

PHENOLOGY, DISTRIBUTION AND PROTECTION OF MIGRATING GEESE IN THE NATIONAL PARK AREA LAKE NEUSIEDEL/ LAKE FERTŐ

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1. INTRODUCTION

During the years 1990-1992 a frontier-crossing cooperation project between Austria and Hungary concerning geese-monitoring was initiated. The project was part of the preliminary studies before the official establishment and foundation of a frontier crossing National Park in the Lake Neusiedel/ Lake Fertő area. Although counting and monitoring of various waterfowl species in this area has a long tradition on both sides of the political border (e.g. BAUER *et al.*, 1995, FESTETICS *et al.*, 1968, LEISLER, 1969, LÖFFLER, 1982, STERBETZ, 1967), further efforts were made to intensify the cooperation in field research between the two countries.

The aim of the project was to gain a more detailed documentation about the actual situation of the dynamics and interactions of migrating winter geese in this area. Data about the total number of geese and the regional distribution of different species in Austria and Hungary were collected, the activity of flocks as well as possible environmental impacts caused by human activities -like farming or hunting- were investigated. The results of the phenological situation and the picture of the regional and seasonal distribution of geese should help to harmonize the efforts for the protection of waterfowl and serve as a data basis for common management plans in the frontier crossing National Park.

2. STUDY

Lake Neusiedel/ Lake Fertő and the adjacent area, the "Seewinkel" in Austria, belong to the Pannonic region -being part of the most western bay of the little Hungarian Plain. Because of political reasons an ecological landscape unit is divided by a political border line. Only a few years ago this frontier was still part of the "iron curtain" between eastern and western countries. In some way the local and regional situation caused by political reasons

was advantageous for the conservation and for the future plans for the protection of wildlife though also. Especially bird species don't have to worry about barrier effects and so the whole region is an international well known and important resting area for migrating geese populations on their way from their northern breeding grounds to the south in Central Europe. Actually for Austria it is the most important geese area known. In the last years total numbers of geese in autumn exceeded 40.000 individuals on Austria roosting places (GRÜLL, 1988). On the Hungarian side of Lake Fertő between 10.000-15.000 geese were counted in the mid-eighties (FARAGÓ *et al.*, 1991; FARAGÓ, 1995). Mainly the southern part of the lake, which belong to Hungary as well as the surrounding marshland area are known also to be of special interest as a famous breeding area for herons, spoonbills, ducks and geese and to serve as one of the most important stop-over sites for migrating waterfowl and numerous waders (e.g. DICK, 1987.; DICK *et al.*, 1994; GRÜLL, 1988).

The total surface area of Lake Fertő covers 321 km², about 233 km² belong to Austria and 88 km² to Hungary. More than 50 % of the lake (total 178 km²) is covered with a closed reed belt along the shore line (Austria 103 km², Hungary 75 km²). The reed belt is reaching up to more than 8 km width on the Hungarian side, leaving only a rest of 13 km² open water surface on the Hungarian territory. The average depth of the shallow lake is about 1.1 - 1.5 m.

In the years 1991/1992 a frontier crossing National Park was established in the southern and south-eastern part of the lake and the Seewinkel and on the Hungarian side, covering an area of about 140 km². The park areas and the different categories of protection (nature zone, protection zone) area shown in **Figure 1**.

3. MATERIAL AND METHOD

Also before to political changes in Eastern Europe during the last years, a cooperation between Austria and Hungary concerning goose-counts was evident. These activities, based on personal engagement, were organized by regional representatives and primarily concentrated on international fixed counting dates.

In addition to already existing cooperation, further effort during this study was taken to organize more frequent simultaneous counts over the whole geese migration period (October-March) to get a more detailed view of geese-activity.

National Park
"Lake Neusiedel - Lake Fertő"

