundområden främst i öster och sydväst.

profile is very different with extensive areas of shallow water and the occurrence of sheltered bays (Figures 1–2). There are rich areas of eelgrass *Zostera marina* on shallow soft bottoms around Gotland, some of which also housing stonewort *Chara* spp. vegetation in bays (Pettersson 2007). Most shallow areas also have extensive areas of boulders and other kinds of hard substrate, with rich populations of blue mussels providing good feeding opportunities for diving ducks. The map in Figure 1 only shows areas where the water depth is less than 10 m, but on the east coast there are extensive areas with water depths of between 10 and 20 m, which also provide feeding opportunities for diving ducks.

Material and methods

The International Waterbird Census (IWC) is organized all over Europe in mid-January every year (Nilsson & Haas 2016). For the counts on Gotland, the coastline was divided into 100 counting units. However, seven of these included small offshore islands that could not be regularly counted, leaving 93 counting units along the coasts of the main island (including Fårö) for analyses. Some sites have been counted every year since the start of the IWC in 1967. In 1969, a total coverage of mainland Gotland (including Fårö) was obtained for the first time. These counts were organized during a full ten-year period (Högström 1980). Full coverage counts were also obtained for the same areas during 1987–1989, 1993, and 2009 in connection with countrywide surveys and the special all-Baltic

surveys, respectively. An additional period of full coverage counts was organized from 2013 onwards by the authors. We mainly compare the two time periods 1969–1978 and 2013–2020 in the analysis here, but also present totals from the other full counts.

All counts were undertaken in mid-January (i.e. the weekend close to 15 January). The counts included ducks (Anatidae), loons *Gavia* spp., grebes (Podicipedidae), Eurasian Coot *Fulica atra*, Grey Heron *Ardea cinerea*, and Great Cormorant *Phalacrocorax carbo*, but not auks (Alcidae). Binoculars and telescopes were used to count birds from vantage points along the coast to cover the different units. This way, all inshore species were covered, whereas only a proportion of offshore species—such as the Long-tailed Duck *Clangula hyemalis*, scoters *Melanitta* spp., loons, and grebes—could be counted, and where numbers were dependent on the weather situation, especially the wind strength and wave actions.

Midwinter counts of waterbirds are also much influenced by winter harshness, especially the ice situation. Most full coverage counts on Gotland were in mild winters with only little ice formation around the island. During the first counting period, 1970 was a harsh ice winter in the Baltic Sea, as was 1987.

Between the years with full coverage counts, some sites were counted each year as a part of the sample used for the calculation of national waterbird indices (Nilsson 1975, Nilsson & Haas 2016) but these counts are not analyzed here.

Results

The number of wintering waterbirds around the coasts of Gotland show a marked increase over the study period from 1969 to 2019 (Table 1; Figures 3–4). This is especially apparent comparing the two main periods of full coverage of the inshore water counts, for which the annual mean total of all waterbirds saw a threefold increase from 32,000 for 1969–1978 to 111,500 for 2013–2020.

The mean counts for all surveyed species during the two main periods are presented in Table 1. Totals for the more common species are discussed separately below, as well as changes in the coastal distributions of these species between the two periods.

MUTE SWAN *CYGNUS OLOR*

The Mute Swan show a marked increase in numbers over the years, from a mean of 898 to a mean of 6,054, in the two periods (Table 1). The number of wintering Mute Swans increased already during the first study period. The highest total recorded was 9,600 Mute Swans in 2009 (Figure 4a). Mute Swans were seen along all coasts of Gotland, but only smaller groups and single swans were recorded along the steeper cliff coasts (Figure 5a). The distribution of swans was similar in the two periods, also when considering the higher number in the second period.

WHOOPEER SWAN *CYGNUS CYGNUS*

Like the Mute Swan, the Whooper Swan also shows an increase between the two periods, from a mean winter total of 336 to 741 (Table 1). However, there was large variation between different years, especially during the second period (Figure 4b).

MALLARD *ANAS PLATYRHYNCHOS*

The Mallard is a common wintering bird on the Gotland coast, constituting 22% and 23%, respectively,

of all waterbirds counted during the two main periods. The species showed a dramatic increase in numbers, from a mean count of c. 7,200 to c. 25,600 (Table 1). The main increase of wintering Mallards along the coasts of Gotland occurred during the last decade (Figure 4c). The Mallard is a habitat generalist and was distributed all around the coasts, with no clear differences in winter distribution between the two time periods (Figure 5b).

OTHER DABBLING DUCKS (*ANAS* SPP. & *MARECA* SPP.)

During the first period considered here, only single individuals of Eurasian Teal *Anas crecca* and Northern Pintail *A. acuta* were found. In the second period, Eurasian Teal, Eurasian Wigeon *Mareca penelope* and Gadwall *M. strepera* had become established wintering species on Gotland, although they form only a small part of the total waterbird community (Table 1; Figure 4d–f). Interestingly, the Northern Pintail has not shown a similar increase, and is still a rare winter guest on Gotland. Scattered individuals of Eurasian Teal and Eurasian Wigeon were found at different sites around the island (Figure 5c–d), but flocks of these were concentrated to the bays in the southeast and, for Eurasian Wigeon, in the southwest (Figure 5d).

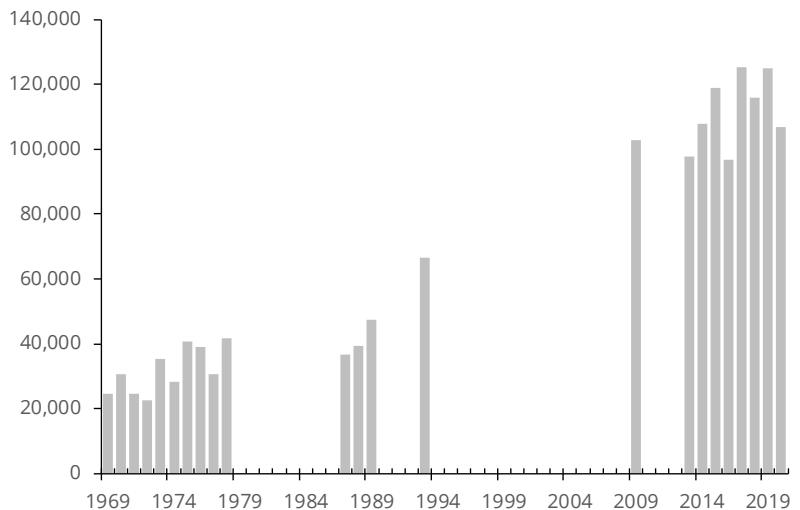


FIGURE 3. Total numbers of waterbirds (all species) counted from the shore during the midwinter counts that covered the entire coast of mainland Gotland (including Fårö).
— Summan för alla sjöfågelarter räknade från stränderna för de midvinterinventeringar där hela Gotlands kust (inklusive Fårö) kunde täckas.

