

Changes in numbers and habitat utilization of wintering Whooper Swans *Cygnus cygnus* in Sweden 1964–1997

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Abstract

A country-wide survey of wintering Whooper Swans *Cygnus cygnus* was undertaken in south Sweden in January 1995 as part of an international census of the species. The paper reports on this census and analyses Whooper Swan counts from earlier International Waterfowl Census data to elucidate changes in numbers and habitat utilization of the swans. A marked increase in the number of Whooper Swans was found between the first country-wide surveys in the early 1970s and 1995, when the winter population was estimated to be at least 8,000. The increase is not reflected in the midwinter indices, calculated from the International Waterfowl Census data, due to an increasing

tendency of the Whooper Swans to feed on land in the southernmost part of the country. In January 1995, nearly 60% of the Whooper Swans in Scania were found on fields, mainly rape and winter wheat, whereas in the other parts of the country the majority of swans still utilised water areas. Earlier in the season the Whooper Swans in Scania also used sugar beet spill for feeding. The field-feeding habit started in the 1970s.

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Received 6 August 1997, Accepted 12 September 1997, Editor: S. Svensson

Introduction

The Whooper Swan *Cygnus cygnus* is a regular winter visitor in south Sweden and is covered by the International Waterfowl Census (IWC), coordinated by Wetlands International (formerly IWRB), in mid-January. Information from the breeding grounds in Fennoscandia has shown marked changes in recent years with a substantial increase in numbers and a spread to new breeding areas, the distribution now covering the major part of Sweden and Finland (Haapanen & Nilsson 1979, Arvidsson 1987, Ohtonen 1992). The indices for continental Northwest Europe, based on the IWC, do suggest an increasing trend (Rose 1995, cf. also Nilsson 1975, 1991, 1996a for national indices) but the counts are not thought to be an adequate reflection of population changes due to Whooper Swans being widely dispersed in the winter quarters (Rose 1995).

To overcome these problems and to obtain an adequate population estimate for the Northwest European winter population of the species, a special survey was organised in January 1995 (Laubek et al. in prep), made at the same time as a census of the Icelandic-British population, which had already been

surveyed in this way in 1986 and 1991 (Salmon & Black 1986, Kirby et al. 1992).

This paper presents the Swedish results from the special Whooper Swan census, compares them with former country-wide midwinter counts and considers the population development as illustrated by the midwinter indices. Moreover, data on the habitat selection of swans are analysed to elucidate the change to a higher degree of field feeding that was noted in south Sweden.

Material and methods

The methods used in the IWC have been described in several earlier reports (cf. Nilsson 1975, 1991). In the early years, following the development of the IWC in January 1967, country-wide surveys were attempted (Nilsson 1975) and more or less complete coverage of the swan sites was obtained in 1971–1973. In subsequent years, coverage was not complete for Whooper Swans (only for the main duck species), but from 1987 to 1989 country-wide coverage was once again attempted. For coastal areas a complete coverage in the Baltic was also

