The significance of the Lake Neusiedl area of Austria for migrating geese

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Introduction

Lake Neusiedl, together with the Seewinkel area immediately to its east, has been designated under the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, of which Austria became a Party in 1982. Located at 47°48N 16°49E, about 50 km south-east of Vienna, the Lake covers some 14,300 ha of open water, about 1,300 of which are in Hungary (Figure 1). The water is shallow, around 1 m, alkaline and strongly fluctuating. The margins have reedbeds, *Phragmites australis*, which in places extend 6 km into the Lake. In the Seewinkel there are about 50 small salty lakes, the largest being Lange Lacke of 150 ha, which was until recently a World Wildlife Fund reserve. Very little of the special pannonic pasture, Hutweide, remains but fields of winter sown cereals and maize provide feeding grounds for geese. For more detailed descriptions of the area see Festetics and Leisler (1968) and Löffler (1979).

Although mainly important as a staging post for migrating geese, the Lake reedbeds also hold 300–400 pairs of Greylag Geese *Anser anser rubrirostris*, the only breeding goose of Austria. The migrant geese, besides Greylag, are mainly Bean Geese *Anser fabalis rossicus* and Russian White-fronted Goose *Anser albifrons albifrons*. Rare visitors are the Lesser White-fronted Goose *Anser erythropus* and the Red-breasted Goose *Branta ruficollis*. Some published data on goose numbers are available from earlier years, namely those of

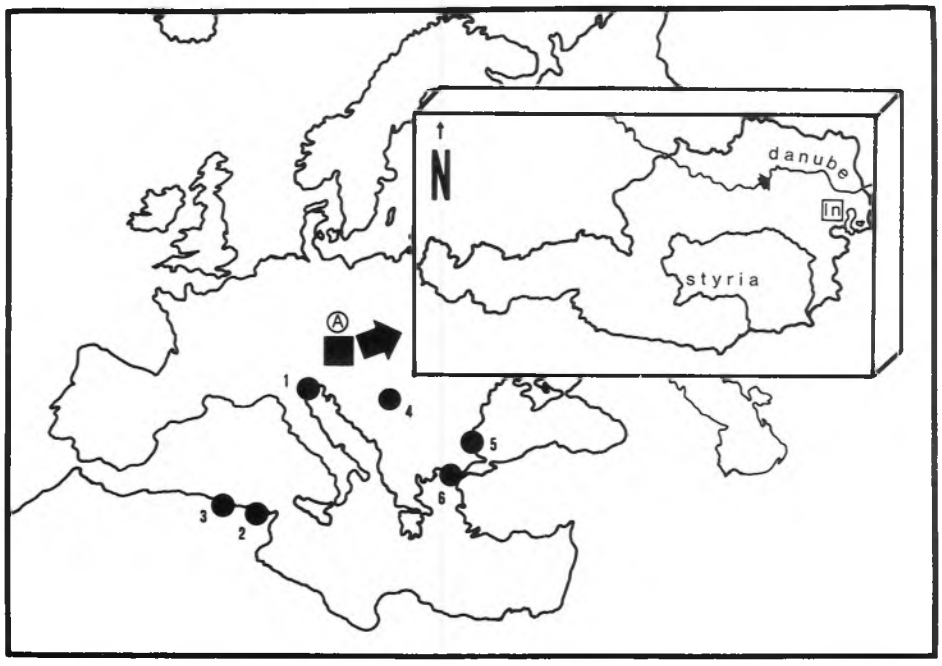


Figure 1. Geographical situation of Austria (A): The Danube in Lower Austria is symbolised by the small arrow. ln = Lake Neusiedl, east of it Seewinkel area, Lange Lacke; 1 = Friuli-Venezia Giulia and East Veneto (I); 2 = Lac de l'Ichkeul (TUN); 3 = El Kala wetlands (ALG); 4 = Kopacki Rit (YU); 5 = Burgas (BG); 6 = Evros Delta (GR, TR).