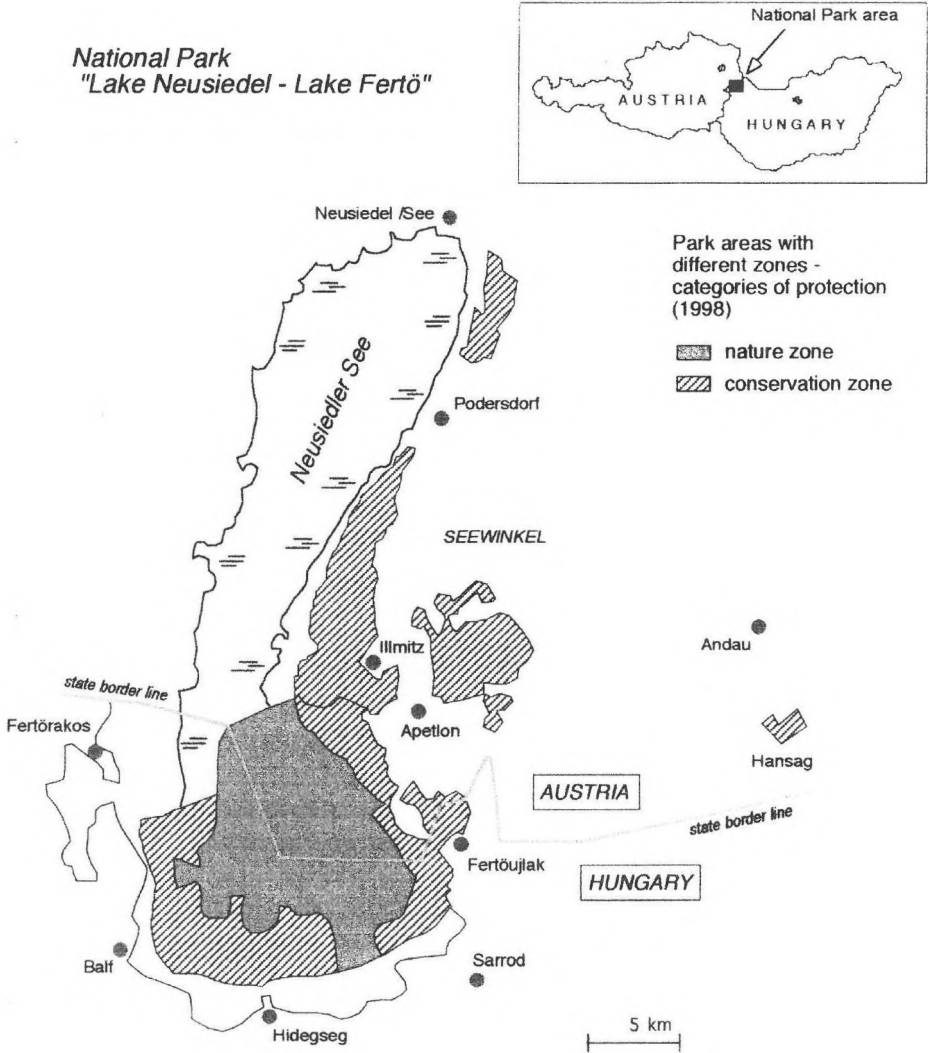


Figure 1: National Park area Lake Neusiedel/Lake Fertő and vicinity

A team of collaborators had to be established, who were responsible for the accuracy of the data collection. Geese were counted simultaneously every second week when they were leaving their roosting places in Austria and Hungary. In that way the results of single counts could be summarized and the total sum for the number of geese in the whole region could be calculated. 18 observation points for geese-counts were set up around the lake and the central lakes in the Seewinkel (mainly the "Lange Lacke") are the most important locations where geese are staying overnight, in Hungary the geese are roosting on the lake itself. The distance between these two main roosting-sites is about 10 to 12 km. The dominant flight direction of geese, leaving the roosting-places on the Hungarian side of the lake, is south-east. In Austria the actual situation of used roosting places may vary because of climatic conditions and therefore also the departure of geese from their roosts is more flexible. According to the known results north-east to east being the mostly preferred directions. After the morning-departure-flights countings teams in Austria and Hungary followed the flocks during day-time to observe size, composition and activity of the birds in feeding areas (FARAGÓ, 1994).

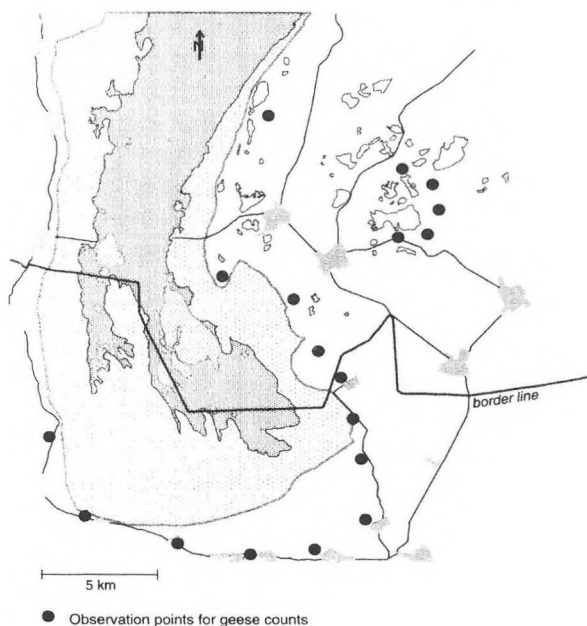


Figure 2: Distribution and position of observation points for geese counts in Hungary and Austria

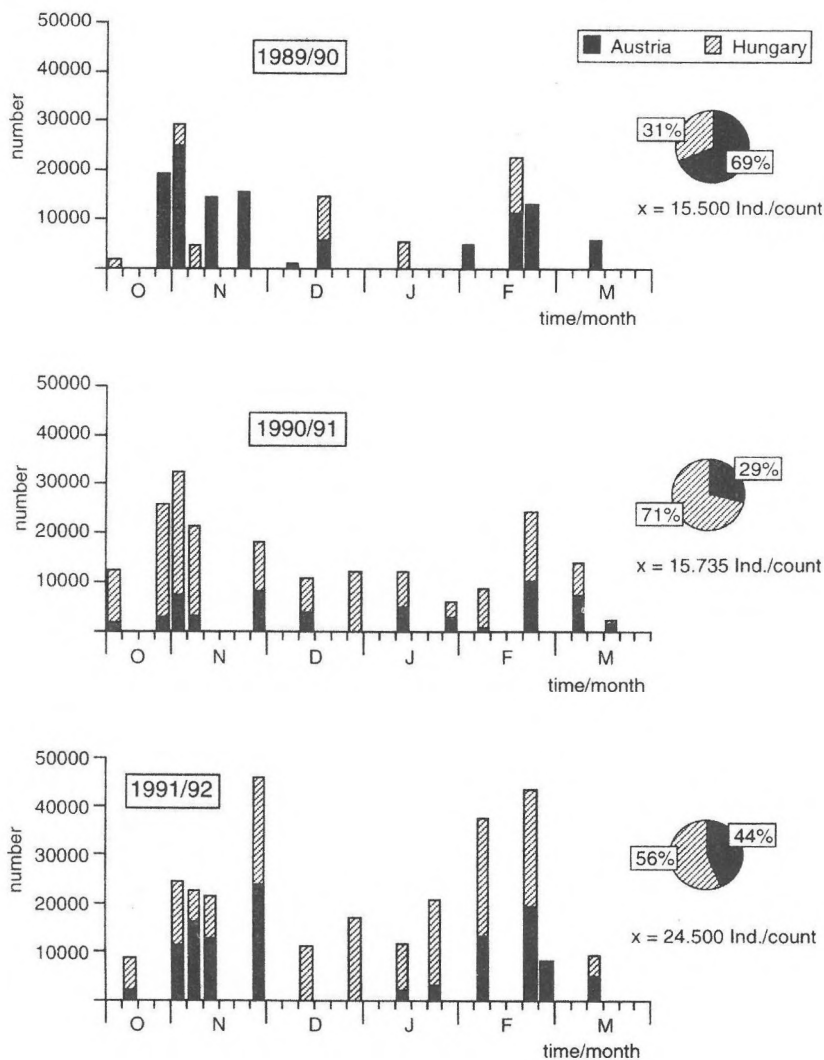


Figure 3: Phenology and regional distribution (%) of geese counted on the Austrian and Hungarian side of the Lake Neusiedel /Lake Fertő during three winter-seasons (1989/1990-1991/1992; simultaneous roosting-counts)