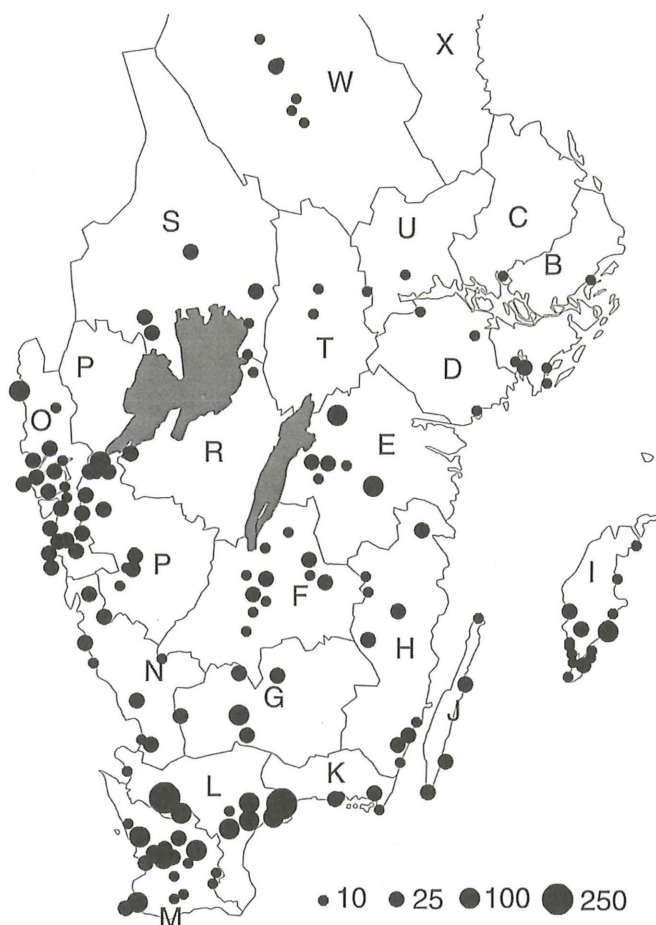


Figure 1. Map of south Sweden showing the distribution of Whooper Swans *Cygnus cygnus* in January 1995. Letters in brackets refer to the different Swedish counties in Table 1.

*Karta över södra Sverige utvisande sångsuvanens *Cygnus cygnus* utbredning i januari 1995. Länsbokstäver (jfr Tabell 1) anges inom parentes.*

obtained in 1993 in connection with a special survey of waterfowl in the entire Baltic (Durinck et al 1994).

Indices presented here have been calculated according to the standard method of the IWC, i.e. by pair-wise comparisons of the totals for sites counted in two consecutive years (Rüger et al 1986, see also Nilsson 1975). The primary indices so obtained have then been recalculated in relation to the index of the base-year (1973) being set to 100. To avoid the influence of extreme years indices have then been recalculated once more so that the mean index for the years 1969–78 = 100. Separate indices for inland and coastal sites have also been calculated.

In the 1995 survey the aim was to obtain complete coverage of Whooper Swans in Sweden, as part of the International Whooper Swan Census. To achieve

this goal, all former counters from the midwinter counts were contacted as were a large number of other ornithologists, bird clubs, report committees etc. Contacts with observers were established in all areas where swans had been found over the years of duck and goose counts. For each flock observed data on numbers, ages, habitat choice, etc. were registered. The counts were undertaken at the same time as the IWC in mid January.

Besides the field choice data obtained in January 1995, observations on habitat selection by Whooper Swans in Scania had been collected mainly by the author during more or less monthly goose surveys over a number of years covering the entire winter period, mostly in the south-western and central parts of the province. The counts were made during mid-day and thus covers feeding areas.

Table 1. Regional totals of Whooper Swans *Cygnus cygnus* in Sweden in January 1995. Letters in brackets denote the different counties and refer to the map in Figur 1.

Antalet inräknade sångsvanar Cygnus cygnus i olika län i Sverige i januari 1995. Länsbokstäver inom parentes hänvisar till kartan i Figur 1.

County <i>Län</i>	Total <i>Antal</i>
Skåne (L,M)	2303
Blekinge (K)	341
Öland (J)	131
Gotland (I)	513
Kalmar län (mainland, H)	224
Kronoberg (G)	316
Jönköping (F)	288
Halland (N)	338
Göteborg & Bohuslän (O)	877
Älvsborg (P)	793
Skaraborg (R)	79
Östergötland (E)	333
Södermanland (d)	131
Stockholm (B)	150
Uppsala (C)	9
Västmanland (U)	20
Örebro (T)	73
Värmland (S)	198
Kopparberg (W)	199
Jämtland (Z)	123
Total <i>Summa</i>	7439

Results

Numbers and distribution in 1995

In all, 7439 Whooper Swans were counted during the 1995 survey in Sweden, 2240 of which in the southernmost province of Scania. The species was well spread over the southern part of the country but with a concentration to the west coast and Scania (Figure 1, Table 1).

The coverage in most provinces was good, especially around the coasts, where all areas of importance for the species were covered with the exception of small parts on Öland and in Bohuslän. The missing parts on Öland are not known to be of any great importance for the Whooper Swan, but the areas in Bohuslän can be more important. For instance, two weeks before the count, 1000 swans were present around the island of Orust (also covered at the count) compared to 877 reported from the entire province at the time of the census. As some areas could not be covered (others were frozen in

Table 2. Total number of Whooper Swans *Cygnus cygnus* in Sweden at country-wide midwinter surveys. *Antalet sångsvanar Cygnus cygnus i Sverige vid landsomfattande midvinterinventeringar.*

Year <i>År</i>	Inland <i>Inland</i>	Coast <i>Kust</i>	Total <i>Summa</i>
1971	620	1330	1950
1972	730	1070	1800
1973	970	970	1940
1987	840	1735	2575
1988	2360	1070	3430
1989	1550	820	2370
1995	5420	2020	7440

between), it is uncertain how many left the province and how many were redistributed. It is possible that up to 300–400 were present in uncounted parts of Bohuslän. Smaller numbers also may have been overlooked elsewhere, so it is highly probable that the total number of Whooper Swans in the country in January 1995 exceeded 8000 but it is unlikely that there were more than 9000 Whooper Swans in the country.