Bauer and Glutz (1968), Leisler (1969), Lebret (1982) and Van den Bergh and Philippona (1985).

The main objective of the present study was to determine the phenology of the goose migration.

Methods

Data for the seasons 1980–81 to 1982–83 were gathered non-systematically by several observers. Since the season 1983–84 monthly counts were carried out simultaneously in Austria and Hungary. The counts were made in the morning during the departure of the geese from their night roosts. Usually four teams counted at the main roost, Lange Lacke. Depending on the actual distribution of geese one to four teams counted on the eastern shore of Lake Neusiedl as well as on the other larger Lacken. Supplementary data originating from observations during the day were added where appropriate. The date of the count was determined by the International Waterfowl Research Bureau as the Sunday closest to the 15th of the month. Additional data from other countries are available from Czechoslovakia, Italy, Yugoslavia and Tunisia.

Results

Count data

For the seasons 1980–81 to 1982–83 there are only few data available (Table 1), but there is an obvious difference in numbers between Bean Geese, which went up to 40,000, while Whitefronts reached almost 10,000 only once. Greylag were only counted very intermittently, but their presence in this period is proved.

The monthly counts of the subsequent four years are shown in Figure 2. The first species to arrive in autumn in Seewinkel is the Greylag in September (e.g. 8.9.84: 127 birds; 24.9.86: 119 birds). Neckbanding of individuals has shown that they originate from Czechoslovakia as well as from Austria. The Austrian geese return to Seewinkel after a summer movement to Southern Moravia (Dick *et al.* 1984). Occasionally some Bean Geese can be observed at the end of September (18.9.84: 2; 24.9.86: 23), but the bigger flocks do not arrive until October (e.g. 21.10.81: 1,000; 8.10.85: 1,600). At this time the Greylag is already present in bigger numbers (e.g. 8.10.83: 10,000; 6.10.84: 1,800). The Whitefront is normally the last species to arrive (e.g. 13.10.85: 2; 17.11.85: 146). This general pattern of arrival applies to the whole period of observations, although there are some exceptions (see Figure 2).

The maximum number of Bean Geese recorded during the monthly counts amounts to 21,000 individuals (November 1985). The maximum number of Whitefront was 6,400 (February 1984) and of Greylag 9,000 (November 1984).

Environmental conditions

Autumn migration is slower than spring migration, and large flocks of geese can remain in the area under favourable

Table 1. Aperiodic counts from the Seewinkel, 1980–81 to 1982–83.

Date	*A. fabalis*	*A. albifrons*	Other	Source
26.10.80	23750	0	4000 *A. anser*	Lebret 1982
12–13.11.80	22000	3000		Lebret 1982
18.1.81	11	10		A. Grüll
End 2.81	19000			V. d. Bergh & Philippona 1985
7.3.81	16–18000	3500	2500 *A. anser*	Lebret 1982
15.3.81	5930	1000		A. Grüll
15.11.81	18950	3000		A. Grüll
17.1.82	1078	400	440 indet.	A. Grüll
End 2.82	11000			V. d. Bergh & Philippona 1985
14.3.82	1448	75		A. Grüll
14.11.82	ca 21844	ca 7275		A. Grüll
16.1.83	17445	at least 9555	8910 indet.	A. Grüll
End 2.83	40000			V. d. Bergh & Philippona 1985
13.3.83	613	205	882 indet.	A. Grüll