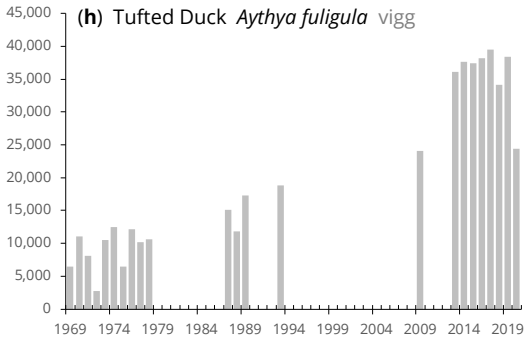
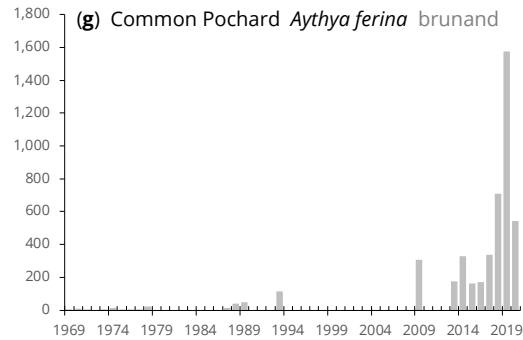
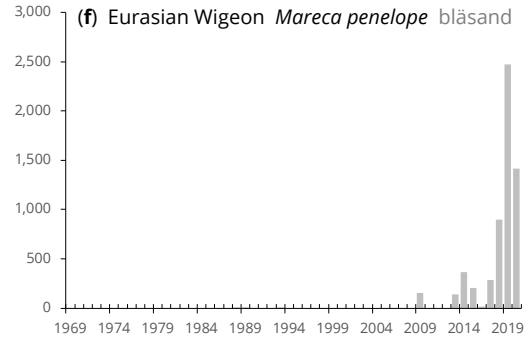
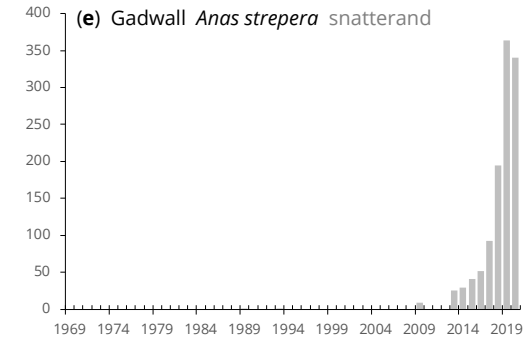
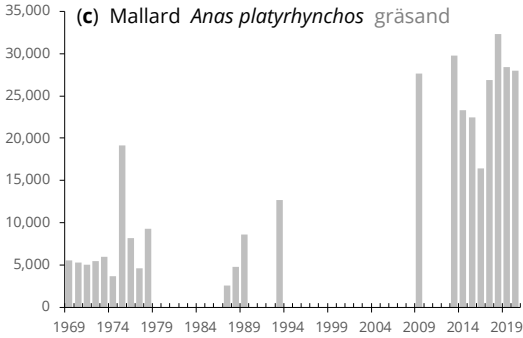
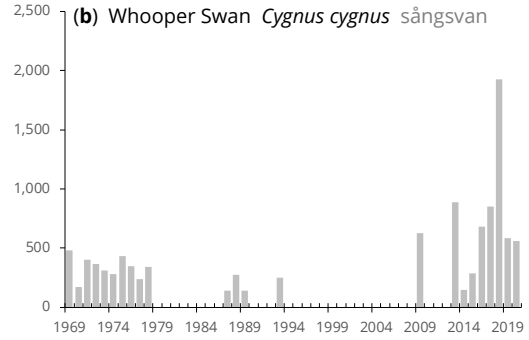
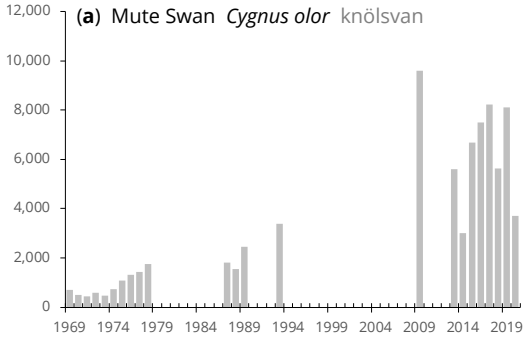
TABLE 1. Mean total numbers of the different waterbird species counted from vantage points along the shores, covering the entire island of Gotland (including Fårö) in January during the periods 1969–1978 and 2013–2020. The percentage composition (prop.) of the waterbird fauna of the two periods is also shown.

— Medeltal för antalet sjöfåglar av olika arter från markinventeringar på Gotland (inklusive Fårö) i januari under två tidsperioder med heltäckande räkningar 1969–1978 and 2013–2020. Procentfördelningen mellan olika arter under de båda tidsperioderna visas också.