Population changes

Annual indices, based on the IWC mid-winter counts in Sweden 1967–1997 (Figure 2), did not show any clear trend but only fluctuations between different years (Regression Index vs. Year for the whole series: $R=0.32$, $P=0.07$). A regression analysis indicates an increasing trend from 1979 or 1980 onwards, which reaches significance if starting with 1979 (a low during a cold winter, $R=0.57$, $P=0.011$) but not if starting with 1980 ($R=0.45$, $P=0.061$).

The information from country-wide midwinter counts made during the more comprehensive surveys in Sweden in January 1971–1973, 1987–1989 and the special survey in 1995 (Table 2), on the other hand, does show a recent increase. Comparing 1995 with the two earlier periods, there was probably a slight increase in coverage for the 1995 census since special surveys for swans feeding in fields were undertaken. The two earlier periods in which country-wide midwinter counts were undertaken had similar coverage. During 1971–1973 the habit of field feeding was not so wide-spread and the totals in Table 2 are probably fairly close to the real numbers present. In 1988 and 1989 the coverage of water areas was adequate and similar to 1995 but field

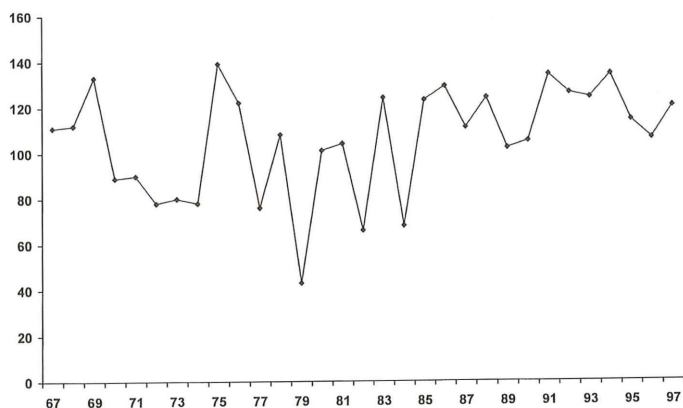


Figure 2. National midwinter indices for the Whooper Swan *Cygnus cygnus* in Sweden 1967–1997. The mean index for 1969–1978 is set to 100.

Midvinsterindex för sångsvan Cygnus cygnus i Sverige 1967–1997. Medelindex för 1969–1978 = 100.

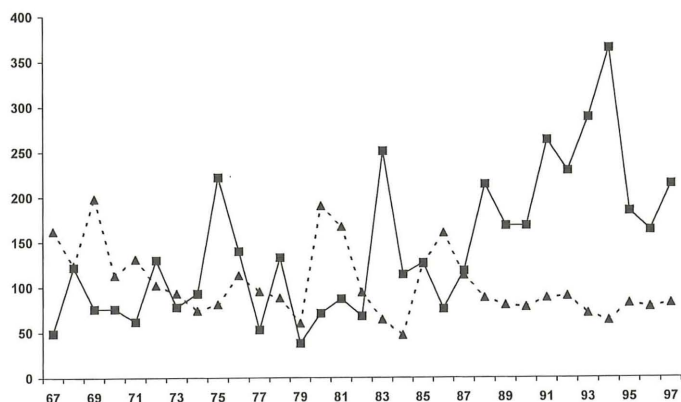


Figure 3. Separate midwinter indices for Whooper Swans *Cygnus cygnus* on coastal (triangles and broken line) and inland (squares and whole line) sites in Sweden 1967–1997.

Separata midvinsterindex för sångsvan Cygnus cygnus på kust (trianglar och streckad linje) och inland (fyrkanter och heldragen linje) lokaler i Sverige 1967–1997.