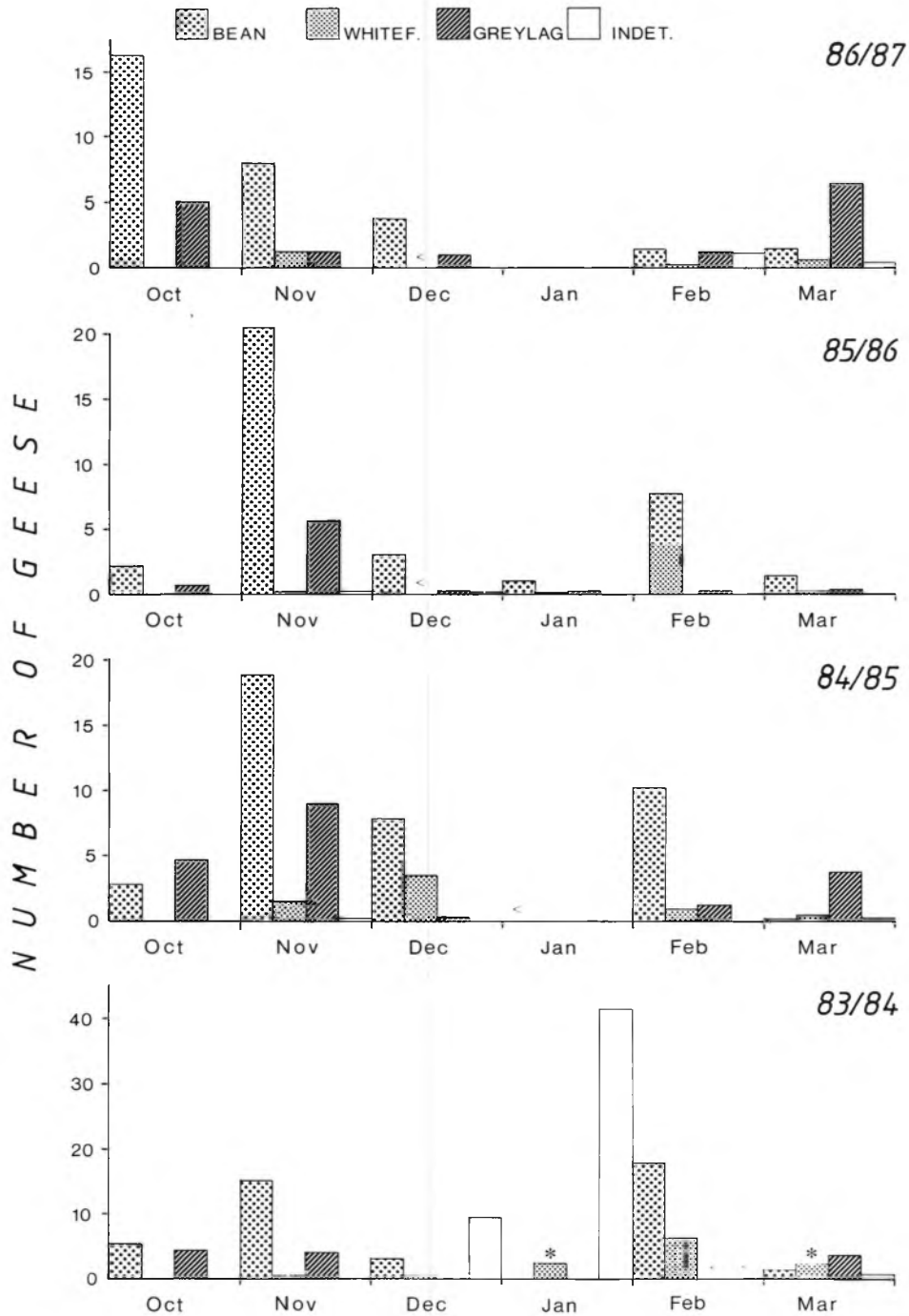
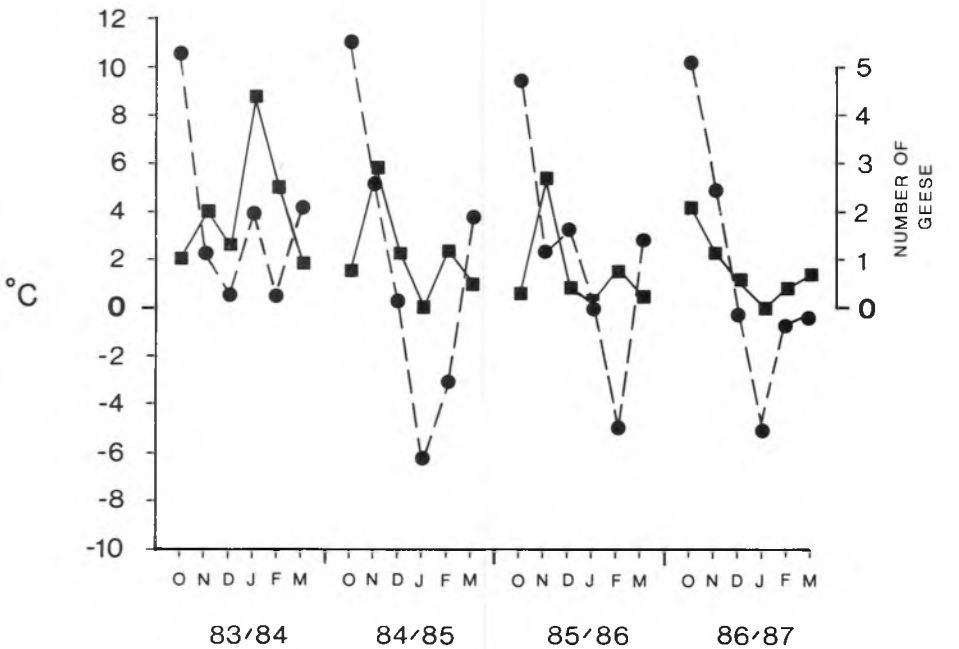


