Folia Zool. – 51(3): 221–225 (2002)

Autumn staging and habitat selection by common cranes *Grus grus* in the Hortobágy National Park, Hungary

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Received 16 July 2001; Accepted 21 June 2002

A b s t r a c t . The feeding area selection of the common crane was studied between 1996–1998 in the Hortobágy National Park and surrounding areas during the autumn migration and staging over period. The cranes roosted in marshlands and drained fishponds and fed in the following types of agricultural areas: maize stubble, maize-, wheat-, alfalfa-, and abandoned fields as well as natural grasslands. The largest proportion of crane flocks fed on maize stubbles on waste grain. Family flocks usually fed separately. The type of feeding area did not depend on the time of the day. The density of feeding flocks did not depend on the type of feeding area, indicating high abundance of food. The study suggests that agricultural areas inside the National Park should be used for growing maize for staging cranes in order to attract them from disturbed non-protected arable lands outside the National Park. It is also important to stop wildfowl-hunting in fishponds to let cranes choose between more roost sites closer to feeding areas.

Key words: flocking behaviour, food availability, staging-over area

Introduction

The Hortobágy provides one of the most important staging areas in Europe for common cranes, since up to 65,000 cranes spend here more than two months from mid September to late November in each year (F i n t h a 1993, P r a n g e 1996, 1999). The peak number of cranes staging in the Hortobágy has been constantly increasing since the early 1980s.

The cranes staging in the Hortobágy roost in undisturbed, large drained fishponds and shallow marshes (F i n t h a 1993, V é g v á r i 2002).

The National Park is surrounded by agricultural lands used by cranes for feeding. According to former studies (F i n t h a 1993) cranes mostly feed on waste seeds on maize stubbles. The aim of this study is to investigate factors determining feeding area selection, spatial and temporal distribution of feeding flocks.

Materials and Methods

The observations were carried out between 1996–1998 in the Hortobágy National Park and in the non-protected agricultural areas surrounding the National Park (Fig. 1) between mid September and late November at different times of the day. Feeding flocks were recorded 2–3 times a week in a 6,000 hectares sample area (Fig. 1). The situations of other feeding areas were recorded 2–3 times a week in the whole area of the Hortobágy.

The total number of cranes, the number of juveniles, the number of actively feeding birds (heads down, A l o n s o 1987), the mean distance between feeding cranes and type of feeding area were recorded. Statistical analyses were carried out by SPSS for Windows 9.0.

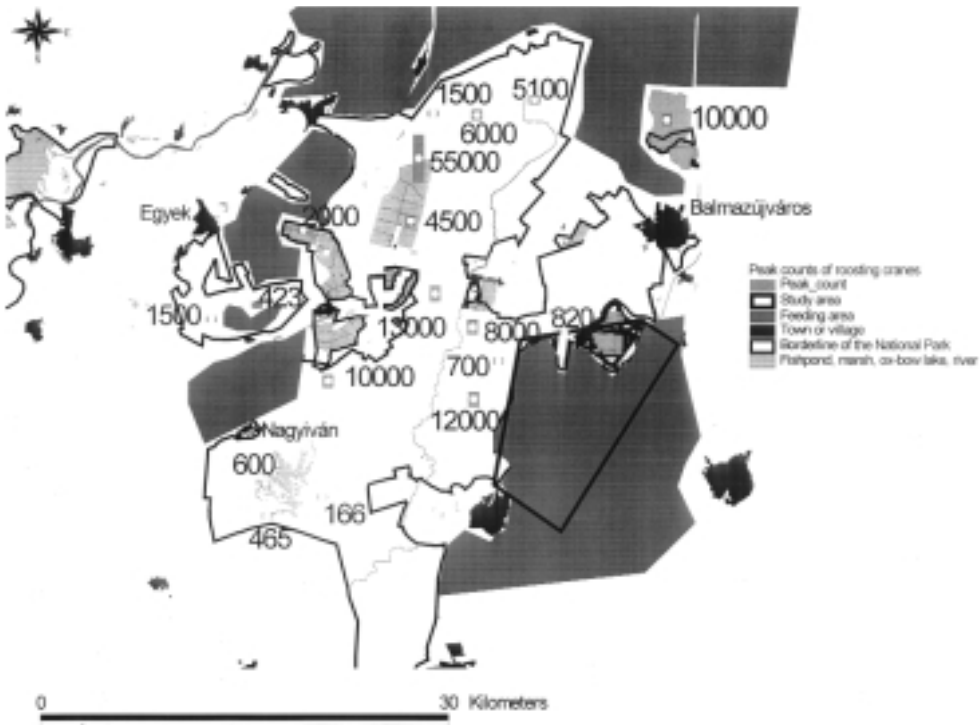

Fig. 1. Feeding areas and roost sites of common cranes staging in the Hortobágy in autumn 1996–1998 with the observed maxima.