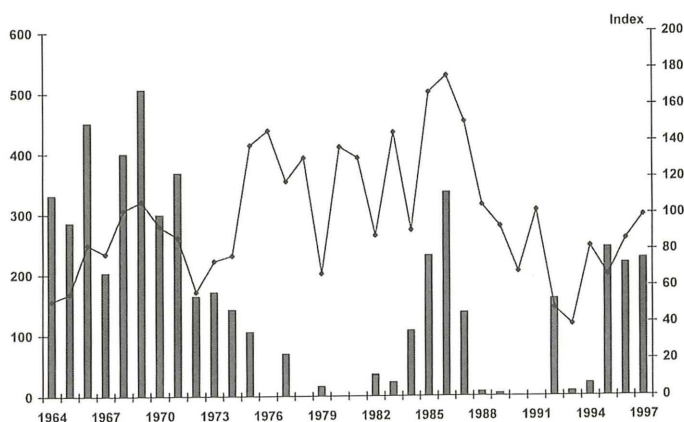


Figure 4. Regional indices for Scania (curve) and actual numbers counted (bars) of Whooper Swans *Cygnus cygnus* in the southern part of the Öresund in Scania (coastal area) at mid-January counts in 1964–1997.

Regionala index för Skåne (kurva) och antalet inräknade (staplar) sångsvanar Cygnus cygnus i södra delen av Öresund (kust) vid inventeringar i mitten av januari 1964–1997.

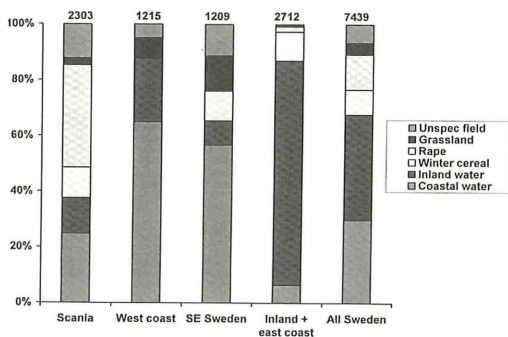


Figure 5. Habitat selection of Whooper Swans *Cygnus cygnus* in different parts of Sweden in the January 1995 census. Sample sizes shown over the bars. Division into regions according to the map in Figure 1. Scania = L,M, West coast = N,O, SE Sweden = H,I,J,K, Inland + east coast = other counties.

Habitatval för sångsvan Cygnus cygnus i olika delar av Sverige vid inventeringen i januari 1995. Stickprovets storlek anges över staplarna. Regionindelningen framgår av kartan i Figur 1. Scania = L,M, West coast = N,O, SE Sweden = H,I,J,K, Inland + east coast = övriga län.

checks were missing in many regions. Even if no organized censuses of field feeding Whooper Swans were undertaken in 1988 and 1989, most suitable feeding sites were actually covered during the goose counts in January. It is clear from this restricted sample that the number of field feeding Whooper Swans away from the IWC sites was much smaller in 1988 and 1989 than in 1995. The overall field feeding frequency in 1995 was 30% for all Sweden. With the same field feeding frequency in 1988 the January population this year can be estimated to be about 5000 Whooper Swans for this winter compared to more than 8,000 1995. Probably it was somewhat lower, as the field feeding frequency was lower.

Separation of coastal and inland sites gives a different picture (Figure 3), with a significantly decreasing ($R=-0.45$, $P=0.10$) trend for coastal sites and a significantly increasing ($R=0.64$, $P<0.001$) trend for the inland sites. There are, however, still quite marked fluctuations between different years, especially inland. When the total time period was split into two, there was no clear trend for either coastal or inland sites for the period 1967–1980 ($R=0.36$, $P=0.21$ and $R=0.07$, $P=0.80$, respectively). For the period 1981–1997, the increase was significant inland ($R=0.60$, $P=0.013$), but not for coastal sites ($R=0.42$, $P=0.09$).

The decrease in numbers on coastal sites is also

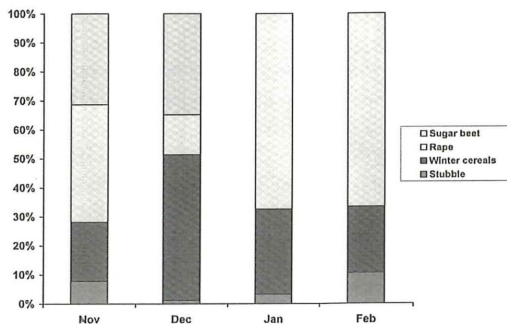


Figure 6. Choice of field types for field-feeding Whooper Swans *Cygnus cygnus* in SW Scania in different months 1987–1997.