4. RESULTS AND DISCUSSION

4.1. Total number of migrating geese

Three geese species -the Bean Goose (*Anser fabalis*), the Greylag Goose (*Anser anser*) and the White-fronted Goose (*Anser albifrons*)- can be observed in great numbers in the area regularly. **Figure 3** shows the pattern of migration and the total number of all geese species together, which were counted simultaneously in Austria and Hungary in three following winters. In general the curve is reaching two peaks during the winter seasons: geese-migration normally concentrated at the beginning or at the end of November, reaching daily maximum numbers from 30.000 to 45.000 individuals during the study-period. Early spring migration was highest in the middle or at the end of February.

This time pattern corresponds with the results of previous years (DICK *et al.*, 1994) but the influence of environmental parameters may vary the picture. The date of arrival, the total number of birds and how long geese are staying in the area highly depend on the actual climatic conditions, the local ones as well as the whole situation in middle Europe. Changes in the traditional migrating routes might also influence the local situation (e.g. MADSEN, 1999.; STERBETZ, 1983). Looking at the three species involved, there is also a clear difference at which time (month) the species normally arrive and reach their maximum numbers in the Lake Fertő area and as a results dominate the various roosting and feeding-flocks over the whole winter period.

For Austria the Lake Fertő -Seewinkel area is the most important region for migrating geese in the whole country where the majority of geese is concentrated (see also **Figure 9**). For the Hungarian side the lake-area covers approximately a proportion of about 10 % the overall Hungarian migrating geese population.

4.2. Phenology of species

Comparing the total numbers of geese which were counted on the Austrian and Hungarian territory together, the Bean Goose clearly was the most dominant species, reaching maximum numbers of more than 33.000 individuals in November 1991 during the three year observation period. The Bean Goose is the typical "winter goose", being the most numerous species in the hunting bag statistics also. Migration numbers are usually highest during November (**Table 1**. and **Figure 4**). Bean Geese are also staying in the region when temperatures are moderate and adequate feeding areas are available (no snow cover, FARAGÓ,

1991). During the spring migration period flock sizes between 10.000 - 15.000 birds in February were observed.

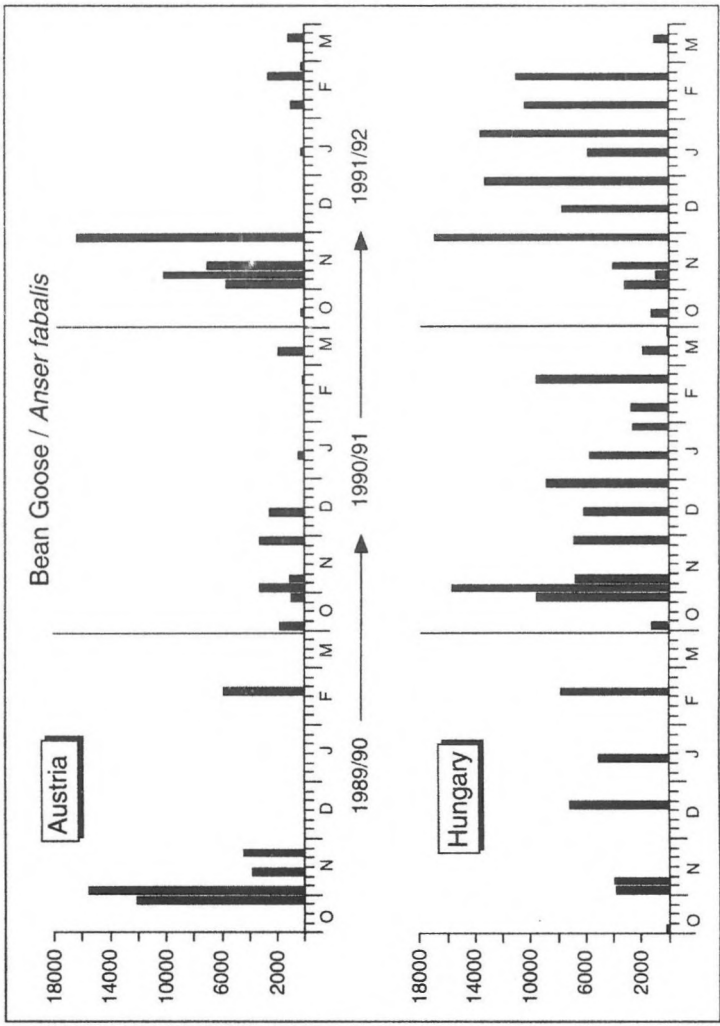


Figure 4: Phenology, number and regional occurrence of Bean Geese (*Anser fabalis*) counted simultaneously on the Austrian and Hungarian roosting places; observation period: years 1989/1990, 1990/1991, 1991/1992, October until March

The Greylag Goose is the only goose species, which is also breeding in the Lake Fertő region. Bigger flocks of this goose are arriving earlier in the area than the Bean Goose. Greylag Geese are showing a first migration peak at the end of October and the beginning of November, when flock sizes raised to 10.000 - 12.000 bird on the roosts (**Table 1., Figure 5.**). During spring migration the geese normally were most abundant in the month of February. Up to 12.000 birds were registered in February. The Greylag Geese population is showing a clearly growing tendency during the last years on the Hungarian side of the Lake Fertő (FARAGÓ, 1996).

