STAGING AND MIGRATION OF CRANES IN THE GERMAN DEMOCRATIC REPUBLIC

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In the GDR, the crane is registered as a species threatened with extinction. It is strictly protected both at the breeding sites and in the gathering and staging places. In this connection, based on regulations by law and a multilateral cooperation project, a monitoring system has been developed with which reliable estimation of the crane population and a purposeful exchange of information can be achieved.

This paper summarizes our experiences concerning crane staging. It will deal with the large stages on the coast of the Baltic Sea and refer to the inland staging sites which, in addition, are always the gathering places of the native crane population.

Stages on the coast of the Baltic Sea

In the "West-Rügen" area and on the westward adjacent group of island named the "Bock", there are two large staging sites where the Scandinavian population interrupts its migration. Frist descriptions date back to the 19th century, and were given by *Picht* (1821) about Rügen and by *Lühder* (1871) about the Bock. Since then the sites of the stages have changed only a little, unlike the agricultural practices. Both sites are situated in a large wetland region of international importance, and therefore, are subject to special conservation measures (*Prange,* 1966, 1974).

Roost sites

A well-frequented roost includes places for undisturbed sleeping, and grounds with sufficient food. Both prerequisites are given here. The 3 main roost sites (Grosser Werder of the Bock, Udarser Wiek of Rügen and a coastal area near the island Liebitz/Rügen) are protected by the status of nature reserve. The roost sites are situated in 10—30 cm deep water of the shallow bays, and in case of the Bock, also on seaward sand-banks. In autumn we observe a closer adherence to the traditional sleeping places than in spring, when wet meadows and fields are also utilized. The choice of the individual roost depends on the situation of the feeding grounds, on the depth of the water, on the animals' need for safety, on factors of sociability and habituation, and near the coast, also on velocity and direction of the wind.

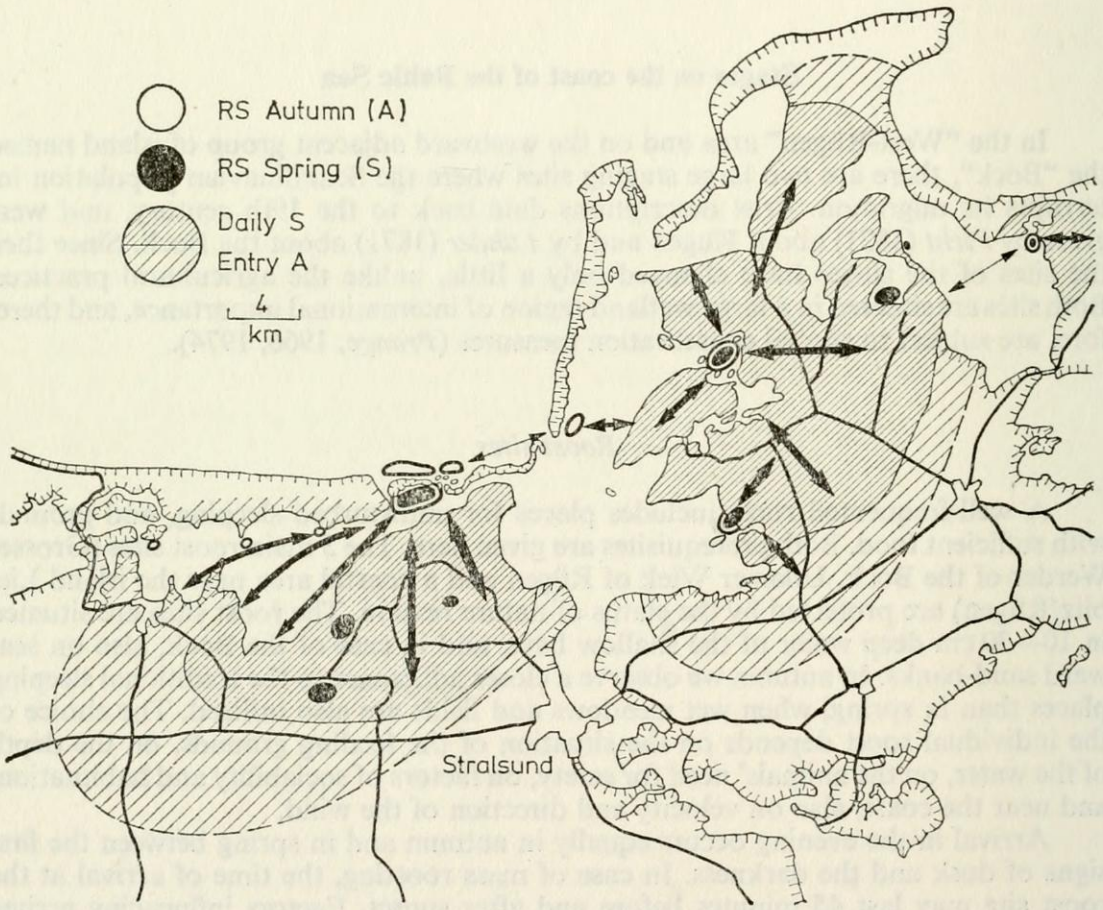
Arrival in the evening occurs equally in autumn and in spring between the first signs of dusk and the darkness. In case of mass roosting, the time of arrival at the roost site may last 45 minutes before and after sunset. Factors influencing arrival time include visual range, light intensity and the safety distances at the roost sites. Moreover, seasonal differences seem to exist, for in August smaller flocks sometimes

return earlier, and the cranes even stay at the roost for some hours in mid-day. The departure in the morning is, as a rule, less protracted, and is over within 30 minutes prior to sunrise.