Val av fältyp bland sångsvanar Cygnus cygnus i SW Skåne, som söker föda på land, under olika månader 1987–1997.

clear from the counts along the coasts of SW Öresund during 1964–1997, where the numbers in coastal flocks is much lower in the eighties and nineties than in the sixties and early seventies (Figure 4). The regional midwinter indices for Scania (inland and coastal sites together) show an increase to 1986 followed by markedly lower indices in later years (relating to the spread of the field feeding habit, see below).

Field feeding

Traditionally, Whooper Swans used areas of open water for both resting and feeding. Even though many Whooper Swans now feed on land, about 70% of all Whooper Swans counted in January 1995 were still found on water-bodies, many on quite small streams. Overall, 30% of the 7440 Whooper Swans recorded in January 1995 were counted on coastal waters, 40% on fresh water and 30% on land (Figure 5).

There are marked regional differences in the distribution of swans across different habitats. In Scania, 63% ($n=2414$) of the swans seen in January 1995 were feeding on arable fields and grassland, whereas this proportion was about 35% ($n=1172$) in the south-eastern part of the country and 12–13% ($n=1215$, 2665 , respectively) in the two other regions (Figure 5). The frequency of field feeding is related to the availability of fields without too much snow and is thus restricted to the southernmost part of the country. Aquatic vegetation is available at least in streaming water all over the part of Sweden covered in the census.

In Scania, more than one third of the swans were

seen on fields of winter rape, with winter wheat used by more swans than grasslands. In the other parts of the country, swans using fields were seen mainly on winter wheat and grasslands, but most were recorded on inland or coastal waters (Figure 5).

Seasonal variation in the swan's use of different field types in SW Scania is shown in Figure 6. Fields of winter rape and winter wheat attracted the largest numbers of swans throughout the winter. Few were seen on grassland, but this habitat is restricted in this part of Scania compared to arable land. During January and February the predominant use of rape was very marked with about 70% of the swans seen on this crop and most of the other swans being seen on winter wheat. During November and December about 30% of the swans seen feeding on fields in Scania were on harvested sugar beet fields feeding on spill. From late December practically all sugar beet fields were ploughed, however, or otherwise unavailable to the swans due to freezing conditions, which changed to other crops as the sugar beets were not possible to dig out.

As the waterfowl counts over the years have concentrated on sites with open water there are no clear data to show when the tradition of field feeding started among the Whooper Swans wintering in southern Sweden. Some ideas can be obtained, however, by comparing the graph showing the annual national indices (Figure 2) with the changes in numbers in the Öresund study area (Figure 4).

Figure 4 shows marked fluctuations in the number of Whooper Swans in the southern part of Öresund during the sixties, the fluctuations following changes in the indices covering the entire province (both inland and coastal sites). Some field feeding by Whooper Swan flocks were seen in the sixties, but the observations were few and mostly restricted to special occasions, such as the very cold winter of 1963 when almost no open water was available.

During the mild winters of the seventies, Whooper Swans decreased in the coastal Öresund area at the same time as they increased inland, as illustrated by the overall indices for Scania in Figure 4. Between the seventies and the country-wide survey in 1987, the increase in the Scanian index agreed with expectations, given the change in the national totals (Table 2, Figure 4). After the cold winter of 1987 indices for Scania showed a marked decrease, perhaps related to a movement of feeding Whooper Swans to feeding areas away from the sites included in the waterfowl counts. The indices may then show a decrease when the population actually is increasing. Indices were somewhat higher again during the

recent colder winters. Regional totals for Scania increased from 1987–1989 to 1995 as in the rest of the country. The total counts in 1987–1989 were 1088, 875 and 767 Whooper Swans in Scania compared to 2414 in January 1995.

Discussion

The country wide surveys in Sweden clearly show that the population of Whooper Swans wintering in the country has risen in line with the general increase in the breeding population. The increase in the winter population is not as marked as the increase in the Swedish breeding population (Arvidsson 1987), where the estimated population in the two northernmost provinces Västerbotten and Norrbotten (130,000 square kilometres or about one third of the country) increased from about 310 pairs (120 nests) in 1973–1975 to about 2800 pairs (1800 nests) in 1997 (Haapanen & Nilsson 1979, Nilsson et al., in prep.). However, a large proportion of the Whooper Swans of northernmost Sweden probably winter at the Norwegian coast, whereas the winter population in southern Sweden includes swans both from Sweden and from more easterly breeding areas (Mathiasson 1991, Preuss 1981). Indices from the midwinter counts (IWC) did not show a significant change in the wintering population between 1967 and 1994, although there were some indications of an increasing trend from 1979 onwards. Differing trends were found for coastal and inland sites, however, with indices increasing inland and decreasing for coastal waters. This lack of agreement between the country-wide surveys and the midwinter indices may be related to a change in habitat selection in part of the winter area, with Whooper Swans in South Sweden, especially in Scania, to a large extent feeding in fields far away from the wetlands covered by the IWC.