Table 1: Daily maximum numbers of geese species observed in Austria and Hungary; results from roosting counts separated for the autumn (October-December) and spring (January-March) migration period during the years 1989/1990, 1990/1991, 1991/1992. A = Austria, H = Hungary

<i>1989/90</i>	<i>autumn</i>		<i>spring</i>	
	A	H	A	H
Anser fabalis	15.533 (Nov)	7.159 (Dec)	5.817 (Feb)	7.719 (Feb)
A. anser	8.845 (Nov)	1.563 (Oct)	3.173 (Mar)	2.520 (Feb)
A. albifrons	713 (Nov)	1.529 (Dec)	1.946 (Feb)	1.113 (Feb)

<i>1990/91</i>	<i>autumn</i>		<i>spring</i>	
	A	H	A	H
Anser fabalis	3.285 (Nov)	15.680 (Nov)	1.870 (Mar)	9.508 (Feb)
A. anser	2.798 (Nov)	10.933 (Nov)	7.378 (Feb)	2.726 (Feb)
A. albifrons	1.028 (Dec)	858 (Oct)	4.250 (Mar)	3.844 (Feb)

<i>1991/92</i>	<i>autumn</i>		<i>spring</i>	
	A	H	A	H
Anser fabalis	16.380 (Nov)	16.915 (Nov)	2.583 (Feb)	13.542 (Jan)
A. anser	5.893 (Nov)	8.677 (Nov)	3.504 (Feb)	8.528 (Feb)
A. albifrons	1.143 (Nov)	2.722 (Dec)	12.507 (Feb)	2.537 (Jan)

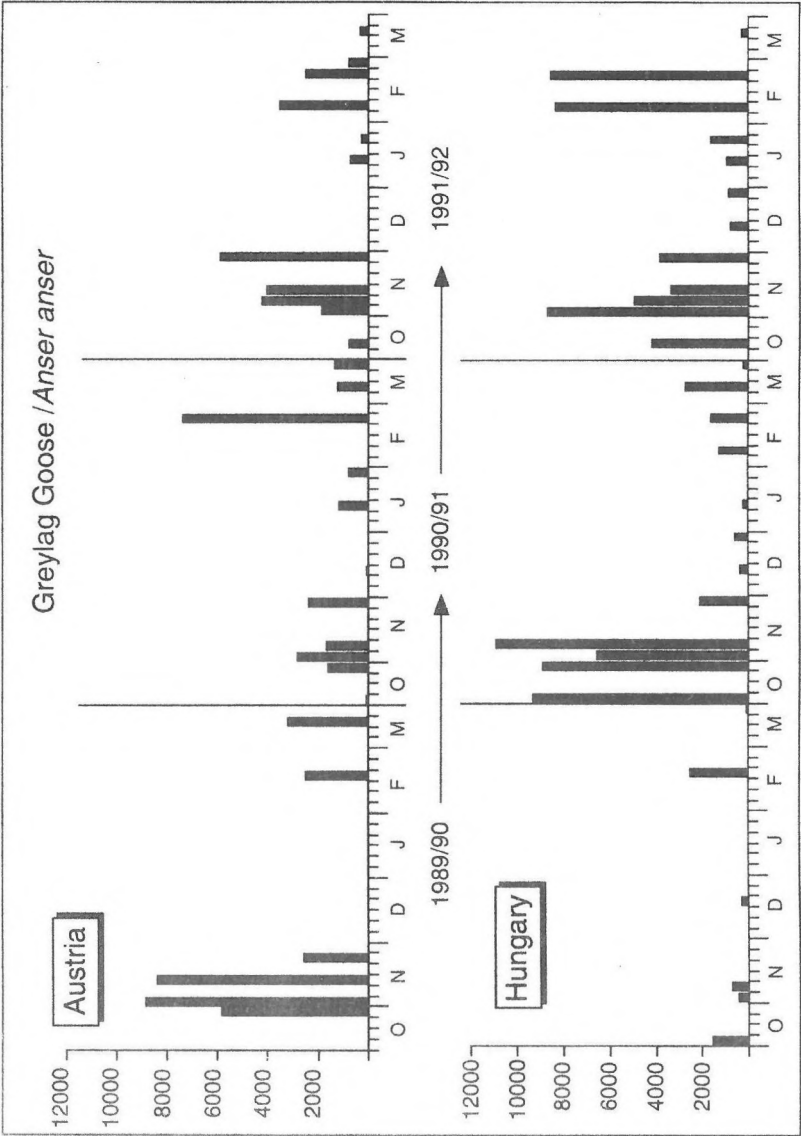


Figure 5: Phenology, number and regional occurrence of Greylag Geese (*Anser anser*) counted simultaneously on the Austrian and Hungarian roosting places; observation period: years 1989/1990, 1990/1991, 1991/1992, October until March

The White-fronted Goose is the latest arriving winterguest with the lowest numbers among the three geese species in the Lake Fert -Seewinkel area (**Table 1., Figure 6.**). Bigger flocks and maximum numbers were concentrated on the roost localities mainly in February/March. On the Hungarian side higher numbers between 2000-3000 birds were also present in December (>2.700 Indiv., Dec. 1991) and January (>2.500 Indiv., Jan., 1992). An extraordinary migration peak could be registered during the spring period in the year 1992, when a total of almost 15.000 White-fronted Geese were present in Austria and Hungary together at the end of February; the majority of more than 12.000 geese were roosting on the Austrian side (PARZ-GOLLNER and FARAGÓ, 1991., FARAGÓ, 1993).

4.3. Regional distribution

The data shown in the **Figure 3-6** point out, that geese are using the landscape area and the ecological resources with different points of interest. It is obvious from the simultaneous counting results that the total number observed as well as the species composition in the flocks differ between Austria and Hungary (FARAGÓ, 1993.; PARZ-GOLLNER, 1994).

A quite significant change in the distribution of wintering geese roosting on Austrian and Hungarian territories could be observed in the two following winter seasons 1989/1990 to 1990/1991. Almost a complete shift between the localities could be registered. The proportion of geese roosting on the Hungarian part of the lake increased from 31 % in the years 1989/1990 up to almost 71 % in the winter season 1990/1991, for the same period the number of geese counted in Austria dropped from 69 % to 29 % (**Figure 3**).