Species Art			1969–1978		2013–2020	
English name <i>Engelskt namn</i>	Swedish name <i>Svenskt namn</i>	Scientific name <i>Vetenskapligt namn</i>	Average <i>Medeltal</i>	Prop. <i>Andel</i>	Average <i>Medeltal</i>	Prop. <i>Andel</i>
Mute Swan	knölsvan	<i>Cygnus olor</i>	898	3%	6,054	3%
Tundra Swan	mindre sångsvan	<i>C. columbianus bewickii</i>	0	0%	3	0%
Whooper Swan	sångsvan	<i>Cygnus cygnus</i>	336	1%	741	1%
Gadwall	snatterand	<i>Mareca strepera</i>	0	0%	156	0%
Eurasian Wigeon	bläsand	<i>Mareca penelope</i>	0	0%	723	0%
Mallard	gräsand	<i>Anas platyrhynchos</i>	7,198	22%	25,949	22%
Northern Pintail	stjärtand	<i>Anas acuta</i>	2	0%	7	0%
Eurasian Teal	kricka	<i>Anas crecca</i>	1	0%	569	0%
Common Pochard	brunand	<i>Aythya ferina</i>	7	0%	500	0%
Tufted Duck	vigg	<i>Aythya fuligula</i>	9,093	28%	35,701	28%
Greater Scaup	bergand	<i>Aythya marila</i>	500	2%	14,548	2%
Steller's Eider	alförrädare	<i>Polysticta stelleri</i>	4	0%	1	0%
Common Eider	ejder	<i>Somateria mollissima</i>	171	1%	143	1%
Velvet Scoter	svärta	<i>Melanitta fusca</i>	114	0%	55	0%
Common Scoter	sjöorre	<i>Melanitta nigra</i>	8	0%	205	0%
Long-tailed Duck	alfågel	<i>Clangula hyemalis</i>	8,576	26%	4,499	26%
Common Goldeneye	knipa	<i>Bucephala clangula</i>	2,941	9%	12,661	9%
Smew	salskrake	<i>Mergusellus albellus</i>	23	0%	1,740	0%
Common Merganser	storskrake	<i>Mergus merganser</i>	570	2%	1,499	2%
Red-breasted Merganser	småskrake	<i>Mergus serrator</i>	855	3%	1,174	3%
Eurasian Coot	sothöna	<i>Fulica atra</i>	949	2%	1,730	2%
Little Grebe	smådopping	<i>Tachybaptus ruficollis</i>	4	0%	22	0%
Red-necked Grebe	gråhakedopping	<i>Podiceps grisegena</i>	5	0%	8	0%
Great Crested Grebe	skäggdopping	<i>Podiceps cristatus</i>	35	0%	170	0%
Horned Grebe	svarthakedopping	<i>Podiceps auritus</i>	2	0%	10	0%
Red-throated Loon	smålom	<i>Gavia stellata</i>	1	0%	17	0%
Black-throated Loon	storlom	<i>Gavia arctica</i>	1	0%	38	0%
Great Cormorant	storskarv	<i>Phalacrocorax carbo</i>	263	1%	2,295	1%
Grey Heron	gråhäger	<i>Ardea cinerea</i>	0	0%	307	0%
Total	totalt		32,557		111,521	

FIGURE 4 (next page). Total January counts of the most common waterbird species counted from vantage points along the shores, covering the entire coast of mainland Gotland (including Fårö) in 1969–1978, 1987–1989, 1994, 2009, and 2013–2020.

— (nästa sida). Totalsummor för de vanligaste sjöfågelarterna vid landbaserade midvinterinventeringar som täckte hela Gotlands kust (inklusive Fårö) under 1969–1978, 1987–1989, 1994, 2009 och 2013–2020.



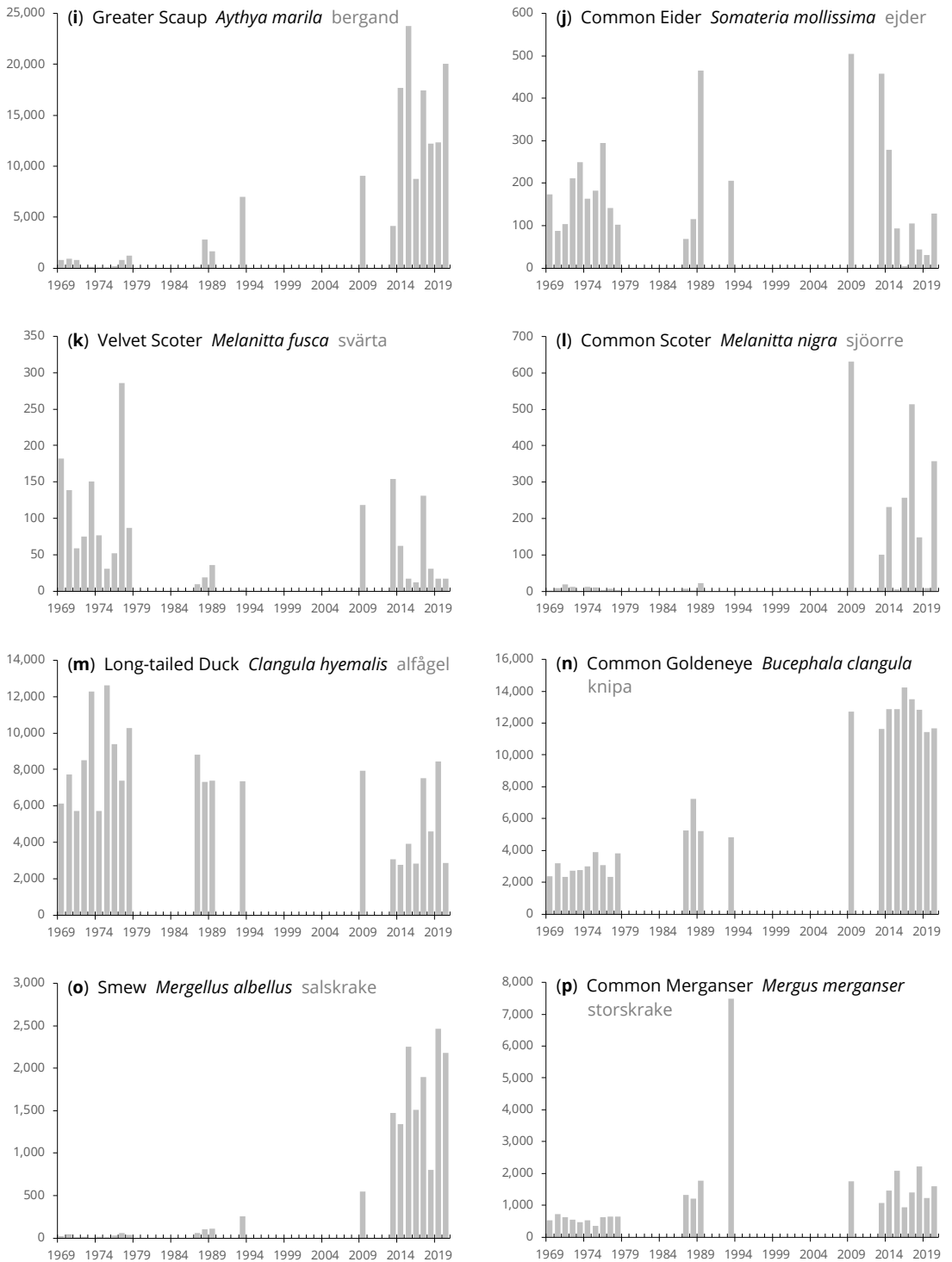


FIGURE 5 continued *fortsatt*.