The indices from the IWC presented by Rose (1995) indicate a doubling of the Continental West European wintering population since 1974. Even if the breeding population of northern Sweden (and also other parts of Fennoscandia) has increased at a higher rate since then (Nilsson et al., in prep., Ohtonen 1992), there are no census data from more easterly breeding areas. Addressing the situation on the European level would be premature, in advance of an analysis of the 1995 survey (Laubek et al., in prep.), but separate reports indicate that Whooper Swans to a large extent feed in fields (Cranswick et al. 1996, Laubek 1995, Rees et al. 1997).

Field feeding by Whooper Swans now seems to be

a regular habit in different parts of the wintering range. In Denmark, some 80% of Whooper Swans fed on submerged vegetation such as *Zostera*, *Ruppia* etc. upon arrival in October (Laubek 1995). By December, about 30% of Danish swans were found on water, however, with less than 15% of the swans seen on water later in the winter. As in Scania, the Whooper Swans wintering in Denmark used both winter cereals and oil-seed rape, but Laubek (1995) did not mention sugar beet spill, which was an important food source in Scania in November and December. A much higher proportion of the Whooper Swans in Scania were seen feeding on rape compared to Denmark, where a higher proportion than in Scania were seen on winter cereals. This difference might be due to differences in snow cover, rape being easier to reach than cereals with some snow on the fields.

Laubek (1995) also studied the habitat choice of Bewick's Swans *Cygnus bewickii* in Denmark and found marked differences between the two species, although about 80% of both Bewick's and Whooper Swans were feeding on land. Among Whooper Swans, no less than 75% of the birds feeding in fields were found on arable crops, compared to 25% of the Bewick's Swans, which fed on grassland and stubble fields to a much greater extent. Bewick's Swans arriving in the Netherlands in autumn also fed first in water, especially on *Potamogeton* tubers, and later changed to field feeding (Dirksen et al. 1991). Besides winter cereals and rape they were also seen feeding on root crops.

In Britain, the habitat choice for wintering Whooper and Bewick Swans is somewhat different from the situation in Scania and Denmark, the majority of the Whoopers were found on water habitats, whereas the majority of the Bewicks were found on arable land (Rees et al. 1997). Overall less than 15% of the Whooper Swans were found on arable land in the UK during the 1990 - 1991 winter (Rees et al. 1997) and less than 7% in January 1995 (Cranswick et al. 1996). For those feeding on arable land, root crops were most important during November - January, cereals and stubble also being used. Brazil (1981, 1984) reported similar field use from Scotland.

The field feeding of swans is a relatively recent habit and, in Sweden, mainly restricted to the southernmost provinces where the lighter snow coverage allows the swans to reach the crops. Data on the start of the field feeding habit are scarce. The first observations recorded in Sweden were made during the hard winter of 1963, when some flocks were seen feeding on winter cereals close to their normal

aquatic feeding areas during icy periods. Brazil (1984) mention that the first field-feeding Whooper Swans in Scotland were seen in relation to the hard winters of the 1940s, when a proportion of the swans took up the habit of flying inland to feed returning to roost at night on the water. The change in feeding habits may have been triggered by food shortage in periods when aquatic vegetation could not be reached due to freezing conditions, but when snow free fields were available, leading to the swans detecting new feeding opportunities.

Similarly marked changes in feeding habits have been noticed for Bewick's Swans wintering in the Netherlands, which up to the late sixties fed mainly on aquatic vegetation before switching to arable land and grassland (Dirksen et al. 1991). The Bewick's still prefer *Potamogeton* tubers, but since 1975 this food source is depleted by the birds in just one or two months, after which the swans change to other habitats.

