

Dispersal of Caspian Terns *Sterna caspia* in the Baltic

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As a result of intensive ringing of young, about one half of the breeding Caspian Tern population in Sweden (ca. 1000 pairs) now bear rings. In 1972—75, ca. 3000 chicks were ringed with combinations of metal rings and coloured plastic rings showing their place and year of birth. In 1976—78, 361 breeding adults were identified in 11 colonies by reading the ring number through a telescope. Of these 53 % were breeding within 0—10 km and 33.5 % within 11—200 km of their natal colony. In a new colony of ca. 100 pairs, nearly half the identified birds were born in a colony 43 km away; the other birds originated from more distant colonies — sometimes over 500 km away. The Baltic colonies seem to exchange first-breeders frequently.

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Introduction

Bird dispersal is best studied in colony-breeding sea-birds, e.g. shearwaters, larids and auks, which can be ringed in great numbers, have a long life expectancy and consequently give a relatively high number of recoveries in the breeding season.

In several sea-bird species the offspring tend to return to their natal colony to breed. This habit is known, for example, in the Common Tern *Sterna hirundo* (Austin 1956), the Manx Shearwater *Puffinus puffinus* (Harris 1966), and the Herring Gull *Larus argentatus* (Davis 1975). In some cases, especially when the populations are increasing, many firstbreeders are found in other than their natal colonies, as in the Gannet *Sula bassana* in the northern Atlantic (Nelson 1977).

In the Baltic, the Caspian Tern *Sterna caspia* has been ringed in great numbers during recent decades, and

about half the breeding population is now bearing rings. For this reason the species was selected for a study on dispersal. This paper will deal with the following questions: (1) How far from their natal colony do Caspian Terns settle to breed? (2) From where did immigrants of a new colony of ca. 100 pairs originate?

Material and methods

As a breeding species of North Europe, the Caspian Tern is restricted to the Baltic Sea. In a census made in 1971, the population was estimated at ca. 2300 pairs, nearly 1000 of which bred in Sweden (Staaav et al. 1972, Väisänen 1973). Since most of them breed in colonies of 5 to 140 pairs, ringing of chicks has been successful. In Sweden alone, 14871 chicks were ringed in 1939—77. In 1972—75 a ringing project was carried out during which about 3000 chicks were ringed with a combination of metal and coloured plastic rings, showing the year and place of birth.

In 1976—78, adult breeding terns were identified by reading their ring numbers or ring combinations in 11 Swedish colonies. A hide and a telescope magnifying 25 or 40

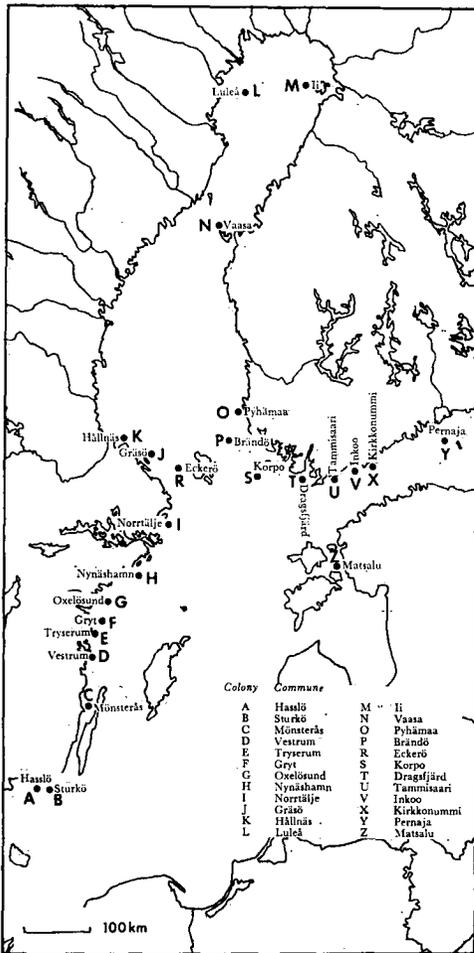


FIG. 1. Distribution of Caspian Tern colonies in the Baltic.

times were used. During the breeding season in June or early July, when there were small chicks, eight colonies were visited three times and three colonies were visited once.

The distribution of Caspian Tern colonies in the Baltic is shown in Fig. 1. All the Swedish colonies (A to K investigated) and the foreign colonies from which immigrants were observed during this study are marked with a letter.