It is natural that with increasing numbers of roosting cranes the duration of the passage and the width of the front of incoming cranes also increases. Violent winds cause unusual directions of entry by displacing the birds. At the Bock, for instance, in case of violent southeastern winds, flocks arrive from the west along the peninsula of Zingst, and on its shallow coast the flight becomes sometimes interrupted. Hereby, mass roosting may give rise to new habits which have also led to new roost sites.

On the island of Rügen, high water-level causes a displacement of the cranes to the marginal areas of the Udarser Wiek where more severe disturbances occur, which repeatedly have led to the abandonment of the roost site. Thereby, since 1977 a new large roost has been established, which is situated between the islands of Hiddensee (Gellen) and Ummanz. This roost is usually deserted again after the water-level returns to normal.

It is apparent, that on the one hand, a strong adherence to the major roost sites but on the other hand, some variability in the development of new roosts may be recognized.



Figure|1. The roosting sites of the Bock (left) and Rügen (right) with the daytime foraging roosting places

Areas of daily visit

With a very small portion of woods, the fields daily entered by the cranes are 12—15 km away from the roosts, during roosting also up to 20 km (fig. 1). In search of food, the birds prefer winter crops (particularly wheat) sown in autumn, as well as harvested maize, corn and potato fields. The flocks remain as long as possible in the nutritious fields.

Before spring sowing, the birds spend all day in search of food, consisting partly of animal origin. When spring sowing begins, food becomes plentiful and only part of the daytime hours spent feeding. The cranes now show many-sided behaviour at patterns.

Damage to agriculture is, under the conditions of the large-scale cultivation of cooperatives, an exception to the rule, even though the cranes pick up grains from the soil surface and may grub out the newly drilled seeds with their beaks. Regularly frequented fields are commonly given 5—15% more seeds, which has brought good results.

By contrast, the small fields of the peasant agricultural system before 1960 had suffered, in part, greater damage in the fields sown first and where wheat sheaves had been set up. Damage to fields of peas and cabbage have also been observed. As a result of the negotiations concerning this damage, the so-called "fow-scharecrow" was developed, which consisted of rotating brown wooden boards and it is said to have been effective in particularly thereatened fields (*Mansfeld,* 1961).

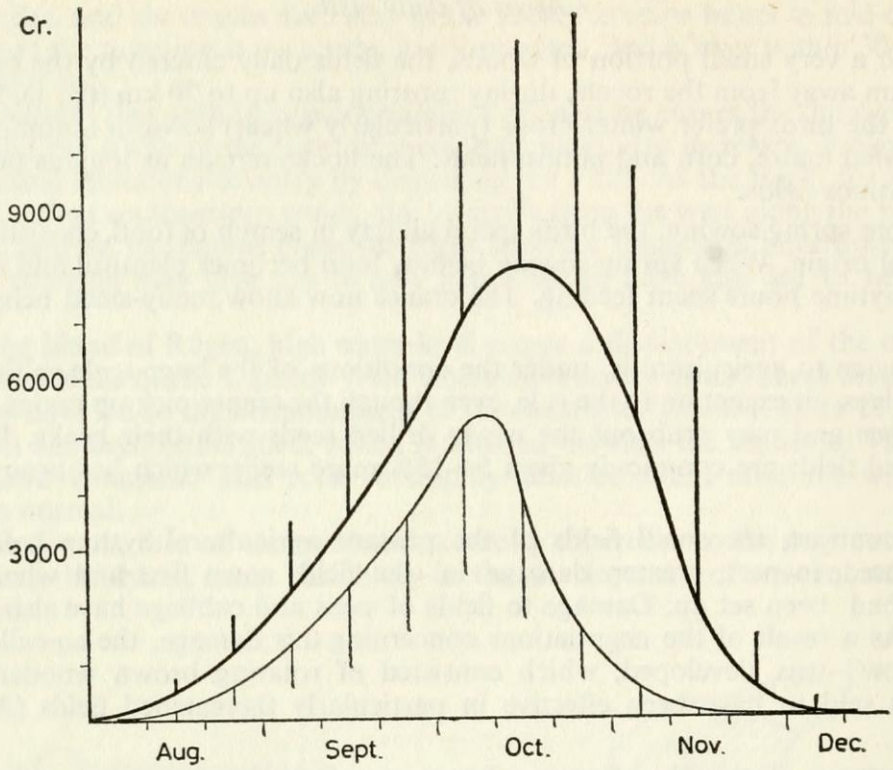
In autumn, during the afternoon hours, we often observe the crane flocks approaching the roosts so that "preliminary" gathering sites or "intermediate" landing places develop, which may be maintained over weeks. Here the gatherings are particularly impressive when the birds are in migration mood and mass departures are imminent.

Variation in number of roosting cranes

In autumn, the number of roosting cranes at Rügen (14 years) and at the Bock (11 years) are depicted in fig. 2. They demonstrate a continuous flow of arrivals from mid-August to late October and partly to November. The descending part the curve is steeper than the ascending one, which is due to mass departures. There are great differences in the number of roosting cranes between the years, which are weather related and become visible in the high standard deviations.

The mean duration of staging is 14 weeks (range 11—18), with slight differences in favour of the Bock. Mass departures do not develop in every year, yet may occur repeatedly several times in a season. They are characterized by distinct deviations in behaviour during preceding days, and by the exodus of a great part or nearly all of the cranes. They are in direct relationship with imminent low-pressure weather and cold fronts (*Deppe,* 1978). A further prerequisite is a marked migratory disposition that is hardly expected here before the 3rd week of October. The end of staging comes when tere are no flights any more to the roost sites. The mean value of all years evaluated showed this to be the 15th of November for Rügen and the 22nd for the Bock. Thereafter, occasionally smaller roosting groups may stay for a short time.

In order to compare the two roosts and various time periods, we also calculated the maximum counts, the sum of all crane staying days (roosting mass), meen roosting day (50% of all crane staging days) and peak staging days (maximum achieved).