Results

Altogether 123 flocks were recorded during the study. Seven types of feeding areas were found: 1. unharvested maize-field 2. maize-stubble 3. wheat-field 4. alfalfa-field 5. weedy, abandoned agricultural area 6. freshly ploughed area 7. natural grassland. Harvested and unharvested maize-fields as well as natural grasslands were the most intensively used feeding areas. The frequency of using different types of feeding areas is shown by Table 1. Although 26.71 % of the agricultural areas were covered by wheat-fields, only 4.9% of the flocks were found feeding on there. On the other hand 32% of the agricultural areas were covered by maize-fields, where 56% of flocks fed on this type of food. Alfalfa- and abandoned fields were selected in 5.7% by cranes. The selection index of feeding cranes was computed as the percentage of flocks using a given type of feeding area divided by the percentage of the available area of the same type (Table 1). Although the largest values are given by the grasslands and the maize stubbles, the grasslands were used only for pre-roosting gathering with very low feeding activities.

The percentage of young cranes was 20.11% in the whole staging population. The flock size was found between 2 and 2000 (mean: 196). The average distance between feeding cranes varied between 0.5 and 40 metres (mean: 4.7 m). The percentage of actively feeding cranes was found to be between 0 and 100%, with 69% on average (Table 2).

The proportion of young cranes was significantly different between years during the study: in 1996 it was 24%, 14% in 1997 and 22% in 1998 (χ^2 = 11.763, df = 6, $p<0.01$,

Table 1. Frequency of different types of feeding areas.

Type of feeding area	Average availability in study period (%)	Number of flocks	Percent (%)	Selection index
Freshly sown wheat-field	25.4	6	4.9	0.1929
Other	23.4	3	2.4	0.1026
Unharvested maize-field	14.0	26	21.1	1.5071
Freshly ploughed maize-stubble	11.5	15	12.2	1.0609
Alfalfa-field	8.1	7	5.7	0.7037
Abandoned arable land	6.9	7	5.7	0.8261
Maize-stubble	5.8	30	24.4	4.2069
Natural grassland	4.9	29	23.6	4.8163
Total	100.0	123	100.0	

The selection index of feeding cranes is computed as the percentage of flocks using a given type of feeding area divided by the percentage of the available area of the same type.

Kruskal-Wallis test). The number of young negatively but significantly correlated with the group size (r_8 = -0.412, $p<0.05$, Spearman rank correlation). This means that families that break up only in the wintering grounds (A l o n s o 1984) often feed separately or else they form loose feeding flocks together with other families. Flock size was significantly different between types of feeding areas (χ^2 = 12.748, df = 6, $p<0.05$, Kruskal-Wallis test). The largest flocks were found on maize fields. The type of selected feeding area did not depend on the time of the day (χ^2 = 6.547, df = 5, $p>0.1$, Kruskal-Wallis test), thus there was no significant daily change either in the degree of distribution or in food availability. The distance between neighbouring feeding cranes did not depend on the type of feeding area (χ^2 = 5.386, df = 5, $p>0.1$, Kruskal-Wallis test). This probably indicates that the abundance of food was high enough in all types of feeding areas to let social relationships determine the interindividual distances. The proportion of actively feeding cranes significantly, positively correlated with flock size (r_8 = -0.348, $p<0.01$, Spearman rank correlation), which is in accordance with the predation avoidance theory. The proportion of actively feeding birds showed only a slight positive correlation with the time of day, (r_8 = -0.078, Spearman rank correlation), i.e. the intensity of feeding did not change significantly during the day which also emphasizes the favourable conditions ensured by food abundance.

Discussion

As was shown by previous studies, the Hortobágy plays a very important role in the life of the European population of the Common Crane (F i n t h a 1993), since ca. 65 thousand cranes spend here more than two months before arriving at their wintering grounds in North-Africa. Therefore cranes have increased survival chances during migration by refuelling their fat reserves. This is of higher importance since roughly the half of the European breeding population migrates across the Hortobágy without having other large stopover areas between their breeding and wintering grounds.