Figure 2. Monthly goose counts: 1983–84 to 1986–87 in Seewinkel. Number of geese in thousands, rounded to the nearest hundred. Unidentified geese = indet.; * = approximately; < = less than 100.

Figure 3. Relation between temperature and goose numbers. Monthly means of temperature (weather station Frauenkirchen): circles and broken lines. Total of geese in Seewinkel (rounded to the nearest thousand) in the years 1983–84 to 86–87: squares and solid lines.



weather conditions. Using the monthly mean of temperature to assess weather conditions, it can be clearly shown that more geese remain under mild circumstances (Figure 3): e.g. in the season 1983–84, 44,000 geese were counted in January after the weather since 16th December had turned warmer, accompanied by rainfall (maximum temperature 2.1.84: 10.5°C).

The following winters were rather severe: in January 1985 only 80 geese were counted, in January 1986 1,450, and during the extremely cold January 1987 (minimum temperature 13.1.87 −19.5°C), no geese at all were present.

Apart from the temperature the duration of snow cover in late autumn and between December and January also seems to be an important factor in determining whether geese leave the area. Deep snow obviously affects the availability of winter cereals. An unusually high number of geese occurred in January 1984, a year where from October to the end of January no snow had fallen (Figure 4). Similar conditions were recorded in 1982–83 (January mean temperature: 4.3°C), when more than 35,000 geese were counted (Table 1, Figure 4). The unfavourable coincidence of low temperature and deep snow in 1986–87 correlates with a complete disappearance of geese in January.

Spring migration to the breeding areas generally occurs faster (Elkins 1983) and this also applies to Seewinkel. Unfavourable weather conditions at this time do not dramatically alter the count totals. The main migration of Bean and White-fronted Geese in spring 1987 occurred before the official count day in March and approximately 25,000 were present on frozen and snow covered Lange Lacke on 4th March (Figure 2), with a temperature of −11°C. This is extremely interesting as this March was the coldest since 1958 (minimum temperature −18°C on 5th March), with heavy snowfall and blizzards reported even from the middle of Greece and Yugoslavia. Also in February 1986 there were 3,000 unidentified geese and 370 Greylags on Lange Lacke (25th February frozen and snow covered, −13°C). The same phenomenon occurred in February 1983 (Table 1; minimum temperature: 23rd February −12°C).