One of the important result on the basis of the frequent simultaneous counts during these two following winter seasons was, the even though a shift between Austrian and Hungarian roosting places occurred - the total number of migrating geese in the whole area did not decrease. The same amount of birds were migrating through the area (1989/1990 $\bar{x}$ = 15.500 Indiv./count, 1990/1991 $\bar{x}$ = 15.735 Indiv./count). Even daily maximum numbers were similar: between the 3./5. November 1989 approximately 30.000 geese were counted, on the 3. November 1990 more than 32.000 geese were registered.

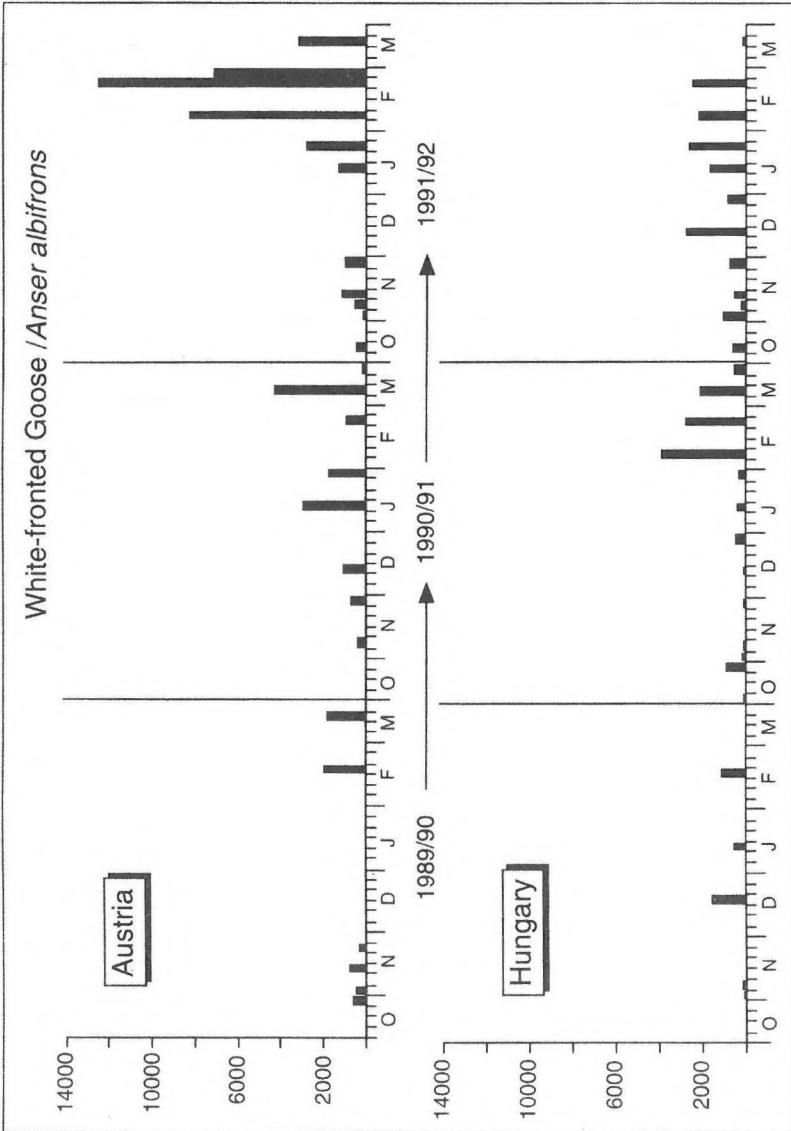


Figure 6: Phenology, number and regional occurrence of White-fronted Geese (*Anser albifrons*) counted simultaneously on the Austrian and Hungarian roosting places; observation period: years 1989/1990, 1990/1991, 1991/1992, October until March

The main reason for the regional shift in this winter season the lack of water on the Austrian side. The most important, central roosting place Lange Lacke fell dry after a very hot summer and as a result migrating geese concentrated on Hungarian territory. But it could be demonstrated, that for such a situation the retreat area on the Hungarian side of the National Park was big enough and could easily compensate the loss of adequate resting sites in Austria.

In the following winter season 1991/1992 the water situation in Austria was normal again and the geese were using the traditionally roosting places as usual, but still more geese were counted again on the Hungarian side. Autumn and spring migration reached maximum numbers around 45.000 geese, the average amount of geese per count was raising from 15.735 Indiv./count to 24.500 Indiv./count.

Other reasons for shifts between Austrian and Hungarian roosting-places can be observed during very cold winters with icing periods. The little lakes in Austria, which are used as roosting places, are very shallow and therefore are frozen quickly when low temperature occurs, but it takes some time until the lake itself is covered completely with solid ice. During cold winters with ice-cover and lot of snow, geese normally are leaving the area leaving the area completely migrating further to the south

4.4. Seasonal differences in the distribution of species in 1991 and 1992

Autumn

Compared to the total amount of geese which were registered in autumn (October until December) a quite similar distribution of geese in Austria and Hungary was noticed. The Bean Goose was the most dominant species on the roosting places in both countries, followed by Greylag Geese and only few of White-fronted Geese were present during the autumn migration period (**Figure 7**).