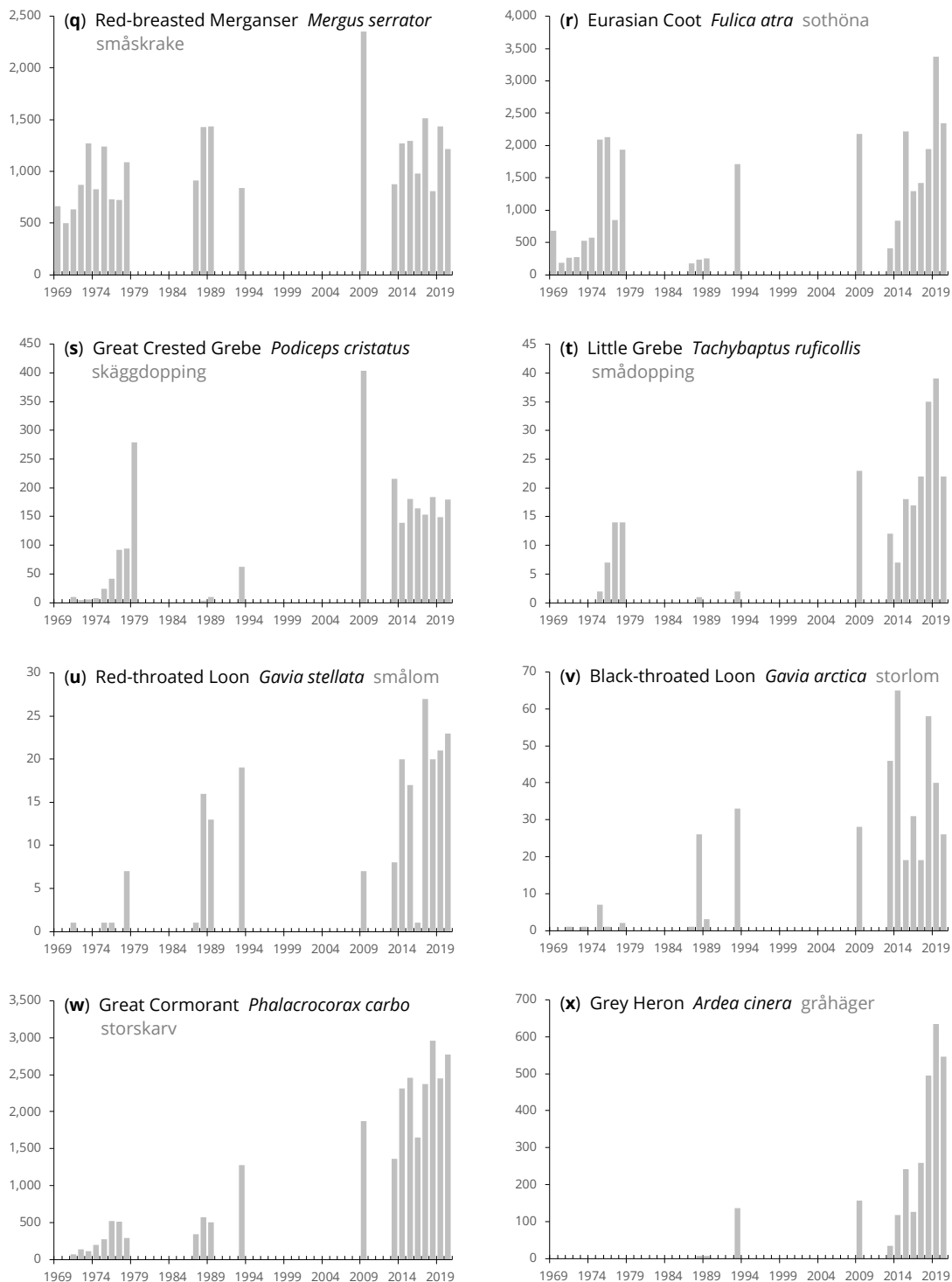


FIGURE 5 continued *fortsatt*.

COMMON POCHARD *AYTHYA FERINA*

The Common Pochard was only recorded in small numbers during the first period, but has increased to a mean of c. 500 individuals during the second period (Table 1; Figure 4g). In the 2019 survey more than 1,500 individuals were counted, of which a single flock located on a site on the east coast of the island comprised 1,200 individuals.

TUFTED DUCK *AYTHYA FULIGULA*

The Tufted Duck was the most common species recorded on Gotland during both study periods, constituting 28% and 32%, respectively, of the counted waterbirds (Table 1; Figures 4h, 5e). The mean totals of wintering Tufted Ducks increased fourfold, from about 9,000 to 35,700 individuals. Numbers during the second period showed little variation, with the highest total being just above 39,400. Tufted Ducks were distributed all around the island, with larger concentrations in the northeast during both study periods. One clear difference between the two main time periods is the occurrence of larger flocks around the southern part of the island during the latter.

GREATER SCAUP *AYTHYA MARILA*

The Greater Scaup showed the largest increase between the two main study periods, from 500 individuals to close to 14,000 (Table 1; Figure 4i). The highest count was 23,800, recorded in 2015, when a single flock of 6,500 individuals was observed on northeast Gotland, as well as several other flocks of more than 1,000 Greater Scaups. During the first period, the species showed a marked concentration to the northeastern part of the island, with only scattered flocks elsewhere. In the second period, there were still large flocks in the northeast, but there were several new sites along the east coast that showed high concentrations of birds, especially on the southern part of the island (Figure 5f).

COMMON EIDER *SOMATERIA MOLLISSIMA*

Although a common breeding bird, most Common Eiders leave the Baltic Sea during the winter, with only small numbers remaining during the winter around the coasts of Gotland. Mean totals for the two periods were 171 and 143, respectively (Table 1; Figure 4j).

SCOTERS *MELANITTA* SPP.