Figure/2. Variation in the number of cranes of the Bock (thick line) and at Rügen (thin line) with standard deviations

Hence it follows that:

— duration of staging since 1977 has in both sites grown longer by 9 days and departure occurs proportionally later; on the Bock all parameters are reached at least one week later and that a clearly higher portion stages here as late as November;

— a numerical comparison between Rügen and the Bock reveals that from 1977 number of roosting significantly decreased at the former and increased at the latter site. This shift has to be related to the greater susceptibility of the Rügen roosting places to disturbances, whereas the vast and inaccesible roost sites of the Bock meet all requirements (table 1):

— the hitherto obtained maximum counts are over 10 000 cranes for Rügen (11 October, 1972) and some 18 000 for the Bock (7 October, 1979, 18 October, 1980). Particularly high total counts of both sites were registered in 1983 and 1984, namely about 21 000 and 23 000 cranes respectively, indicating a further increase in staging at present.

Spring staging is far less massive. On the average, the cranes arrive in the first 10 days of March (fig. 3). First their number rises gradually, yet more sharply from the last week of March to a peak in the first 10 days of April, then decreasing until the beginning of May. Thus, on the average of several years, an approximately isoceles curve develops. Considerable scatter again suggests great differences between several years, referring to both crane counts and the temporal course of staying. The maximum counts obtained for Rügen vary from 460 (6 April, 1984) to 3075 (14 April,

Table 1.

Duration of staging and maximum numbers of cranes

	Duration of staging days ×1000		Maximum numbers	
	Rügen	Bock	Rügen	Bock
	$\bar{x}$ ±s	$\bar{x}$ ±s	$\bar{x}$ ±s	$\bar{x}$ ±s
1965—1972	288±39,5	201±123	9000±3100	5 430±3540
1977—1984	165±45,2	518±133	4250±1260	13 200±2880

$\bar{x}$ = mean value.
±s = standard deviation.

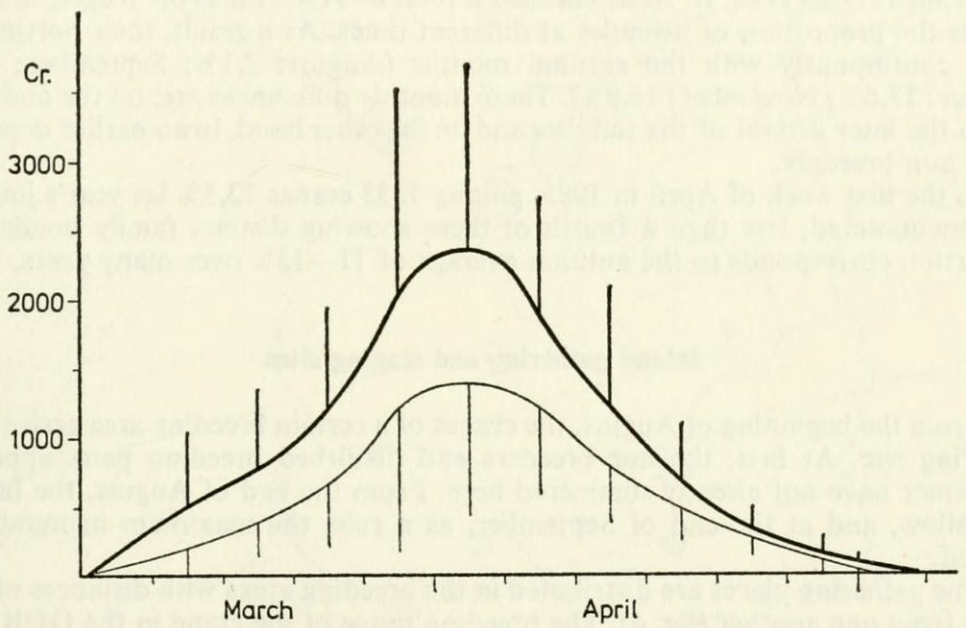


Figure 3. Variation in the number of cranes staging in spring at the Bock (thick line) and at Rügen (thin line) with standard deviations

1971), whereas those obtained for the Bock range from 1940 to 4100 cranes (30 March, 1973).

After the termination of the continuous staging process, in most years crane flocks were observed for a short time in the field or at the roost site. They are thought to be non-breeding groups. A proportion of 78% of last year's juveniles in a late staying flock of 255 cranes of Rügen (8 May, 1985, *RW. eiss*) corroborates the finding of *Alonso* et al. (1984) that those birds may form their own migratory groups that leave the winter quarters after the adults.

The greater speed of spring migration is characterized by a far shorter duration and by correspondingly lower figures of the staging parameters as compared with those in autumn (table 2).

Table 2.

Comparison of autumn and spring staging in Rügen and on the Bock

	Spring	Autumn	Ratio
Duration of staging (weeks)	7,2	14,0	1:1,9
Crane Roosting Days ×1000	88,8	621,0	1:7,0
Crane Roosting Days ×1000/week	12,3	46,0	1:3,7

The proportion of juveniles

From 1977 to 1984, *R. Weiss* checked a total of 9156 cranes on Rügen island as regards the proportion of juveniles at different times. As a result, their portion increases continuously with the autumn months (August: 2,1%; September: 7,2%; October: 13,5%; November: 15,9%). These monthly differences are, on the one hand, due to the later arrival of the families and on the other hand, to an earlier departure of the non-breeders.

In the first week of April in 1985, among 1333 cranes 12,5% las year's juveniles were encountered, less than a fourth of them showing distinct family bonds. This proportion corresponds to the autumn average of 11—13% over many years.