Results

From a hide I observed that about one

half of the breeding terns wore rings. But some rings were too shiny or worn to be read and many terns were too far from the hide for identification. In all 361 birds were identified. That is about 18 % of the Swedish population. Of these, 167, or 46 %, were breeding within 0–10 km of their natal colony — 158, or 44 % actually in the colony of their birth (Table 1). If the birds in colonies C and E are excluded, since no young were ringed there before, 53 % of the identified terns returned to within 10 km of their natal colony; 33.5 % of the terns originated from colonies at distances of 11 to 200 km and the rest came from more distant colonies, even as far as 800 km away (one bird from M to H, Fig. 1). Table 2 gives the numbers and birth places of the terns breeding in the 11 colonies studied. The same or a nearby colony was more commonly chosen than a distant one, for example birds from the northernmost Finnish colonies dispersed to my study area (Fig. 1). Possible errors in study methods are dealt with in the Discussion.

In 1975, a new colony was established (colony E, Fig. 1, V. Olsson *in litt.*) and in the following year there were ca. 100 breeding pairs. Of the 41 terns identified, 18 were born in the neighbouring colony D situated 43 km to the south. In recent years, this colony had suffered from heavy predation on chicks by Herring Gulls, and decreased in size. Apparently many of the newcomers to colony E were not first-breeders but adult emigrants from colony D. Seventeen other terns were born in Swedish colonies north of colony E, five terns were from the southwestern coast of Finland and one was from Estonia. Here it may be mentioned that in 1970 three terns ringed in

TABLE 1. Distances between the birth-place and subsequent breeding place of 361 Caspian Terns in Sweden.

	Distance in kilometres								
	0—10	11—100	101—200	201—300	301—400	401—500	501—600	601—700	Over 700
%	46	18	15	9	6	2	2	1	0
N	167	66	55	33	21	8	7	2	1

Sweden were reported to be breeding in an Estonian colony.

Discussion

The frequencies of dispersal distances recorded in studies of this kind (Tables 1 and 2) are strongly dependent on (1) the location of colonies to and from which to disperse, (2) the efficiency of chick ringing in the different colonies within the possible range of dispersal, and (3) the efficiency of identification of breeding birds. If there was only one colony in the Baltic, practically all the first-breeders would settle down in the natal colony. A large majority of the Caspian Tern colonies in the Baltic are located less than 500 km from each other (Fig. 1).

If only a few or no chicks have been ringed in a colony visited later for ring identification, the fidelity to the natal colony will appear low. Correspondingly, a high dispersal rate will be found if chicks in distant colonies where ringing was intensive come to breed in a colony where there has been no ringing. This source of error should not be strong in this study, as chicks have been ringed in great numbers nearly every year in all the bigger colonies in the Baltic. In this study, the efforts to identify breeding terns were concentrated on the Swedish colonies. Thus I missed Swedish-born terns breeding in Finland or Estonia, expect for a few accidental recoveries. But this will be corrected to some extent by distant dispersals from Finnish or Estonian colonies to

TABLE 2. Dispersal of Caspian Terns between colonies in the Baltic Sea (for letters see Fig. 1). The figures in italics are the numbers of terns faithful to their natal colonies.

	Born in colony																									
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	R	S	T	U	V	X	Y	Z	Σ	
Breeding in colony	A	—	7	—	3	—	—	—	3	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18
B	—	2	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
C	—	—	—	4	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	5
D	—	—	—	<i>38</i>	—	—	—	—	2	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	46
E	—	—	—	18	—	1	1	6	5	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	41
F	—	1	—	5	—	<i>7</i>	2	2	2	1	1	—	—	—	1	3	—	—	1	—	—	—	—	—	—	21
G	—	—	—	5	—	1	<i>19</i>	8	2	2	—	—	—	1	—	1	—	—	—	—	3	—	—	—	—	42
H	—	—	—	5	—	—	8	<i>38</i>	7	2	—	—	1	1	—	1	—	—	—	—	—	—	—	—	—	63
I	—	—	—	—	—	—	—	3	<i>25</i>	8	1	—	—	—	—	2	—	—	—	1	2	—	—	—	—	43
J	—	—	—	—	—	—	2	3	4	<i>18</i>	6	—	—	—	—	1	—	1	1	1	—	—	—	—	—	37
K	—	1	—	2	—	—	—	3	2	3	26	—	1	—	—	—	1	—	1	1	—	—	—	—	—	41
Σ	—	11	—	81	—	3	32	68	51	37	38	—	2	2	1	12	2	1	4	8	4	1	1	2	361	

Sweden, if the dispersal rate and distance from all the Baltic colonies is assumed to be the same. For these reasons I believe that the frequencies of dispersal distances shown in Table 1 are more or less real.