Both the Velvet Scoter *Melanitta fusca* and the Common Scoter *M. nigra* are typical offshore species, seen in smaller numbers around Gotland during the aerial surveys of offshore waters (Nilsson 2012). Velvet Scoters were observed from the shore during both periods, but in varying numbers and with a decrease over time (Table 1). The picture is different for the Common Scoter, which was hardly seen during the first period but counted in varying numbers up to 600 during the second period (Figure 4k–l).

LONG-TAILED DUCK *CLANGULA HYEMALIS*

Including the offshore waters around Gotland, the Long-tailed Duck is the most common species during the winter; this also applies to the entire Swedish coast (Nilsson 2016a). However, the majority of Long-tailed Ducks occur far out at sea and cannot be seen from the shore. In the land-based counts discussed here, the mean count for the first period was only 8,570 individuals compared to a mean count of 4,500 in the second period (Table 1; Figure 4m).

COMMON GOLDENEYE *BUCEPHALA CLANGULA*

The Common Goldeneye is a ubiquitous winter visitor occurring at a large number of sites around Gotland. In the two study periods the Common Goldeneyes constituted 9% and 11%, respectively, of the counted waterbirds. The total number of Common Goldeneyes increased more than fourfold from a mean of 2,900 to 12,700 between periods (Table 1). Numbers showed relatively small variations between years within the two periods (Figure 4n). The maximum total was around 14,000 Goldeneyes. During both of the two main periods the Goldeneyes were evenly spread around the coasts (Figure 5g).

SMEW *MERGELLUS ALBELLUS*

During the first study period, the Smew was a rare species mostly recorded with single individuals or small groups. The mean total for the first period was only 23 Smews, whereas the mean for the second period was 1,740 (Table 1). The highest total for Gotland was 2,462 individuals, recorded in January 2019. Total counts from the few years between the two main periods confirmed a general increase for the Smew (Figure 4o). During the first period, the few individuals were

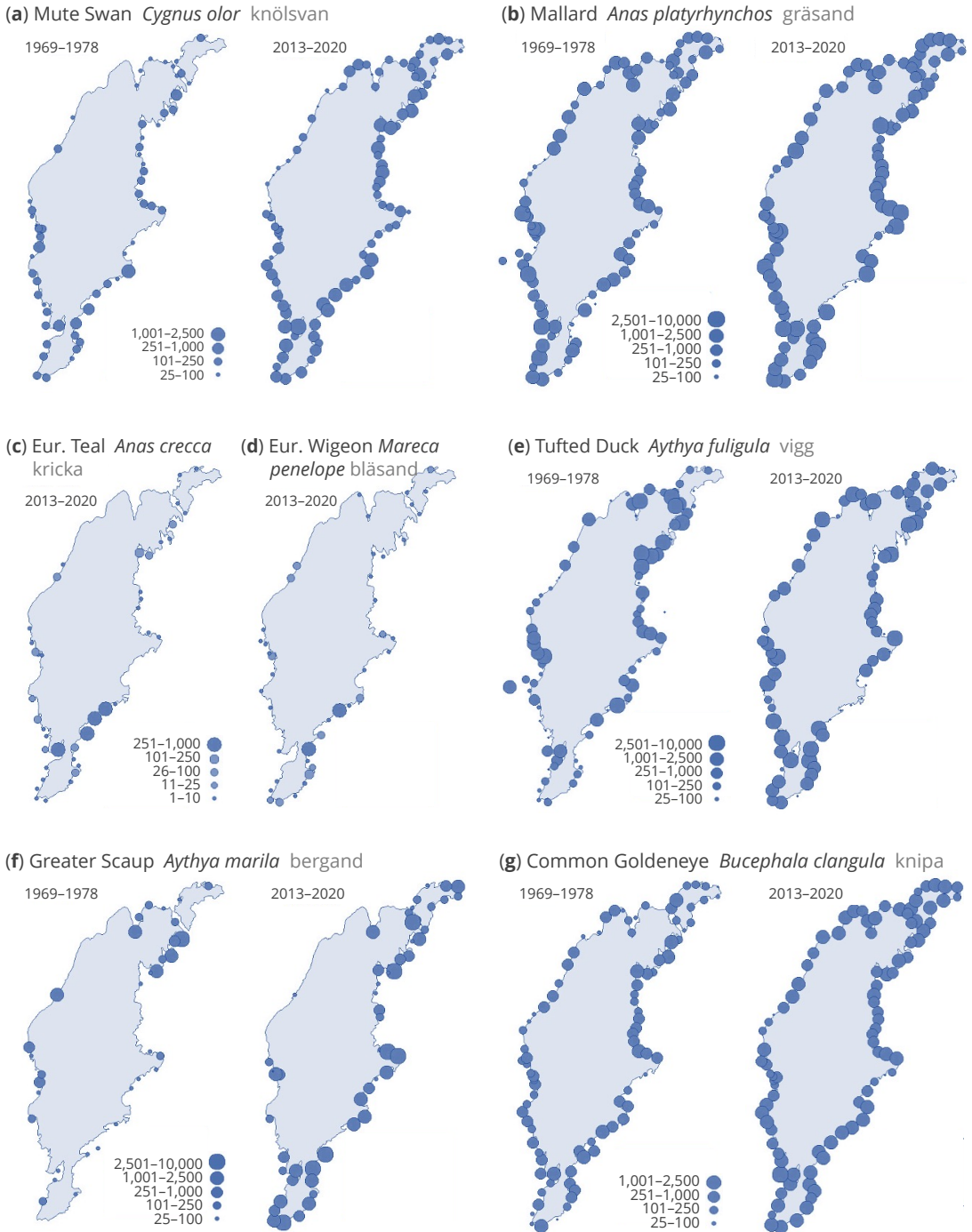


FIGURE 5. Midwinter distribution of the more common waterbirds around Gotland during the two periods with full coverage counts from the shoreline. The maps show the highest number recorded in the different counting sectors during the two time periods.
 — Midvinterutbredning för de vanligaste sjöfåglarna runt Gotland under de båda perioderna med full täckning av de strandnära områdena. Kartorna visar högsta antal noterat i de olika sektorerna för respektive tidsperiod.