Inland gathering and staging sites

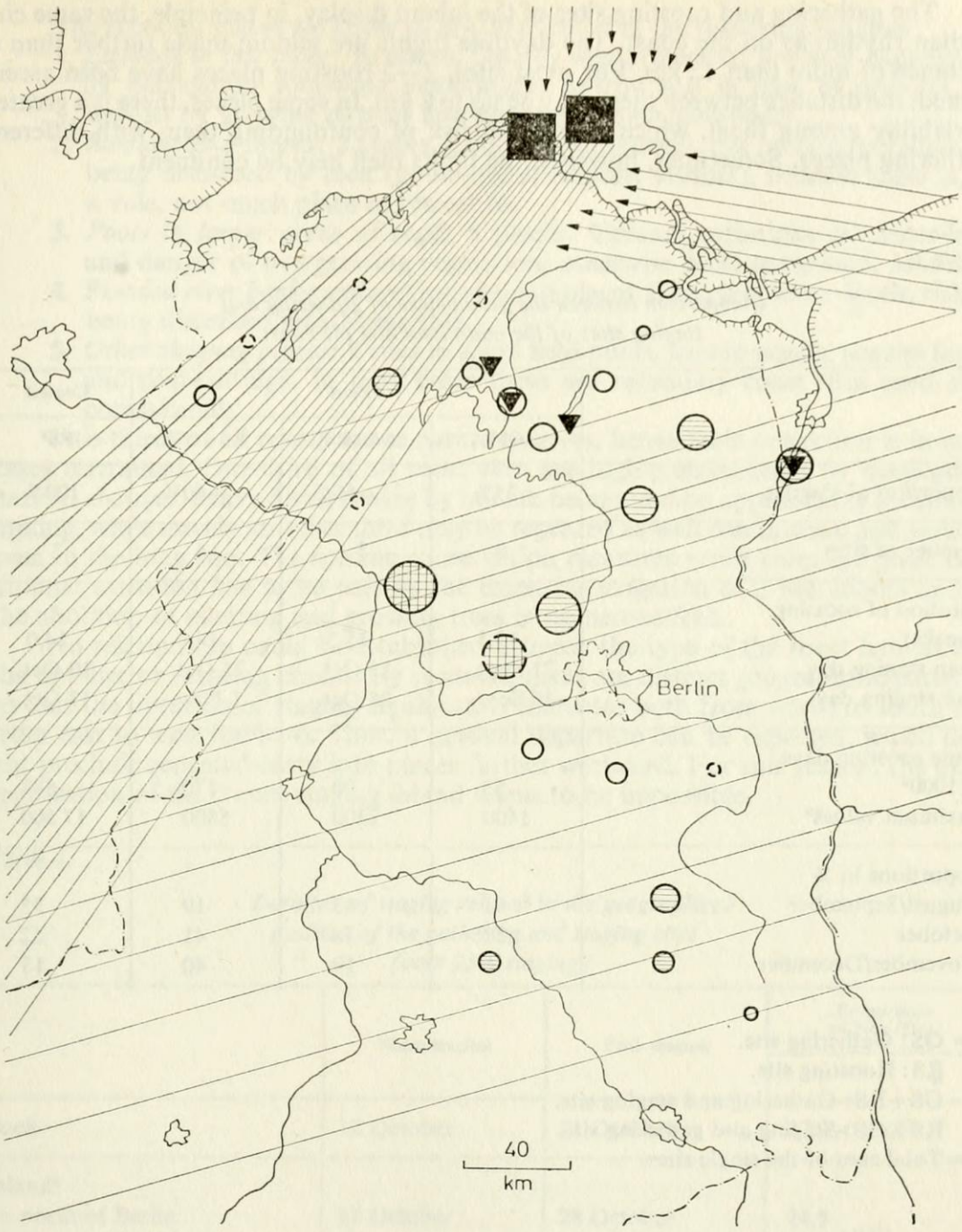
From the beginning of August, the cranes of a certain breeding area arrive at the gathering site. At first, the non-breeders and disturbed breeding pairs appear, if the former have not already summered here. From the end of August, the families will follow, and at the end of September, as a rule, the maximum in numbers is reached.

The gathering places are distributed in the breeding areas with distances of 20 to 60 km from one another (fig. 4). The breeding range of the crane in the GDR is roughly bordered by the course of the Elbe river to the west and south. Higher breeding densities of the altogether 850—900 pairs are found in the terminal moraine bend between the subdistricts of Bad Freienwalde in the east and Schwerin in the west, as well as in numerous river valleys, lake- and fen-areas (*Mewes,* 1980).

During the past three decades an increasing number of breeding localities and gathering sites have become known. In each of the 24 sites between 25 and 400 cranes gather, which are joined by birds staging in October and November. These sites may be classified into three categories:

— exclusive of predominant gathering sites with a staging portion below 25%;
— mixed gathering and staging sites with a staging portion of 25—60% as well as
— staging and gathering sites with a staging portion of over 60%.

A comparison of the staging parameters clearly shows later dates, on the one hand, for the places with more staging than gathering, and on the other hand, for staging inland ragher than at the Bock (table 3).



Figure|4. The autumn migration routes in the GDR with the staging sites at the coast as well as with the gathering sites (hollow circle) and staging sites (full circle) on the mainland (triangles correspond former staging sites)

The gathering and roosting sites of the inland display, in principle, the same circadian rhythm as on the coast. The daytime flights are seldom made further than a distance of more than 12 km. For most sites, 2—3 roosting places have been ascertained, the distance between them may be up to 8 km. In some places, there is a greater variability among them, which causes the risk of confounding them with different gathering places. Sometimes, however, the limits mell may be confluent.

Table 3.