Pair formation in birds may occur at the breeding place or during wintering and migration. If it occurs during wintering or migration, one of the birds is forced to follow his or her mate to a new colony, which results in long dispersals and weak site tenacity. If pairing occurs on the breeding grounds, neither sex will be influenced by the mate during dispersal for breeding, and site tenacity will be strong. It has been suggested that Caspian Terns may arrive at the nesting grounds paired. Bergman (1953) observed that terns arrived in April in pairs and Jozefik (1969) saw trans-migrants in spring flying in pairs in Poland. However, as first-breeders and older adults show strong fidelity to the natal colony and former site of breeding (Bergman 1953, M. Soikkeli, pers. comm.), it seems probable that the birds generally pair on the breeding grounds.

During wintering Caspian Terns from the isolated Baltic population meet birds from another isolated European population, which breeds on the Black Sea. As shown by Mayaud (1956) and Shevareva (1962), both populations spend the winter in tropical West Africa along the River Niger. If pair formation occurred in the wintering areas, the terns from these two populations would mix, but so far there have been no recoveries of breeding birds born on the Baltic and dispersed to the Black Sea, or *vice versa*.

In this study the adult terns show strong fidelity to the colony where they

bred the year before; 43 were observed in the same breeding sites in two years and five in all three years. There was only one record of a tern moving to a neighbouring colony. But interchange of adults between different colonies probably occurs because some of the terns breeding in the newly established colony E were older birds and had presumably bred in another colony in earlier years. The reasons for such interchange between colonies may include heavy predation on chicks by Herring Gulls, or disturbance by man during the sensitive early stages of breeding (Bergman 1953). Väisänen (1973) suggested that disturbance by human activity in 1947, after the Second World War, may have caused the movement of large Caspian Tern colonies from the Gulf of Finland (Kirkkonummi) to the northern Gulf of Bothnia (Luleå archipelago), a distance of about 800 km. In my study one bird dispersed about the same distance from its birth site, but in the opposite direction. Such long movements indicate that the Caspian Terns of the Baltic form a population within which all types of interchange are possible.

In other studies of larids, the fidelity to the natal colony appeared to be somewhat weaker. In the American Herring Gull, 40 % of a surviving sample returned to their natal colony to breed (Ludwig 1963), but the author considered that this relatively low percentage was influenced by environmental factors rather than a tendency to recruit from other colonies. In another study of Herring Gulls, however, Chabrzyk & Coulson (1976) also found that no more than 40 % of the young gulls returned to their natal colony. They inferred that large-scale dispersion is the normal course of events, with females showing a signi-

ficantly greater tendency to disperse to other colonies.

The dispersal pattern in Swedish colonies of Caspian Terns shows some similarities to that for Scottish Herring Gulls (Duncan & Monaghan 1977). Most recoveries from breeding seasons are reported from colonies within a distance of 100 km from the natal colony, but a few are from colonies farther away. This is probably a typical dispersal pattern in colony-breeding larids, although we have insufficient knowledge about other species.

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Selostus: Itämeren räyskien synnyinpaikkauskollisuudesta

Noin puolet Ruotsin pesivistä räyskistä on rengastettuja. Vuosina 1972—75 merkittiin n. 3000 räyskänpoikasta Ruotsissa metalli- ja värirenkaiden yhdistelmillä. Samoina ja aikaisempina vuosina suuri osa Suomen ja Viron räyskänpoikasista on rengastettu.

Vuosina 1976—78 tunnistettiin 11 yhdyskunnassa Ruotsissa kaikkiaan 361 pesivää räyskää lukemala renkaan numero kaukoputkella piilokojusta käsin. Tunnistettujen osuus oli n. 18 % Ruotsin pesimäkannasta. Linnuista 53 % pesi synnyinkoloniassaan tai 10 km:n säteellä siitä, 33,5 % oli syntynyt 11—200 km:n etäisyydellä pesimäpaikasta ja muutamat vielä kauempana, jopa 800 km:n päässä (taul. 1, kuva 1 ja taul. 2, missä ylhäällä on synnyin- ja vasemmalla pesimäkolonia). Lajin vahva paikkauskollisuus sekä Itämeren ja Mustan meren populaatioiden pysyminen sekoittumatta, huolimatta niiden talvehtimisestä samalla alueella Afrikassa, osoittavat parinmuodostuksen tapahtuvan pääasiassa vasta pesimäpaikoilla.

Eräässä vastasyntyneessä n. 100 parin koloniassa lähes puolet pesivistä linnuista oli lähöisin naapurikoloniasta 43 km:n päästä ja lo-

put kauempaa Ruotsista, Suomesta ja Viirosta. Itämeren koko kanta on yhtenäinen sikäli, että kuhunkin koloniaan voi asettua pesimään muualla syntyneitä lintuja.

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