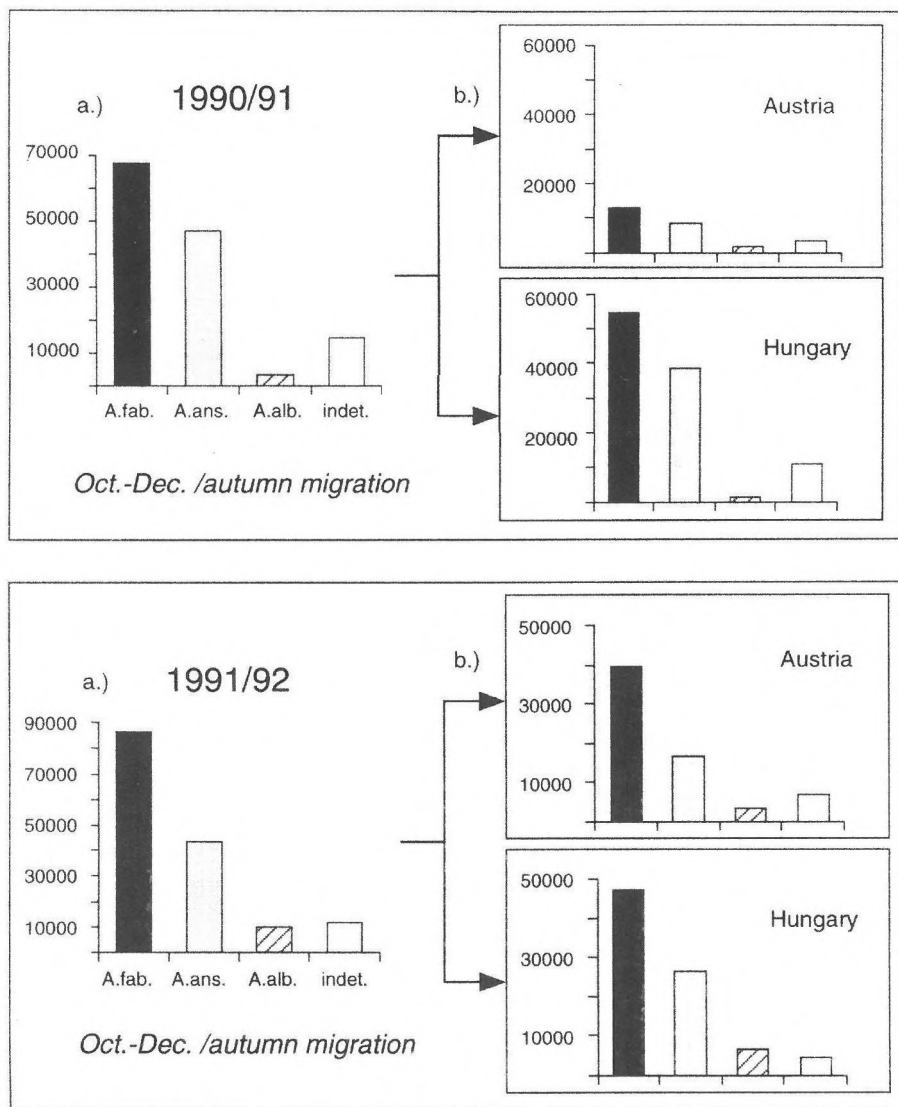


Figure 7: a: Total sum of all geese counted in Austria and Hungary together during the period of migration (October-December) in the winter season 1990/1991 and 1991/1992. **b:** Distribution of different species on the two state territories (A.fab = *Anser fabalis*, A.ans = *Anser anser*, A.alb = *Anser albifrons*, Indet = not identified)

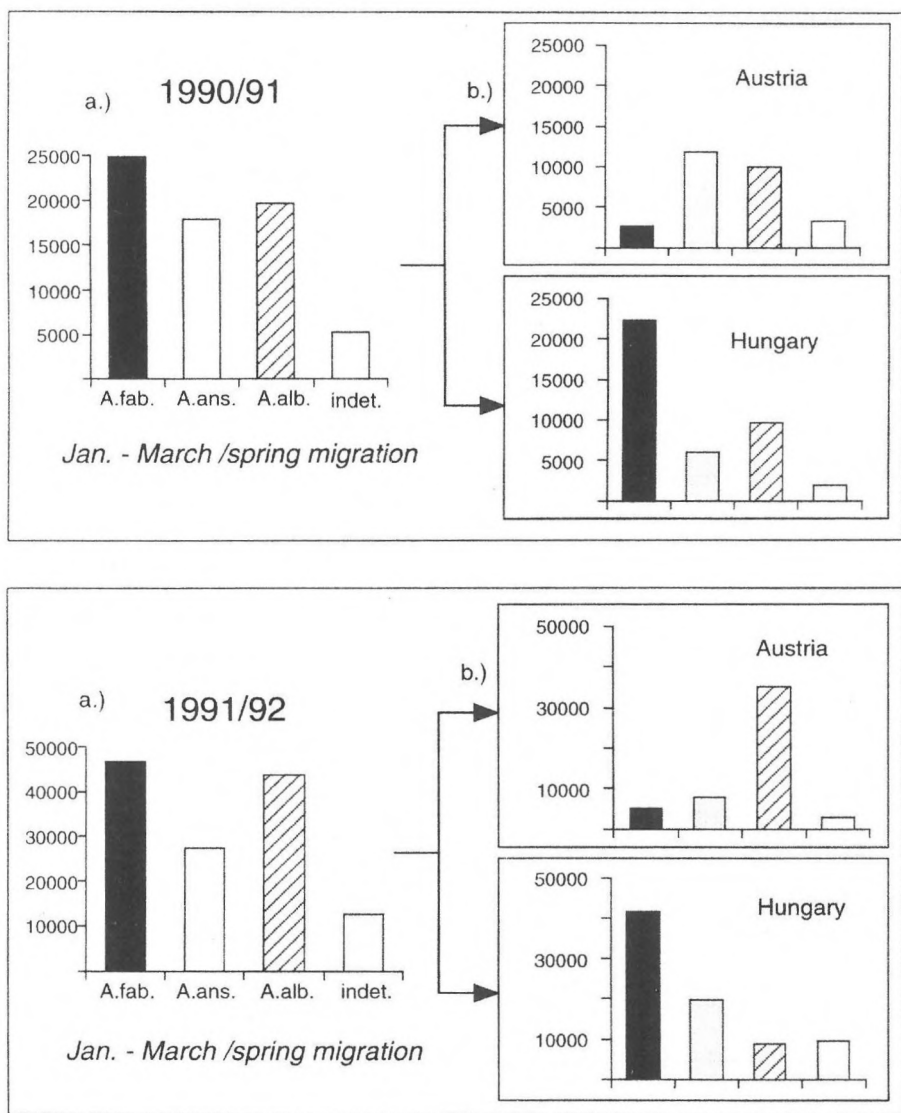


Figure 8: a: Total sum of all geese counted in Austria and Hungary together during the period of migration (January-March) in the winter season 1990/1991 and 1991/1992. **b:** Distribution of different species on the two state territories (A.fab = *Anser fabalis*, A.ans = *Anser anser*, A.alb = *Anser albifrons*, Indet = not identified)