Comparison between the parameters of gathering and staging sites of the main land and the coast

	Inland			Coastal
	GS[1]	GS+RS[1]	RS+GS[1]	RS[1]
Proportion of staging	<25%	25—60%	>60%	100%
Number of sites	8	7	6	2
Duration of roosting (weeks)	12,1	15,3	14,9	14,0
Mean staging day	21 Sept.	11 Oct.	25 Oct.	10 Oct.
Peak staging day	30 Sept.	25 Oct.	1 Nov.	17 Oct.
Crane roosting days ×1000[2]	55	80	170	683
Maximum values[2]	1400	2300	5800	17 500
Proportions in %				
August/September	61	43	19	35
October	31	38	41	52
November/December	8	19	40	13

1 = GS: Gathering site.
RS: Roosting site.
GS+RS: Gathering and staging site.
RS+GS: Staging and gathering site.
2 = Total sum of the single sites.

The crane flocks enter the roosting places either directly from the fields or, more frequently, a preliminary gathering at so-called „intermediate" lading places occurs. They are close to the roosting sites and may repeatedly change during one season In certain manner they seem to be necessary for tiding over the time between last feeding and the night falling; for this is crucially determined by the safety distances at the roosting place. Sites where these are small and where possibilities of greater disurbances exist, for instance in the open reed zone of a lake, the birds enter distinctly later than in the vast lagoons of large fens.

The roosting places we know of are distributed in the following habitats:

1. *Lagoons in low moor:* 10 places. Usually well-protected; however endangered by dessication following meliorations nearby and in case of drought, as well as by growing of trees and disturbances by wild-boars.
2. *Shallow lake shores:* 8 places. Constant water-level, but more possibilities of being disturbed by men (goose-hund, anglers, visitors), because there is, as a rule, not much place to retreat to.
3. *Pools in larger areas of reed:* 6 places. Greater variations in water-level and danger of overgrowing vegetation, otherwise good protection, as a rule.
4. *Flooded river banks and wet meadows:* 6 places. Changing water-levels, risk of being disturbed greatly variable.
5. *Other sleeping places:* 8 sites in small field pools, fishing ponds, sewage farms and peat-cuttings. In most cases these are secondary roost sites used only occassionally.

Two-thirds of all roosts are in nature reserves, hence their protection is in most cases warranted. One-third of all roost sites are highly endangered by dessication, natural changes, heavy disturbances by human beings and by approaching browncoal mining, while merely an other third may be regarded as well conditioned and suitable even in the long run. The specific conservation measures result from the given conditions; attention has to be paid to the extensive irrigation of 2 low moors and to the abolition of planting and growing trees in numerous fens.

No relationship could be established between the type of the roost habitat and the number or roosting cranes. By contrast, there are distinct geographical patterns, so that the duration of staging significantly increases both from north to south and from east to west (table 4). Thus, a gradual departure can be expected, which does not preclude repeated entry into places farther westward. For this reason, the exact registration of the cranes staging inland seems to be impossible.

Table 4.

Duration of staging related to the geographical position of the gathering and staging sites (over 25% staging)

	Mean staging	Peak staging	Proportions of Nov./Dec.	
			%	p
Bock	12 October	21 October	17,2	<0,001[2]
Inland[1]				
— north of Berlin	17 October	28 October	24,5	<0,01
— south of Berlin	23 October	29 October	43,5	
— east of Berlin	12 October	25 October	23,0	<0,05
— west of Berlin	25 October	1 November	38,0	

1 = Included are GS+RS in the subdistricts of Prenzlau, Neustrelitz, Oranienburg, Havelberg, Luckau and Eilenburg.

2 = Frequencies differ significantly between the stages of the Bock and the staging and gathering sites west and south of Berlin (chi-square test).

Table 5.

Variation in the number of staging cranes

RS+GS	Time period	Maximum values		
		date	$\bar{x}$ ±s	from—to
East shore of Lake Müritz	1947—1959	13.10.	4050±3620	600—12 000
	1960—1981	3.10.	324±103	180—570
"Stremel" near The Havel river	1968—1976	22.10.	456± 185	220—825
	1977—1983	1/2.11.	2960±1965	650—5 000

Finally, some examples to illustrate which alterations over longer period have be taken into consideration:

— Between 1940 and 1960, the largest of the 4 major inland stages was situated in the nature reserve "East Shore of the Lake Müritz", where, with considerable annual variations, up to 15 000 cranes were staging. Table 5 documents the change of this stage into a gathering site which it certainly had been before. On the other hand, the nature reserve "Stremel" nearby the Havel river has for some years shown the opposite tendency, with up to 5000 staging cranes. In both cases, the standard deviations are larger with increasing staging portion, as an expression of large annual differences.

— The gathering and staging site of the nature reserves "Borcheltsbusch" and "Bergen-Weissacker-Moor" in the subdistrict of Luckau south of Berlin was subject to a particularly intensive study by *Jähme* (1984), so sthat comparisons between different time periods are possible (table 6). The duration of stay has become longer in every time period studied, with increased portions in November—December.

Regular spring staging inland can sometimes be observed only in a few places. With regard to the staging of small migratory groups, lasting days or weeks, it is remarkable that the autumn roosts are often not sought out by the birds (*Schröder* et al., 1972; *Jähme*, 1983).

Estimation of the total number of staging cranes

Pooled maximum counts on Rügen and the Bock during 5 years were 17600 (range 16 000—23 000) cranes, registered by simultaneous observations. Further, the proportion of departing birds has been calculated before the maximum value and that of the arriving ones after it. Given a mean observation interval of 5 days, this results in a value of about 40%, which is related to the mean maximum value and is added to it. Hence, on the average about 25 000 cranes (range 22 000—32 000) stage every years on the coast.

The above counts are in very good agreement with representative data collections performed in the Lüneburger Heide (FRG), over which the majority of Scandinavian oranes pass. Here, *schindler* (1972) yearly registered 25 400 cranes (range 23 000—295 000) between 1964 and 1968, in the course of which good agreements was found between mass departures here and main migratory days there.

Table 6.