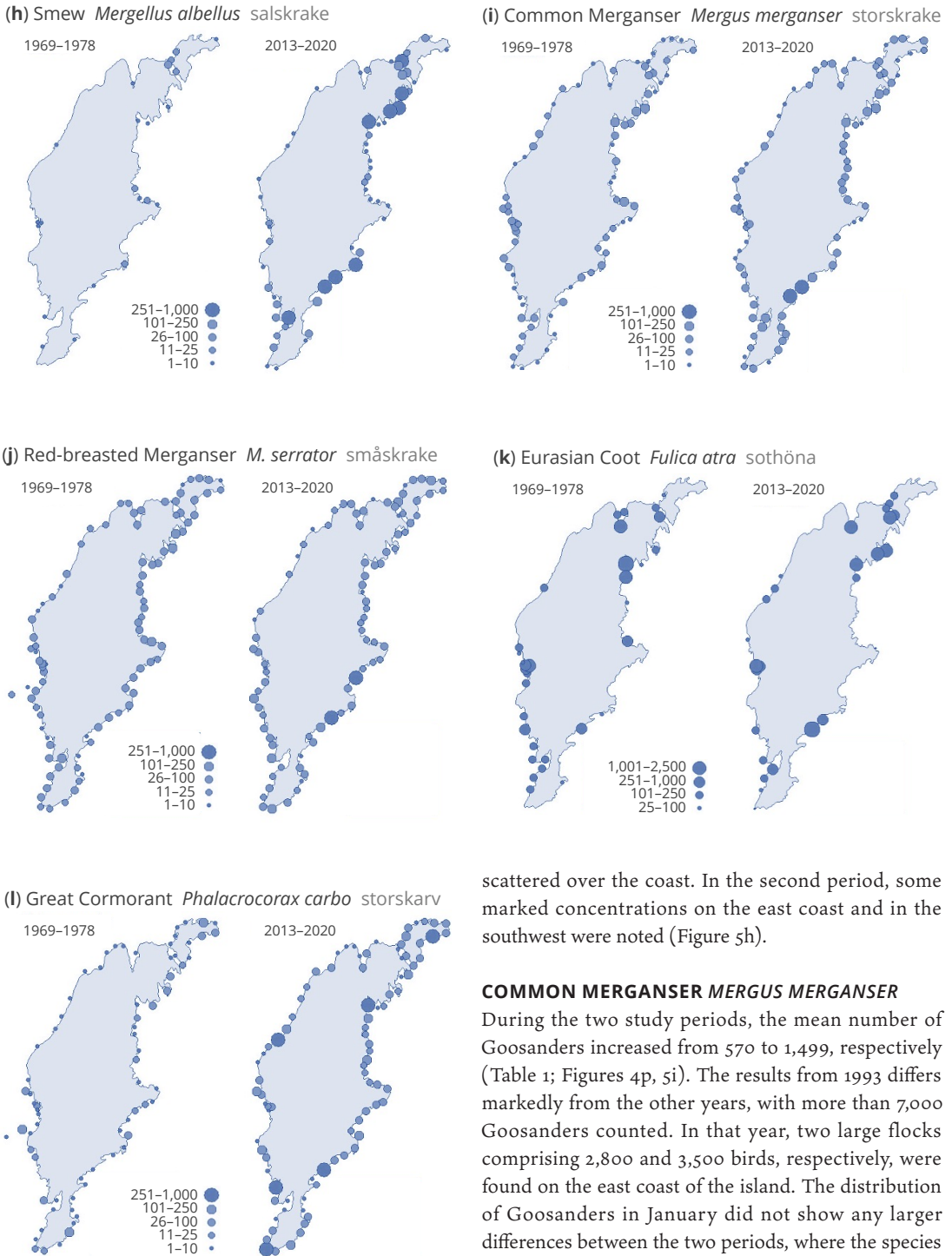


FIGURE 5 continued fortsatt.

scattered over the coast. In the second period, some marked concentrations on the east coast and in the southwest were noted (Figure 5h).

COMMON MERGANSER *MERGUS MERGANSER*

During the two study periods, the mean number of Goosanders increased from 570 to 1,499, respectively (Table 1; Figures 4p, 5i). The results from 1993 differs markedly from the other years, with more than 7,000 Goosanders counted. In that year, two large flocks comprising 2,800 and 3,500 birds, respectively, were found on the east coast of the island. The distribution of Goosanders in January did not show any larger differences between the two periods, where the species mostly occurred in smaller flocks. Generally, the flocks were somewhat larger on the east coast.

RED-BREASTED MERGANSER *MERGUS SERRATOR*

The Red-breasted Merganser was counted in moderate numbers (Figure 4q) evenly distributed along the coasts of Gotland, typically in small flocks (Figure 5j). Similar to most of the surveyed species, there number of Red-breasted Mergansers also increased, with mean counts for the two periods being 855 and 1,174, respectively (Table 1). There were no apparent changes in distribution between the two periods (Figure 5j).

EURASIAN COOT *FULICA ATRA*

The total number of Eurasian Coots counted during the extensive surveys showed much variation between years, and especially low counts were obtained from the first years of the first period and for the years 1987–1989 (Figure 4r). Even so, the mean total was higher in the second period, with 1,730 compared to 949 for the first period (Table 1). The highest total was close to 3,400, recorded in 2019 (Figure 4). The Eurasian Coot showed a more concentrated distribution than most other waterbird species on Gotland, and the largest flocks were seen in more sheltered areas (Figure 5k). There were no marked differences in the distribution pattern of the species between the two time periods (Figure 5k).

GREBES (PODICIPEDIDAE)

The Great Crested Grebe *Podiceps cristatus* is the most common grebe seen in the midwinter counts, with a highest total of about 400 individuals (Figure 4s). The mean totals for the two periods were 35 and 170 individuals, respectively (Table 1). In addition, Red-necked Grebe *P. grisegena*, Horned Grebe *P. auritus*, and Little Grebe *Tachybaptus ruficollis* were also recorded at the counts, the latter species being more common during the second period (Figure 4t).

LOONS *GAVIA* SPP.

Few loons were observed during the first period only (Table 1; Figure 4u–v). Like many other waterbirds, more loons were seen during the second period, and this especially applies to the Black-throated Loon *Gavia arctica* (Figure 4v), which was more commonly seen than the Red-throated Loon *G. stellata* (Figure 4u).

Discussion

As is apparent from the data presented here there, have

been marked changes in the wintering numbers of different waterbird species on Gotland since the start of the International Waterfowl Counts in 1967. Most species show dramatic increases when the two main study periods are compared. Likewise, annual trends calculated for a smaller sample of sites on Gotland show significant increases for six out of seven studied waterbird species (Nilsson & Haas 2016). In that study the only species that did not show any clear trend was the Red-breasted Merganser.