Spring

The pattern of geese distribution during the time of spring migration (January until March) was different comparing the Austrian and Hungarian situation. According to their presence in the area the Bean Goose was missed on the Austrian roosting sites. During spring migration usually more Greylag Geese and specially White-fronted Geese were dominating the counts in Austria (**Figure 8**). Number of Bean Geese were again highest on the Hungarian side, reaching daily maximas up to more than 13.500 birds (January 1992; see **Table 1**).

These results fit into the findings of already published observations, depending on the different feeding behaviour, preferred food of the various geese species and actual situation and condition of available feeding areas (LEISLER, 1969). Greylag Geese and White-fronted Geese show a tendency to forage on feeding grounds situated closer to their roosting places than Bean Geese. Depending on the actual climatic condition Bean Geese were observed to fly up to 100 km distances to reach their feeding grounds on the Hungarian side (e.g. FARAGÓ, 1991; 1993; 1994).

The distribution and availability of appropriate feeding areas is a limiting factor for the distribution of geese in Austria. The majority of all three geese species roosting on Austrian territory are usually flying to feeding areas in Hungary (DICK AND GRÜLL, 1990).

5. CONFLICTS AND INTEREST

5.1. Protection and hunting of geese

With the implementation of a National Park area the aims for a common nature conservation plan and regulations for the protection of wildlife species and natural resources in this area became an important issue for both countries.

In general the idea of nature protection on one side and human activities, concerning tourism, farming and hunting on the other side, are frequently sources of conflicts of interest when nature reserve zones are planned and finally established. The questions of ownership, hunting lease-contracts, the ban of hunting activities or hunting restrictions and necessary regulations to compensation the cost of damages on cultivated land caused by protected wildlife species in the vicinity of nature reserves, are the main problems occurring (PARZ-GOLLNER AND SZINOVATZ 1994).

Hunting of waterfowl in this region was common and popular in both countries. Traditionally geese were and are hunted when they are leaving or returning to their roosting places; central roosting places on the Austrian side are still playing an key role for the general presence or absence of geese in the Seewinkel area. Despite to the situation in Austria, hunting of geese on feeding places was more common in Hungary.

Bag statistic

The annual bag statistic for Austria shows, that an average of 2000 geese was shot per year lately in the Lake Neusiedler See area, slightly higher numbers up to 3000 geese were shot in the years until 1983 until 1986 (**Figure 9**). About 80% of all geese shot in Austria were killed in the region of the Lake Neusiedler See area, Province Burgenland.

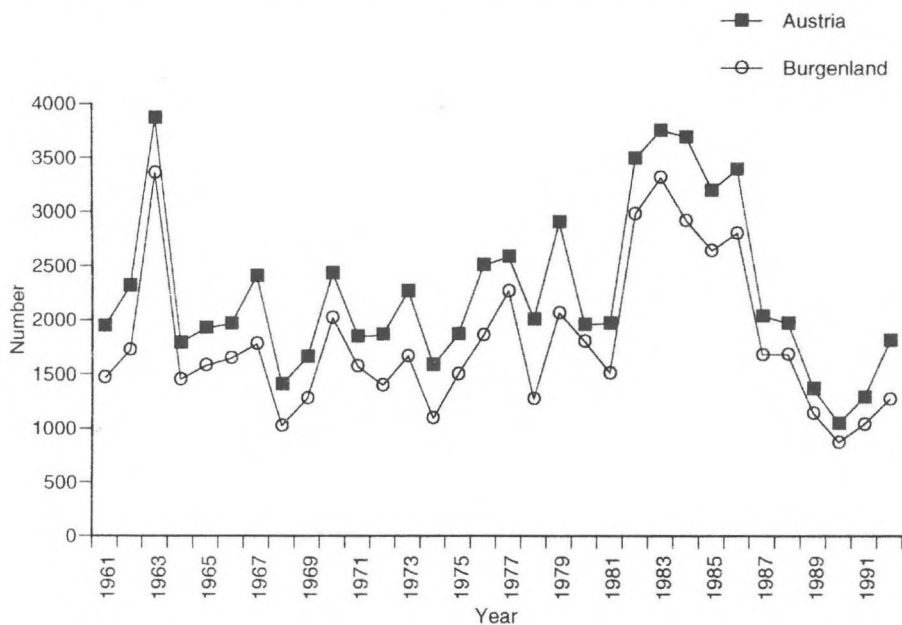


Figure 9: Number of shot wild geese (total bag statistic for Bean Geese, Greylag Geese, White-fronted Geese) in Austria and in the province Burgenland (Lake Neusiedel See area) during the years 1961-1992.