Variation in the number of staging cranes at a medium-size gathering and staging site of the main land (Subdistrict of Luckau)

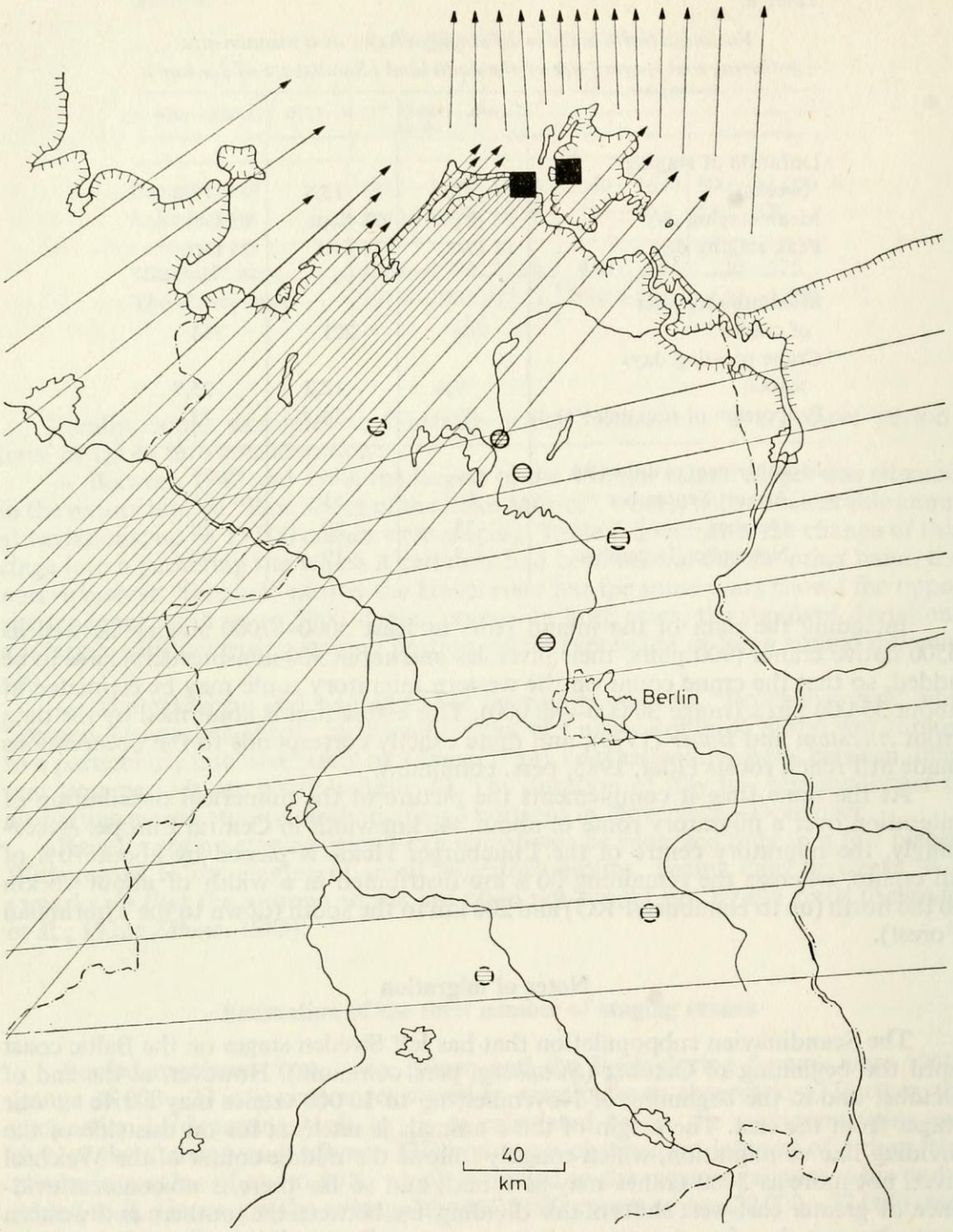
	1960—1968	1969—1976	1977—1984
Duration of staging (weeks)	12,5	15,8	17,8
Mean staging day	22 Sept.	28 Sept.	17 Oct.
Peak staging day	11 Oct.	15 Oct.	23 Oct.
Maximum number of cranes	206	221	333
Crane roosting days ×1000	9,6	12,2	25,7
Proportion of roosting (%)	49	34	72
Monthly proportions (%)			
— August/September	60	51	31
— October	33	30	29
— November/December	7	19	40

Including the data of the inland pairs at least 5000—7000 staging as well as 3500 native cranes (900 pairs, their juveniles and about 900 non-breeders) have to be added, so that the crane count on the western migratory route may be estimated at about 35 000 birds (range 30 000—40 000). This estimation is confirmed by the data from *Alerstam* and *Bauer* (1973), and quite exactly corresponds to the observations made at French roosts (*Riol,* 1985, pers. commun.).

At the same time it complements the picture of the numerical distribution of migration over a migratory route of about 340 km width in Central Europe. Accordingly, the migratory centre of the Lüneburger Heide is passed by about 70% of all cranes, whereas the remaining 30% are distributed in a width of about 75 km to the north (up to Hamburg/FRG) and 200 km to the south (down to the Thuringian Forest).

Notes of migration

The Scandinavian subpopulation that has left Sweden stages on the Baltic coast until the beginning of October (*Swanberg,* pers. commun.). However, at the end of October and in the beginning of November, up to 10 000 cranes may arrive at our stages from the east. The origin of these animals is unclear; for on this side of the dividing line of migration, which roughly follows the middle course of the Weichsel river, not more as 3000 cranes may be found; and so far there is no concrete evidence of greater east-west shifts of this dividing line between the southern and western route. It must therefore be assumed that an annually varying portion of the Scandinavian cranes migrate over the island of Öland/Sweden to the Polish coast and then entering the gathering and stages there. With the onset of migration these cranes sometimes arrive in greater number on our coast and sometimes in greater number at our inland stages. This could explain why also inland at least occasionally, mass staging is possible (fig. 5).