The only species showing a marked decrease in the present study was the Long-tailed Duck, a species that has shown a marked decrease in the entire Baltic Sea, even if there are some regional differences (Skov *et al.* 2011, Nilsson 2016a). Among the less common winter species, there were also fewer Velvet Scoters and Common Eiders during the second period compared to the first. This is in line with the general decline of these species in the region (Skov *et al.* 2011).

A number of species established new wintering habits in the country during the study period, which was also reflected in the counts on Gotland. During the first period, only single individuals of other dabbling ducks than Mallard were found, whereas appreciable numbers of Eurasian Teal, Eurasian Wigeon, and Gadwall wintered on the island during the second study period. This also applies to the Grey Heron, which now occurs in fairly good numbers (Figure 4x).

The waterbird counts on Gotland show the same general trends as the national data based on the annual midwinter indices (Nilsson & Haas 2016). In fact, Gotland is an important waterbird area in winter at the national scale. This is apparent when the total counts presented here are compared with the estimates for the entire country based on the countrywide survey in 2015 (Nilsson & Haas 2016; Table 2), demonstrating that an appreciable proportion of the national totals of several wintering species is found in the coastal waters of Gotland (Table 2).

As discussed in the national analyses (Nilsson & Haas 2016) it is often difficult to figure out the reasons for the increasing trends in many wintering waterbird species. For a few species the increase in wintering numbers could reflect a general population increase, as is the case for the Whooper Swan (Nilsson 2016b). However, in most cases the increase of wintering numbers in Sweden (and on Gotland) reflects a change

in the winter distribution due to milder winters, i.e. short-stopping. This has been shown at an international scale for some of the common species such as Tufted Duck, Common Goldeneye, and Goosander (Lehikoinen *et al.* 2013), Smew (Pavon-Jordan *et al.* 2015), and Greater Scaup (Marchowski *et al.* 2020). In all these species the International Waterbird Census has rendered decreases in the southern parts of their winter ranges in Northwest Europe, whereas the numbers have increased in the northerly parts of their winter ranges. These changes in the winter distribution of several species may conceal trends in the real population size, whereas the total wintering population of the Greater Scaup (Marchowski *et al.* 2020) in Europe has decreased during the same period. For a species like the Greater Scaup, the northerly wintering areas and especially Gotland have become more important over the years.

Of the species using the inshore waters around Gotland in this comparison the Greater Scaup stands out

with 88% of the national total in January 2015 found on Gotland (Table 2). According to Marchowski *et al.* (2020), the European winter population of the species was estimated to 192,300 individuals in 2015–2019. The peak count from Gotland of 23,800 is hence 12% of the flyway population. Another species with a high proportion of the national wintering population being found on Gotland is the Smew, with 28% of the national total in 2015 (Table 2).

When discussing the importance of the waters around Gotland for wintering waterbirds, the offshore waters should not be forgotten, being important wintering areas especially for the Long-tailed Duck. During the first all-Baltic survey, about 280,000 Long-tailed Ducks were estimated for the waters east and north of Gotland (Durinck *et al.* 1994), but the population was probably even larger during the 1970s (Nilsson 2012). At the offshore survey in 2016 no more than about 15,000 were estimated for these areas (Nilsson 2016a).

TABLE 2. The total number of common wintering waterbirds species around Gotland in January 2015, compared to the countrywide survey the same winter, including the proportion (prop.) of the national total found around Gotland.

— Antalet övervintrande vanliga sjöfåglar runt Gotland i januari 2015 jämfört med den landsomfattande inventeringen samma vinter.

Species Art			Total number in survey <i>Totalt antal i inventering</i>		
English name <i>Engelskt namn</i>	Swedish name <i>Svenskt namn</i>	Scientific name <i>Vetenskapligt namn</i>	Gotland	National <i>Nationell</i>	Prop., Gotland <i>Andel, Gotland</i>
Mute Swan	knölsvan	<i>Cygnus olor</i>	6,689	52,000	12.86%
Whooper Swan	sångsvan	<i>Cygnus cygnus</i>	287	12,000	2.39%
Eurasian Wigeon	bläsand	<i>Mareca penelope</i>	203	9,000	2.26%
Mallard	gräsand	<i>Anas platyrhynchos</i>	22,555	200,000	11.28%
Eurasian Teal	kricka	<i>Anas crecca</i>	96	500	19.20%
Common Pochard	brunand	<i>Aythya ferina</i>	162	1,250	12.96%
Tufted Duck	vigg	<i>Aythya fuligula</i>	37,391	190,000	19.68%
Greater Scaup	bergand	<i>Aythya marila</i>	23,785	27,000	88.09%
Common Eider	ejder	<i>Somateria mollissima</i>	93	60,000	0.16%
Common Goldeneye	knipa	<i>Bucephala clangula</i>	12,856	90,000	14.28%
Smew	salskrake	<i>Mergellus albellus</i>	2,251	8,000	28.14%
Common Merganser	storskrake	<i>Mergus merganser</i>	2,088	40,000	5.22%
Red-breasted Merganser	småskrake	<i>Mergus serrator</i>	1,296	9,000	14.40%
Eurasian Coot	sothöna		2,218	13,000	17.06%
Great Crested Grebe	skäggdopping	<i>Podiceps cristatus</i>	180	3,000	6.00%
Great Cormorant	storskarv	<i>Phalacrocorax carbo</i>	2,462	15,000	16.41%

One significant factor for the importance of Gotland for wintering waterbirds, in a Baltic context, is its position in the central part of the Baltic Sea. This means that open water is available even during the coldest periods, when large parts of the Baltic Sea freeze, including most shallow coastal, especially in archipelagos. The vast areas with relatively shallow water around Gotland, especially along the eastern coast, provide good feeding conditions for diving waterbirds and underscores the importance of the island.

Data availability

The data used in this paper are from the International Waterfowl Census. All original data will be available from the Swedish Bird Survey, Department of Biology, Lund University, at <https://www.fageltaxering.lu.se>.

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Svensk sammanfattning

Gotland är sedan länge känd som en viktig lokal för övervintrande sjöfåglar (Högström 1965). Stora delar av ön är omgivna av betydande områden med grunt vatten och goda förutsättningar för födosökande sjöfåglar. Dessutom gör läget centralt i Östersjön att det som regel finns god tillgång till öppet vatten även under hårda isvintrar.