Whereas there are clear indications that the shift from feeding in aquatic areas to field feeding in the Bewick's Swans in the Netherlands (Dirksen et al. 1991) is associated with food depletion, the situation is less clear for the Whooper Swan in mild winters. Even though there are no data to show that the same applies to them, it is quite possible that the change to field feeding is due to food depletion in the aquatic habitats in southernmost Sweden, which in turn is due to the increasing population. The eutrophication of many lakes has also led to a shift from macrophytes to planctonic production, leading to a decrease in the available food resources for swans in some lakes. There are, however, no indications of such influences for the shallow coastal areas in Scania, where extensive meadows of submerged vegetation of extensive *Zostera* beds and *Ruppia* are available for Whooper Swans and Mute Swans during all but the very coldest winters (Nilsson 1996).

The most important factor behind the field feeding of Whooper Swans in recent years is probably also changes in agriculture. Sugar beet were hardly ever available for swans and geese feeding in south Sweden in the 1950s, being an important food item in the autumn from the 1960s onwards, after the introduction of mechanical harvesting methods (Nilsson & Persson 1991). The larger acreage of autumn sown cereals is probably also important as is the introduction of new varieties of some crops, such as the new more tasty variety of oilseed rape used in recent years.

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Sammanfattning

Förändringar i antal och biotoputnyttjande hos övervintrande sångsvanar Cygnus cygnus i Sverige 1964–1997.

Sångsvanen tillhör de regelbundna vintergästerna i södra Sverige och ingår bland de arter som täcks av de Internationella Sjöfågelinventeringarna. Under senare år har sångsvanarna i Europa visat en mycket markant ökning och spridning i Sverige och annorstädes (Arvidsson 1987, Haapanen & Nilsson 1979). Denna ökning återspeglas emellertid inte tydligt i de index som beräknas på basis av midvintringinventeringarna vare sig i Sverige eller internationellt. En anledning till detta är den ökande tendens till att söka föda på olika fält ofta långt från våtmarker svanarna visat på senare år.

Mot denna bakgrund organiserade Wetlands International en speciell inventering i januari 1995 avsedd att täcka alla sångsvanlokaler av betydelse i de länder som utnyttjas av den Fennoskandisk-Ryska häckpopulationen. I denna uppsats analyseras data från den internationella inventeringen och jämförs med resultaten från sjöfågelinventeringarna för att belysa långtidsförändringar i det övervintrande sångsvanbeståndet.

Material och metoder

Metoderna som används i de internationella sjöfågelinventeringarna har beskrivits i ett flertal tidigare arbeten (Nilsson 1975, 1991), där också metoderna för indexberäkning behandlas ingående. Vid inventeringen 1995 eftersträvades så fullständig täckning som möjligt, varför alla gamla inventerare samt ett stort antal andra ornitologer kontaktades. Förutom uppgifter om antalet sångsvanar på de olika lokaler-na insamlades också uppgifter om valet av fälttyp.

Antal och utbredning 1995

Vid inventeringen 1995 inräknades 7439 sångsvanar i Sverige, varav 2240 i Skåne (Tabell 1). Som framgår av Figur 1, var arten väl spridd över södra Sverige men med en tydlig koncentration till Skåne och västkusten. I de flesta områden var täckningen god, men vissa kustavsnitt på Öland (normalt med få svanar) samt i Bohuslän kunde inte inventeras. Det uppskattas att antalet sångsvanar i Sverige i januari 1995 uppgick till minst 8000 men ej över 9000.

Beståndsförändringar

Index baserade på midvinterinventeringarna i Sverige 1967–1997 (Figur 2) visar ingen klar trend ($R=0,32$, $P=0,07$) utan endast fluktuationer mellan olika år. Baserat på beräkningarna på den senare delen av inventeringsperioden, noteras en signifikant trend uppåt från 1979 och framåt. De landsomfattande inventeringar som företagits 1971–1973, 1987–1989 samt 1995 visar dock en klar ökning i det övervinterande beståndet (Tabell 2).

Analyseras index för kust och inlandslokaler separat finner man en signifikant uppåtgående trend för inlandslokalerna ($R=0,64$, $P<0,001$), medan en nedgång antyds för kustlokalerna (Figur 3). Förändringarna kan tydas som en minskad tendens att vistas vid kustlokalerna i sydligaste Sverige under senare år, vilket framgår av inventeringsresultaten från Skåne, där antalet övervintrare i Öresund minskat kraftigt sedan 1960-talet, medan totalindex för Skåne visat en ökning fram till senare delen av 1980-talet följt av minskande Skåneindex för den senaste perioden med milda vintrar (Figur 4).