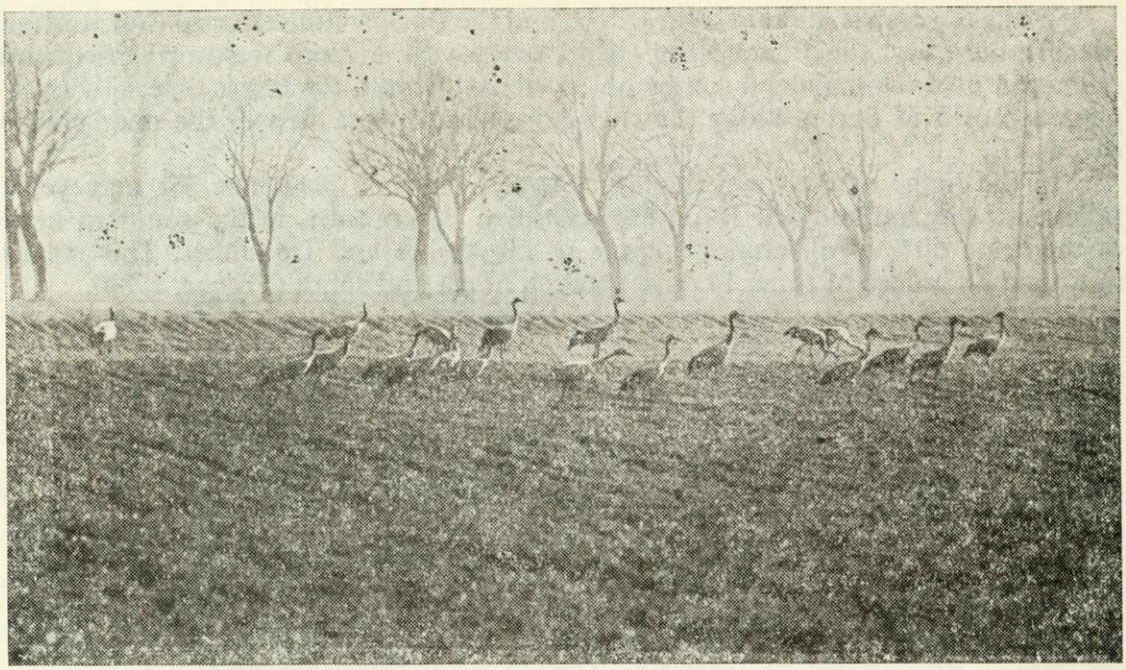


Figure/5. The spring migration routes in the GDR with staging sites on the coast and in the mainland

While the cranes migrate from Rügen and the Bock southwestward over western Mecklenburg and the Lüneburger Heide, every year a more westward orientated migration over the mainland can be observed. At present, the last is especially conspicuous north of Berlin, along the river Havel and in the area of the middle Elbe (fig. 6—7).

In the range of the main migratory route, the time peak has for may years fallen into the 2nd and 3rd 10 days of October. By contrast, in the southern zone of the route 60% of all cranes migrate in November and December. This results in a time difference of some 14 days between north and south (*Prange*, 1984).

Figure|6. Common Crane (Photo: P. Schroeder)



Figure|7. Common Cranes on their feeding place in Rügen (Photo: P. Schroeder)

The flight home to the breeding areas is accomplished quicker and more purposefully than the autumn departure. In spring, the cranes fly on the average at greater altitudes and in smaller flocks, probably more often during the night hours. In Central Europe, compared with the autumn, a northward shift of the entire migratory route by 30—50 km may be detected, equally appearing in the border areas as in the centre. On the one hand, it seems to be due to a more pronounced orientation towards the breeding sites, and on the other hand, to regular southwest winds and corresponding warm currents in the lower and middle troposphere (*Deppe*, in print).

In spring the migration passing the mainland of the GDR appears to be smaller than in autumn, the Scandinavian birds now do not fly via Poland. About 80% leave our coast between Darsser Ort in the west and the isle of Greifswalder Oie in the east. According to *Alerstam* and *Bauer* (1973), nearly 20% of all passing cranes already turn away farther west from our coast to reach Sweden via the Danish islands or the open Baltic Sea.

The inland passage peaks already 14 days prior to the arrival at the coast so that in regions of common migration not uncommonly 2 peaks can be identified. While on Rügen and the Bock the staging peak may be as late as in the first days of April, the nests of the native breeding population have long been occupied (on the average, by 16 March in Mecklenburg — *Mewes,* 1976; by 11 March in the most southwest habitat in the Dübener Heide near Leipzig — *Seidel*, pers. commun.).

As regards the earlier return and the departure in larger number, the cranes of the southwest stay about 4 weeks longer in your country, than the Scandinavian staging population. Hence, the migratory time is apparently defined by the geographical origin and it is modified by the weather conditions. Taking into account these two factors the great variability in migratory behaviour may be understood, which, over longer or shorter periods, leads to both temporal and spatial shifts.

Summary

In the west Rügen area and the westward adjacent group of islands named the Bock, there are 2 large stages at which the Scandinavian crane population interrupts its flight. The roosting places are in shallow bays surrounded by a feeding area with a radius of 12—15 km. Autumn staging starts in the beginning of August, peaks in October and lasts for an average of 14 weeks. On the Bock, up to 18 000 cranes have been observed yearly with increasing tendency for about 10 years. By contrast, the tendency on Rügen has been decreasing to 6000 cranes, due to the susceptibility to disturbances of the main roosting place. From the middle of October mass departures are regular, but do not occur every year. In spring, only a fraction of the autumn number of cranes stages between the beginning of March and the end of April. The proportion of juveniles is about 11—13%. In autumn, the non-breeders appear first, in spring there is a reversed trend.