Gotland har varit representerat i de internationella midvinterinventeringarna av sjöfågel ända sedan starten i januari 1967. Redan den tredje inventeringsvintern kunde hela huvudöns (inklusive Fårö) stränder täckas med inventeringar. Kompletta inventeringar av huvudöns stränder genomfördes sedan årligen under perioden 1969–1978 av en grupp lokala ornitologer (Högström m. fl. 1980). Mer eller mindre fullständiga inventeringar av de inre farvattnen runt huvudön organiserades också 1987–1989 samt i samband med de större Östersjöinventeringarna 1992/1993 (Durinck m. fl. 1994) och 2007–2009 (SOWBAS; Skov m. fl. 2011). Under perioden 2013–2020 genomfördes en längre serie heltäckande inventeringar runt Gotlands stränder organiserade av Clas Hermansson. Mellan de heltäckande inventeringarna inventerades viktiga lokaler i januari varje år.

I föreliggande uppsats analyserar vi sjöfåglarnas uppträdande runt Gotlands kuster främst baserade på de heltäckande inventeringarna. Syftet är att närmare belysa förändringar i antalet övervintrade sjöfåglar mellan de båda perioderna samt att studera eventuella förändringar i deras lokala utbredning.

UNDERSÖKNINGSOMRÅDE

Gotland har en berggrund av kalksten. Runt stora delar av ön kännetecknas stränderna av branta klippor, främst längs den norra delen av västra kusten, medan den östra kusten har flackare stränder och betydande områden av grunt vatten närmast land (figur 1–2). Den totala längden av huvudöns stränder är ca 800 km. Utanför kusten återfinns en del mindre holmar i öster och utanför västkusten de båda klippöarna Stora och Lilla Karlsö.

Utanför klippkusten återfinns endast ett relativt smalt band av grunt vatten, men som erbjuder goda födosökmöjligheter för sjöfågel med blåmusslor *Mytilus edulis* och olika slags kräftdjur i bältet av blåstång *Fucus* spp. Ostkustens större områden med grunt vatten

har ofta mjukbotten och vidsträckta undervattensängar av ålgräs *Zostera marina* och kransalger *Chara* spp. (Petersson 2007).

MATERIAL OCH METOD

I samband med den internationella sjöfågelinventeringen (IWC) delades kusten runt Gotland in i 100 räkningssektorer, varav 93 återfinns runt huvudön och Fårö. Dessa inventerades med få luckor under de båda perioderna med heltäckande inventeringar (1969–1978 samt 2013–2020) samt vid några år däremellan (se figur 4). Under mellanåren inventerades ett antal av dessa lokaler och ingick i stickprovet för att beräkna de årliga vinterindexen (Nilsson 1975, Nilsson & Haas 2016).

De strandnära områdena täcktes från lämpliga observationspunkter med kikare och tubkikare så att alla sjöfåglar i de strandnära delarna kunde observeras på ett effektivt sätt. Däremot kom endast en mindre del av arter som alfågel *Clangula hyemalis*, svärta *Melanitta fusca*, sjöorre *M. nigra*, doppingar (Podicipedidae) och lommar *Gavia* spp. att täckas vid inventeringarna. Andelen som kan ses från land av dessa arter är starkt beroende av väderleken, främst sjögången.

RESULTAT OCH DISKUSSION

Antalet övervintrande sjöfåglar runt Gotland har ökat markant under de år de internationella sjöfågelinventeringarna har pågått (tabell 1, figur 3–4). Medeltalet för samtliga inräknade sjöfåglar från land var 32 000 per år för perioden 1969–1978 att jämföras med 111 500 för perioden 2013–2020.

Inventeringsresultaten för de olika arterna presenteras i en serie diagram som visar antalet inräknade i de strandnära vattnen för de heltäckande inventeringarna (figur 4). De viktigaste arternas utbredning runt Gotland under de båda inventeringsperioderna 1969–1978 och 2013–2020 visas i en serie kartor i figur 5.

Det är uppenbart att de flesta arter ökat i antal under de år inventeringarna pågått, vilket illustreras väl av jämförelserna i tabell 1. På samma sätt visar flertalet arter utom småskrake *Mergus serrator* och alfågel ökande trender i de årliga vinterindexen för Gotland, liksom är fallet för de nationella indexen (Nilsson & Haas 2016).

Den enda art som minskat markant under de senaste åren är alfågel, som visade en minskning i hela

Östersjöområdet även om det föreligger regionala skillnader (Nilsson 2016a, Skov m. fl. 2011). Minskningen framträder tydligt i resultaten från de landbaserade inventeringarna, men är ännu tydligare i resultaten från inventeringar till havs. Vid den första totala Östersjöinventeringen uppskattades antalet *alfåglar* öster om Gotland och runt Fårö till ca 280 000 (Durinck m. fl. 1994), medan endast ca 15 000 noterades 2016 (Nilsson 2016a).

Mellan den första och andra periodens totalinventeringar etablerade sig blåsand *Mareca penelope*, snatterand *M. strepera* och kricka *Anas crecca* som regelbundna vintergäster på Gotland. Dessa nyetableringar torde kunna härledas till den senare tidens mildare vintrar, vilket lett till att flera arter förkortat sin

flyttning och i större utsträckning övervintrar närmare häckningsområdena, s. k. ”short-stopping”. Detsamma gäller ökningen hos arter som vigg *Aythya fuligula*, knipa *Bucephala clangula*, storskrake *Mergus merganser* (Lehikoinen m. fl. 2013), salskrake *Mergellus albellus* (Pavon-Jordan m. fl. 2015) och bergand *Aythya marila* (Marchowski m. fl. 2020).

Som framgår av tabell 2 utgör Gotlands inre farvatten ett nationellt viktigt övervintringsområde för ett flertal arter såsom vigg, knipa, salskrake och inte minst bergand. Gotlands ostkust utgör ett internationellt viktigt område för den sistnämnda arten med upp till 12 % av det totala antalet bergänder i nordvästra Europa (Marchowski m. fl. 2020).

† Clas Hermansson avled 18 mars 2021 och denna uppsats publiceras postumt.

Se Berg & Abrahamsson (2021): Clas Hermansson till minne (<https://doi.org/10.34080/os.v31.23214>)



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