Mean of shot geese in Austria and proportion of shot geese in Burgenland:

	Austria	Burgenland
1961 - 1970	$x = 2171$	1732 = 80 %
1971 - 1980	$x = 2138$	1649 = 77 %
1981 - 1990	$x = 2593$	2154 = 83 %
1991 - 1992	$x = 1549$	1154 = 75 %

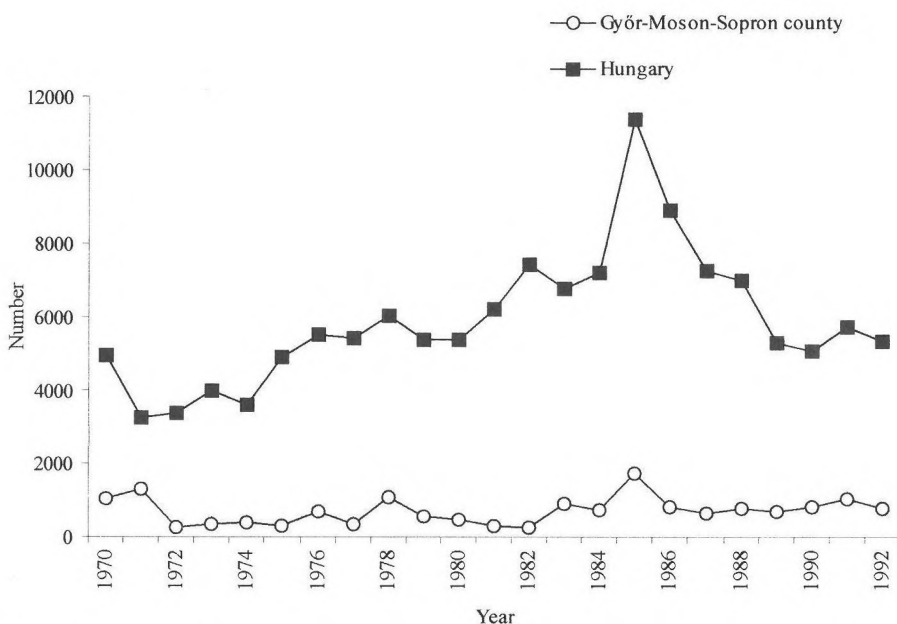


Figure 10: Number of shot wild geese (total bag statistic for Bean Geese, Greylag Geese, White-fronted Geese) in Hungary and in the Győr-Moson-Sopron county (Lake Fertő area) during the years 1970-1992.

Mean of shot geese in Hungary and proportion of shot geese in Győr-Moson-Sopron county:

	Hungary	Győr-Moson-Sopron county
1971 - 1980	x = 4720	622= 13,2 %
1981 - 1990	x = 7264	775= 10,5 %
1991 - 1992	x = 5542	909= 16,4 %

Hungary

The bag statistic of geese for Hungarian Fertő region (County Győr-Moson-Sopron) (**Figure 10**) shows, that after more than 1000 geese shot yearly in 1970's, the annual number of bag decreased to 300-500 individuals in the early 1980's. Lately increased the harvest of geese around of the lake. The peak number of annual bag were 1740 geese in the year 1985 and 1026 geese in the year 1991. In the same periode were shot 3000-11,400 geese in Hungary, consequently 3 – 40% of all geese in the bag of Hungary were shot at the Fertő region (County Győr-Moson-Sopron) (FARAGÓ, 1982; 1994).

Status of protection

Since the foundation of the National Park Lake Fertő – Seewinkel some additional restriction for hunting regulations were established in this area to guarantee the protection of wildlife species in the nature and protection zones of the park. Regulations concerning waterfowl – especially geese – are of special interest and importance. The hunting of waterfowl in the nature zone and the adjacent areas in the southern part of the Lake Fertő in Austria and Hungary is strictly banned. The location and range (size) of the area guarantees a secure resting site.

The rest of the park on the Austrian side does not form such an ecological unit of area. More isolated and smaller patchy areas are grouped together to form the other protection zones. In that situation there is a higher risk, that the activities in the surrounding neighbourhood – mainly cultivated landscape and normal hunting practices – might interfere the goals of protections. Quality and number of resting sites for waterfowl on the Austrian side is a limiting factor for the occurrence and the regional distribution of geese species.

One of the points of discussion between nature conservationists, park administration and hunting representatives deals with the problem, that waterfowl hunting is supposed to be in general a factor of disturbance. Not the actual killing of birds seemed to be the only and major problem, but the impacts of hunting pressure, which can influence the overall habitat quality. Negative hunting impacts on a local scale are of relevance, when protected areas are not big enough, when there is too much fragmentation or when no buffer zones around core areas exist.

Comparing the actual situation between Austria and Hungary, the fact is, that because of existing differences in the current hunting law regulations, it is still difficult in practice to harmonize the efforts for common waterfowl protection plan.

Differences in hunting law regulations between Austria and Hungary concerning **geese species:**

Austria

Species: all "wild geese" can be hunted, no specification on the species level;

Hunting season: 1. August – 31. January;

Hunting bags: "wild geese" in bag statistics

Number: no bag limits for the hunting season exist;

Hunting lease contracts: period of 8 years.

Hungary

Species: Bean Goose and White-fronted Goose are huntable, Greylag Geese is protected by hunting law;

Hunting season: 1. October – 31 January;

Hunting bags: bag – statistic are on the level of species;

Number: number of geese allowed to be shot is limited – 4 geese/day/person;

Hunting lease contracts: 10 years

6. CONCLUSIONS

After our investigation are the conclusions the followings:

- (1) The Lake Neusiedel/Fertő is one of the most important roosting and wintering area of the migratory geese in the Pannon region in our days as well.

- (2) The dispersion of the three geese species (*Anser fabalis*, *A. albifrons* and *A. anser*) at the Fertő region was determined by the weather conditions. Very dry periods mean, that the flocks are displacing from the dry Seewinkel lakes to the open water of Lake Fertő, where they prefer the southern part of the Hungarian side. In years, the salt (soda) lakes on the Austrian side are filled with enough water, the geese concentrate on roosting places in the center of the Seewinkel (mostly in Lange Lacke).
- (3) The second important factor in the case of the distribution is the food availability. The appropriate feeding area is the limiting factor in Austria and it will be a possible limiting factor in the future after the political change (see privatisation) in Hungary as well.
- (4) The hunting pressure and the annual harvested/shooted number of geese is higher in Austria than in Hungary. In the future must realize on both side of the border the theory of the „wise use”, namely sustainably geese management.
- (5) These facts are clearly amphasizing the need of coordinated, simultaneous counts on both side of the border in Austria and Hungary to get reliable datas and a correct interpretation of counting results for this border crossing resting site of international importance.

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