Fältval

Vid inventeringen i januari 1995 återfanns 70% av sångsvanarna på vattenbiotoper, medan 30% noterades på olika fält, ibland långt från vatten. Markanta skillnader föreligger mellan olika delar av landet, så noterades t.ex. 63% av sångsvanarna i Skåne på olika fält, medan motsvarande andel i SE Sverige var 35% och i övriga Sverige 12–13% (Figur 5). Under vintern var raps den dominerande fälttypen för de födosökande sångsvanarna i Skåne följt av höstsäd.

Under hela säsongen är raps och höstsäd de dominerande fälttyperna för de födosökande sångsvanarna i SV Skåne, men under november och december återfinns också många av sångsvanarna på resterna efter sockerbetskörderna. Under hösten utnyttjas ock-

så, om än i mindre grad, skördade fält med andra grödor, t.ex. potatis.

Förändringarna i antalet övervintrande sångsvanar i Öresundsregionen jämfört med index för Skåne totalt antyder att sångsvanarna började utnyttja fält mer regelbundet under 1970-talet, men de första observationerna av födosökande sångsvanar på fält gjordes i samband med isvintern 1963. Vanan blev sedan mer spridd, men index för Skåne följer beståndsutvecklingen ganska väl fram till vintern 1987. Under de därpå följande vintrarna minskar index kraftigt trots att ett stort antal svanar finns i landskapet under vintern, men nu på sådana lokaler att de ej täcks in av sjöfågelinventeringarna.

Diskussion

De landsomfattande inventeringarna i Sverige visar tydligt en ökning i vinterbeståndet parallellt med den ökning som noterats för det häckande beståndet, även om den inte är lika stor. Ökningen återfinns emellertid inte i det nationella sångsvanindex även om en viss ökning antyds och de internationella inventeringarna visar en ökande trend. Bristen på överensstämmelse mellan de landsomfattande inventeringarna och de årliga index förklaras av sångsvanarnas ändrade furageringsvanor med fler och fler sångsvanar sökande föda på fält långt från vatten jämfört med tidigare.

Fodosök på land är en regelbunden vana bland övervintrande sångsvanar i olika länder. I Danmark söker de flesta svanarna under ankomstperioden i oktober föda på vattenbiotoper, men skiftar sedan till olika typer av åkermark (Laubeck 1995). Höstsäd och raps är viktiga både i Skåne och Danmark, men rapsen dominerar starkt över höstsåden i Sverige, förmodligen beroende på att rapsen är lättare att komma åt under snöperioder. Laubek (1995) studerade också mindre sångsvanen. Betydande skillnader i fältval förekom mellan arterna även om ungefär 80% av vardera arten återfanns på fälten. Bland sångsvanarna sågs de flesta på åkrar, medan de mindre sångsvanarna huvudsakligen sågs på gräsmarker. Samma födotyper återfanns i Skottland, men en betydligt lägre andel av båda arterna sökte föda på land (Rees et al 1997). Mindre sångsvanen i Nederländerna startade också med en födosöksperiod på vattenlokaler under hösten för att sedan övergå till åkrar.

Sångsvanarnas födosök på land är en relativt sen vana och i Sverige begränsad till de sydligaste delarna där snödjupet inte är för högt. Första iakttagelserna gjordes i samband med en hård isvinter 1963,

medan Brazil (1984) anger att det första födosöket på land i Skottland observerades i samband med en serie kalla vintrar på 1940-talet. Liknande förändringar i de mindre sångsvanarnas uppträdande i Nederländerna noterades i slutet av 1960-talet (Dirksen et al. 1991). Här kunde man konstatera att den prefererade födan, rhizom av nate, räckte för ungefär två månader, varefter de mindre sångsvanarna tvingades söka föda på jordbruksmarken. Det är fullt möjligt även om belägg saknas att ett ökat tryck på

de akvatiska födoresurserna ligger bakom sångsvanarnas sentida furagering på land. En annan viktig faktor torde vara förändringar i jordbruket, bl.a. ändrade skördemetoder. Under 1950-talet utnyttjades sockerbeter inte alls av gäss och svanar, men med senare tiders mekaniska skörd finns mer och mer spill som utnyttjas av fåglarna (Nilsson & Persson 1991). Övergången till nya sorter, såsom en för fåglarna mer smaklig rapssort, är förmodligen också av betydelse i sammanhanget.