Inland, 24 differently frequented gathering sites are known, at which the native cranes arrive between the beginning of August and the end of September. In October they are joined by staging birds whose count varies widely in between years and places. Two-third of the roosts are situated in nature reserves. One-third of all roosting sites are subject to greater disturbances. The departure of the southern and western sites takes place significant later than from those in the north and east. In autumn and spring the main migratory dates vary by 14 days between the centre (West—Mecklenburg) and the southern border (Thuringian forest) of the migratory route, so that the cranes of the southern range stay with us about 4 weeks longer than the Scandinavian staging population does.

On the average 25 000 cranes (range 22 000—32 000) roost on the coast. In addition, there are 3500 native and 5000—7000 inland staging birds, so that the cranes of the western migratory route of 340 km in width here in Central Europe are estimated at approximately 35 000 (30 000—40 000).

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References

Alerstam, T.—A. Bauer (1973): A radar study of the spring migration of the crane (Grus grus) over the southern Baltic area. Vogelwarte. 27:1—16.

Alonso, J. C.—J. P. Veiga—J. A. Alonso (1984): Familienauflösung und Abzug aus dem Winterquartier beim Kranich (Grus grus). J. Orn. 125:69—74.

Deppe, H. J. (1978): Witterungsbedingte Steuerungsfaktoren beim Herbstzug des Kranichs (Grus grus) in Mitteleuropa. Vogelwarte. 29:178—191.

Deppe, H. J. (in print): Zum Frühjahrszug des Kranichs (Grus grus) im Ostseeküstenraum. Beitr. Vogelk.

Jähme, W. (1983): Der Kranich (Hrus grus L.) in der nordwestlichen Niederlausitz. Teil 1: Frühjahrszug, Brutpaarbestand und Nichtbrüter. Biologische Studien Luckau. 12:55—69.

Jähme, W. (1984): Der Kranich (Grus grus L.) in der nordwestlichen Niederlausitz. Teil 2: Sammeln, Rasten, Herbstzug und Überwinterung. Biologische Studien Luckau. 13:56—70.

Lühder, W. (1871): Notizen über den Bock. J. Orn. 19: 300—303.

Mansfeld, K. (1961): Zur Ernährungsbiologie des Kranichs und seiner Abwehr auf landwirtschaftlichen Nutzflächen auf norddeutschen Rastplätzen Falke. 8: 272—276.

Mewes, W. (1976): Der Zug des Kranichs in den 3 Nordbezirken der DDR. Falke. 23:75—78.
Mewes, W. (1980): Der Bestand des Kranichs (Grus grus L. 1758), in den 3 Nordbezirken der DDR. Arch. Natursch. u. Landesforsch. 20:213—234.
Picht,? (1821): Antworten auf Fragen. Pommersche Provinzialblätter für Stadt u. Land. Treptow an der Rega. 2:231.
Prange, H. (1966): Über den Rastplatz der Kraniche am Bock. 1. Mitteilung: Der Herbstzug 1965 und 1966. Natur u. Natursch. in Mecklenb. 4:145—162.
Prange, H. (1974): Kranichrast und -zug auf Rügen. Arch. Natursch. u. Landesforsch. 14:157—177.
Prange, H. (1984): Der Kranichzug in Thüringen und seine Einordnung in die mitteleuropäische Flugroute. Thür. Orn. Mitt. 32:1—16.
Schindler, W. (1972): Über den Zug des Kranichs (Grus grus) durch die Lüneburger Heide. Celler Ber. Vogelk. 2:38.
Schröder, P.—B. Endler—W. Scheller (1972): Über den Kranich in Südostmecklenburg. Falke. 19: 370—374.

A daru vonulása és pihenőhelyei a Német Demokratikus Köztársaságban

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A nyugati Rügen térségében és az ettől keletre fekvő Bock szigeteken két nagy gyülekezőhely található, ahol a Skandináviából vonuló darvak megpihennek. Az éjszakázóhelyek sekély öblökben vannak, amely körül 12—15 km sugarú körben táplálkoznak. Az őszi vonulás augusztus elején kezdődik és októberben tetőzik, átlagosan 14 hétig tart. Az elmúlt 10 év folyamán a Bock szigeteken emelkedő tendenciával mintegy 18 000 darut figyeltünk meg, ellenben a rügeni területen ez a szám 6000-re csökkent, amit az éjszakázóhelyek zavartsága okozott. Október közeéptől tömeges továbbvonulás válik rendszeressé, bár ez nem minden évben következik be. Tavasszal az őszi darvak csak egy része jelenik meg a területen, március elejétől április végéig. A fiatalok aránya 11—13%. Ősszel a szaporodásban részt nem vevő egyedek pihennek meg először, tavasszal fordított a sorrend. 24 különböző gyülekezőhely ismert a szárazföldön, ahol a helyi populáció egyedei augusztus elejétől szeptember végéig gyülekeznek. Októberben újabb egyedek csatlakoznak, ezek egyedszáma évenként és helyenként nagyon változik. A gyülekezőhelyek kétharmada védett területen van, egyharmada erősen zavart. A déli és a nyugati területekről a darvak hamarabb indulnak délre, mint az északi és a keleti pontokról. Ősszel és tavasszal a főbb vonulási időpontok 14 nappal különböznek a vonulás központi (nyugat-mecklenburgi) és a déli (thüringiai) határától, tehát a déli területek darvai mintegy 4 héttel tovább maradnak a területen, mint a skandináv madarak. Átlagosan 25 000 (22 000—32 000) daru gyülekezik a tengerparton. Ezek mellett a 35 000 helyi és az 5000—7000 szárazföldön gyülekező daruval számolva, a 340 km széles nyugati útvonalon Közép-Európában kb. 35 000 (30 000—40 000) madár vonulát.