Importance of other areas for geese

Seewinkel is the only important place for geese in Austria, although there are a few observations from the Danube Valley in Lower Austria (Figure 1) since 1970–71 (F. Böck; H.P. Kollar; R. Parz; A. Ranner, in litt.). During the cold winters 1984–85 (December to January more than 1,000) and 1986–87 (January at least 100), quite a lot of Bean Geese were reported from Styria (Figure 1; Hable 1986; Sackl, in litt.).

Lake Neusiedl is divided into two parts by the Hungarian border in the south. When the main roost at Lange Lacke is totally frozen the geese move to the Lake to stay overnight. Thus on 16th February 1986 Lange Lacke had 800 geese, whereas the southern part of Lake Neusiedl had 4,700. As a great part of these geese fly to Hungary to feed, the Hungarian count results represent a valuable supplement (Figure 5). This shows the importance of the whole area for the geese. The Bean Goose also dominates in the Hungarian counts. In October this species is more frequent there than the others, whereas the Greylag can be the more numerous in Austria. In general the relationship between the various species is similar to that in Austria, with a spectacular exception in January 1987. Then ice and snow resulted in the absence of geese in Austria, but there were 530 in Hungary. When the Austrian and Hungarian data are combined, the maximum number of geese occurred in the mild January of 1984, when 69,100 were counted. The closest to this peak was recorded in November 1985, when 42,000 geese were present. The lowest figure was in January 1987, as previously discussed.

Southern Moravia, which is situated to

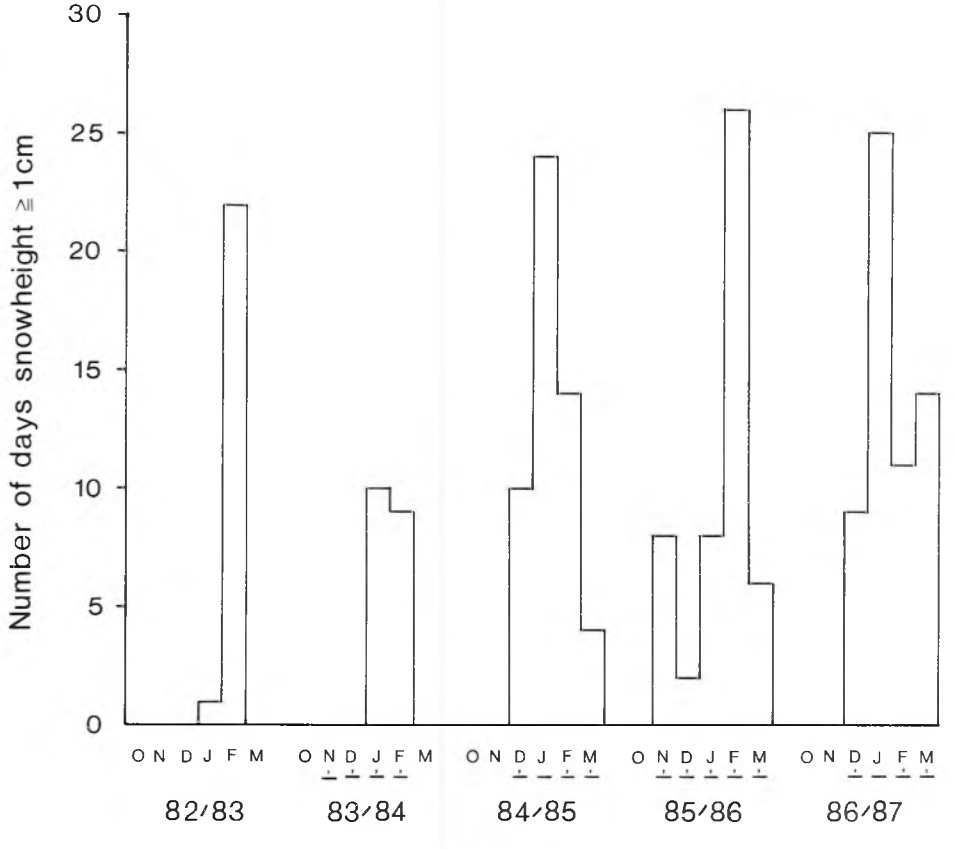


Figure 4. Depth of snow and the occurrence of ice on Lake Neusiedl and Lacken in the years 1982–83 to 1986–87. ___ = total ice coverage; _'_ = some parts free of ice.