Their most important type of feeding area is the maize-field since more than 80% of feeding flocks selected this type; also the largest flocks fed in such areas. Applying usual agricultural technologies no damage can be caused by them because cranes feed mostly on waste seeds. Cranes land on fields of unharvested short hybrid maize-types only

Table 2. Frequency of different flock sizes.

Frequency	Percent	Valid Percent	Cumulative Percent	Valid
2	1	,8	,8	,8
3	11	8,9	8,9	9,8
4	5	4,1	4,1	13,8
5	1	,8	,8	14,6
6	3	2,4	2,4	17,1
7	2	1,6	1,6	18,7
8	1	,8	,8	19,5
9	2	1,6	1,6	21,1
10	5	4,1	4,1	25,2
11	5	4,1	4,1	29,3
12	2	1,6	1,6	30,9
13	2	1,6	1,6	32,5
15	1	,8	,8	33,3
16	2	1,6	1,6	35,0
18	3	2,4	2,4	37,4
19	3	2,4	2,4	39,8
20	1	,8	,8	40,7
25	3	2,4	2,4	43,1
27	1	,8	,8	43,9
30	1	,8	,8	44,7
31	1	,8	,8	45,5
33	1	,8	,8	46,3
34	1	,8	,8	47,2
35	1	,8	,8	48,0
36	1	,8	,8	48,8
40	1	,8	,8	49,6
43	2	1,6	1,6	51,2
45	1	,8	,8	52,0
47	1	,8	,8	52,8
50	8	6,5	6,5	59,3
53	1	,8	,8	60,2
55	1	,8	,8	61,0
60	3	2,4	2,4	63,4
70	1	,8	,8	64,2
78	1	,8	,8	65,0
80	6	4,9	4,9	69,9
90	2	1,6	1,6	71,5
94	1	,8	,8	72,4
100	1	,8	,8	73,2
110	1	,8	,8	74,0
116	1	,8	,8	74,8
140	1	,8	,8	75,6
150	1	,8	,8	76,4
200	2	1,6	1,6	78,0
250	3	2,4	2,4	80,5
300	2	1,6	1,6	82,1
350	3	2,4	2,4	84,6
500	3	2,4	2,4	87,0
600	4	3,3	3,3	90,2
700	1	,8	,8	91,1
750	1	,8	,8	91,9
900	1	,8	,8	92,7
1000	3	2,4	2,4	95,1
1200	3	2,4	2,4	97,6
1300	1	,8	,8	98,4
2000	2	1,6	1,6	100,0
Total	123	100,0	100,0	

exceptionally. Thus, by abandoning growing this type of maize no damage can be caused at all. Cranes feed in alfalfa-fields as well as in abandoned agricultural areas mostly in the case of vole gradations together with White Storks and Great White Egrets. Feeding flocks often use natural grasslands to hunt for invertebrates among grass roots. In spite of this fact the Hortobágy National Park Directorate started to grow maize-fields for cranes in agricultural lands inside the National Park.

Our results indicating that families feed in separated, loose flocks is similar to observations in wintering grounds in Spain (A l o n s o 1984).

R e c o m m e n d a t i o n s f o r n a t u r e c o n s e r v a t i o n m a n a g e m e n t

Our results suggest that cranes stage in the Hortobágy for more than two months because they can find the combination of abundant resources and shallow, undisturbed roost sites in a considerably large area (80 thousand hectares). Nowadays the annual availability of roost sites is quite stable: the largest fishponds used for roosting are drained purposefully in time in accordance with the local fish farm management. Also several hundreds of hectares are flooded artificially each year in late summer in order to provide feeding and roosting area for cranes, geese, ducks and waders.

On the other hand the spatial and temporal distribution of food availability, which is abundant, is quite chaotic: the timing of harvesting depends on the weather and economic conditions, while the length of the period of food availability depends totally on the weather. Besides some of the farmers chase the cranes away from their fields even if no damage is caused, which makes the conditions of food availabilty even more unpredictable. Therefore it is highly important to create crane-fields in existing agricultural areas inside the National Park where hardly any human activity would disturb them, further increasing their survival chances during their migration.

A c k n o w l e d g e m e n t s

Special thank goes to Otto W e s z e l i n o v for his assistance in the field and local farmers for tolerating data collection on their land.

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