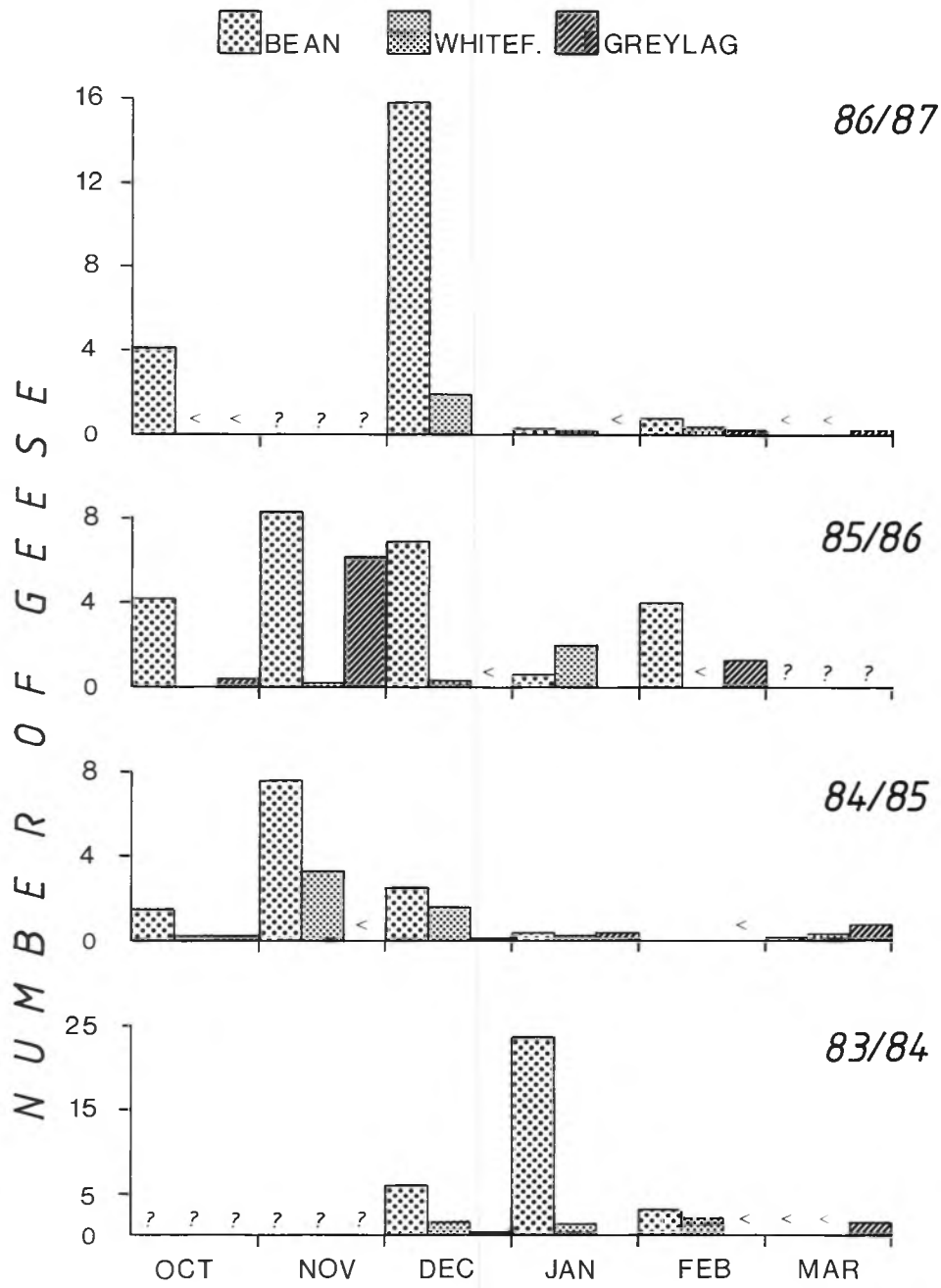


Figure 5. Monthly goose counts 1983–84 to 1986–87 in the Hungarian part of Lake Neusiedl. Number of geese in thousands, rounded to the nearest hundred. < = less than 100; ? = no data. (Unpubl. data from L. Karpati and S. Farago.)

the north of Austria, plays an important role for the Greylag (Dick *et al.* 1984; Hudec *et al.* 1986) but is less important as a winter gathering place (Hudec and Pellantova 1985). The decrease of Greylag in Southern Moravia is accompanied by an increase in numbers in Seewinkel (Table 2, Figure 2). The opposite situation during springtime is not so obvious because the geese leave Seewinkel after the March count. For example, on 20th March 1985,

Table 2. Greylag Goose counts in Southern Moravia (Czechoslovakia). Data from K. Hudec.

	1984–85	1985–86
Oct	4740	5150
Nov	2050	1070
Dec	208	100
Jan	15	100
Feb	36	220
Mar	300	300

apart from the Austrian breeding population, there were still 1,300 Greylags resting on Illmitzer Zicksee. That there is in fact a movement is indicated by observations of neckbanded geese. Between 1983 and 1986 (February to April) 4 East German and 10 Czech rings were read in Seewinkel.

Discussion

The collected counts from 1980–81 to 1982–83 (Table 1), as well as the regular monthly counts since 1983–84 in Austria and Hungary, show the phenology of 3 goose species (Figure 2, 5). Supplementary data between the count days indicate important changes but cannot replace an organised count. For instance, there was an early migration in March 1987, there being on 4th March 25,000 Bean and White-fronted Geese on Lange Lacke, yet on the count day there were only 2,500. The count results of course do not represent absolute figures for the various migratory species, but they give information about phenology, population trends and the importance of the staging area. Although the Seewinkel area has changed its character considerably during recent decades as vineyards expand and various Lacken are drained, it is still an important staging area for thousands of migrating geese, with the highest number of geese normally recorded in autumn. In mild weather, however, geese remain much later. This suggests that low temperatures, especially in December and January, are responsible for the presence of high numbers of geese during the winter. Bean and White-fronted Goose are more likely to be an exception to this general "rule" than the Greylags. For instance, after 5th December 1983, when the Lake and all Lacken were recently frozen (minimum temperature 3rd December −10.5°C), approximately 2,500 Whitefronts and Bean Geese were still observed in the area. Bean Geese have been recorded in southern Sweden during winter (Ogilvie 1978). The tendency of these two species to endure short periods of bad weather rather than move away like Greylag may be due to their being at a greater distance from their breeding areas, the hypothesis being that geese try to pass winter as close as possible to their breeding range (Owen 1980).

In contrast, temperature, ice and snow do not affect spring migration to the north. This migration is much faster than the autumn and the geese come on time even under severe weather conditions.

Populations and migrations

Greylag Goose

The count results agree well within those of former years (Bauer and Glutz 1968; Leisler 1969), suggesting no great changes in numbers. Bauer and Glutz (1968) had mentioned 400–500 individuals staying in the area during the mild winter 1966–67. In the mild winter 1983–84 the usual number of birds was recorded in the winter quarters at Lac Ichkeul in Tunisia (Figure 1), 16,700 on 5th December 1983 (Skinner 1986), 11,300 on 15th January 1984 (count by Skinner and Dick). A cold spell of weather in mid November resulting in the ice coverage of Lake Neusiedl and the Lacken may have hastened the Greylags' disappearance, the last large flock of 2,230, in Seewinkel, being seen on 13th November. Although some thousands of Bean and Whitefronts were present up to December, the largest number of Greylags was only 71. In January only 200 were counted in Hungary, and no remarkable numbers in Austria. This could mean that the autumn migration of the Greylag is more fixed and

less flexible than the migration of other geese.

A part of the Greylag population stops on the North Adriatic coast during spring migration from Algeria (Skinner and Smart 1984) and Tunisia to Austria and Czechoslovakia (Parodi and Perco 1980). According to counts organised by F. Perco in Northern Italy, geese are more numerous in spring than in autumn. Approximately 5,000 (including Bean and White-fronted Geese) were present in the North Adriatic coastal wetlands (i.e. Laguna di Marano, Laguna di Grado, Laguna di Caorle-Valle Vecchia, Valli di Comacchio; Figure 1) in late January 1985, while counts in autumn 1984 never exceeded 100 geese. There were slightly more than 500 geese in December 1985. The exceptionally high number of geese, 11,900, in February 1987 included 910 Greylags (Perco, in litt.). The observation of neckbands again indicated their origin: 10 Austrian and 14 Czech neckbands being observed in the last three winters. Also recoveries of shot geese indicate their migratory route is via Sardinia from North Africa (Dick 1987). This migration route is quite well defined; however, there are some ring recoveries which indicate a migration of an unknown extent to South-east Europe. Two geese ringed in Austria were reported from Yugoslavia, another from Hungary and a fourth from Bulgaria, on the coast of the Black Sea (Figure 1). Also two Czech geese were found in Yugoslavia, in January and March.

Bean Goose

The majority of the population belongs to the race *rossicus* (Huyskens 1986). The results of the present counts agree with the maxima for the years 1948–58, i.e. 20,000-35,000 (Bauer and Glutz 1968). The population has apparently recovered after a decrease in the 1960s. The exact origin in Siberia of the geese passing through Austria is not known, nor their wintering area. The potential winter quarters, such as Kopacki Rit or the Evros Delta (Figure 1) hold such variable numbers of geese (Mikuska; Athanasiou, in litt.), that no correlation can be found with Austrian passage numbers. The exchange of individuals between the Central-European and the Baltic-North Sea population, as is indicated by neckband resightings, is quite unusual (Van den Bergh and Philippona 1985). The Baltic-North Sea population migrates through the German Democratic Republic to the Netherlands and France. The Austrian Bean Geese migrate through Czechoslovakia and must have their origin more to the east in Siberia.

White-fronted Goose

The Whitefront is the last goose species to arrive in Seewinkel in autumn (Figure 2) and it is the last to leave in spring. Even in April there are some in the area (e.g. 1.4.85: 22). The dramatic decrease in numbers since the period of 1948 to 1958, when 40,000–45,000 geese were reported (Leisler 1969) has already been reported elsewhere (Dick 1986). This decrease may be due to a decline in the breeding population as such, but another possible explanation is a shift of the migration route so that the birds now winter with the North Sea population. This has greatly increased since the 1960s (Rooth *et al.* 1981). A shift of the migration route to the east is also possible. In Hungary the Whitefront numbers increased between 1972 and 1982 by 40% (Sterbetz 1983). More research is needed to unravel this complex problem.

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Summary

Three migrating goose species *Anser fabalis*, *Anser anser* and *Anser albifrons* use the Seewinkel area near Lake Neusiedl in Austria. Counts from 1980–81 to 1982–83 by various authors are analysed and compared with organised monthly counts since 1983–84 in

Seewinkel and on the Hungarian part of Lake Neusiedl. The most numerous species is *A. fabalis*, with up to 40,000 birds, *A. anser* reach a maximum of 9,000, and *A. albifrons* 6,400. The first two species have changed little in numbers since the 1950s and 1960s, but *A. albifrons* has decreased dramatically. In general, mild weather leads to the presence of a large number of geese in winter. Air temperature and snow cover are the most important factors determining whether the geese remain. *A. albifrons* and *A. fabalis* were less sensitive to short periods of bad weather. Spring migration is much faster than autumn migration.

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