

Distribution and feeding habits of the Great Skua *Catharacta skua* in the North Sea

*Mark L. Tasker, Peter Hope Jones, Barry F. Blake
and Tim J. Dixon*

In response to concern for the potential environmental impact of the North Sea oil industry, the Nature Conservancy Council has recently carried out a wide ranging survey of the distribution and behaviour of seabirds at sea in the North Sea. This paper is an analysis of all records of Great Skuas *Catharacta skua* from this project, made between 1979 and 1982.

METHODS

Observations were made from a large variety of non-fishing ships and oil production platforms in the North Sea. The methods used in counting Great Skuas from ships involved recording the number of birds seen per ten minutes in the 180° arc ahead of the ship. This count was later converted, using the ship's speed, to the number of birds seen per 100 linear kilometres. Counts were made throughout each year of the survey. Data for all years have been analysed together using 15°N × 30°E/W (c782 km²) rectangles as units. Records were made of seabird behaviour including any association with other species or with ships.

At platforms, the number of birds within 500m of the structure (and which were apparently not moving past the platform), were counted at intervals throughout the observer's visit. The maximum numbers of birds seen at any one count during one day were averaged by month to produce a mean maximum abundance for each month. This procedure minimised confusion from birds moving between nearby platforms and hence distorting patterns of occurrence. The results from two oil fields, Auk and Argyll, were treated together due to their relatively close proximity (50 km). Records from the following four oil fields are presented: Brent (61°05'N 01°42'E), Beryl (59°33'N 01°32'E), Auk (56°24'N 02°02'E) and Argyll (56°10'N 02°47'E). Visits to these platforms were made throughout the year and data for all years were analysed together. At least five days data for each month/platform were collected. Full descriptions of the methods used in counting seabirds from ships and platforms are described elsewhere (Blake *et al.* 1984; Tasker *et al.* 1984).

RESULTS

(a) *Records from ships*

The first Great Skua of the year recorded by this study was in the English Channel in early March, and birds were first seen near the breeding colonies in Shetland and Orkney by the end of the month. The species was observed on most days in the North Sea until mid-November, with the majority of these sightings being in the vicinity of Shetland and Orkney. Three zones were used in the analysis of the records collected at sea: (i) the breeding area — all rectangles containing part of Orkney or Shetland; (ii) peripheral breeding zone — any rectangle adjacent to the breeding area; (iii) the remainder of the North Sea.

Fig. 1

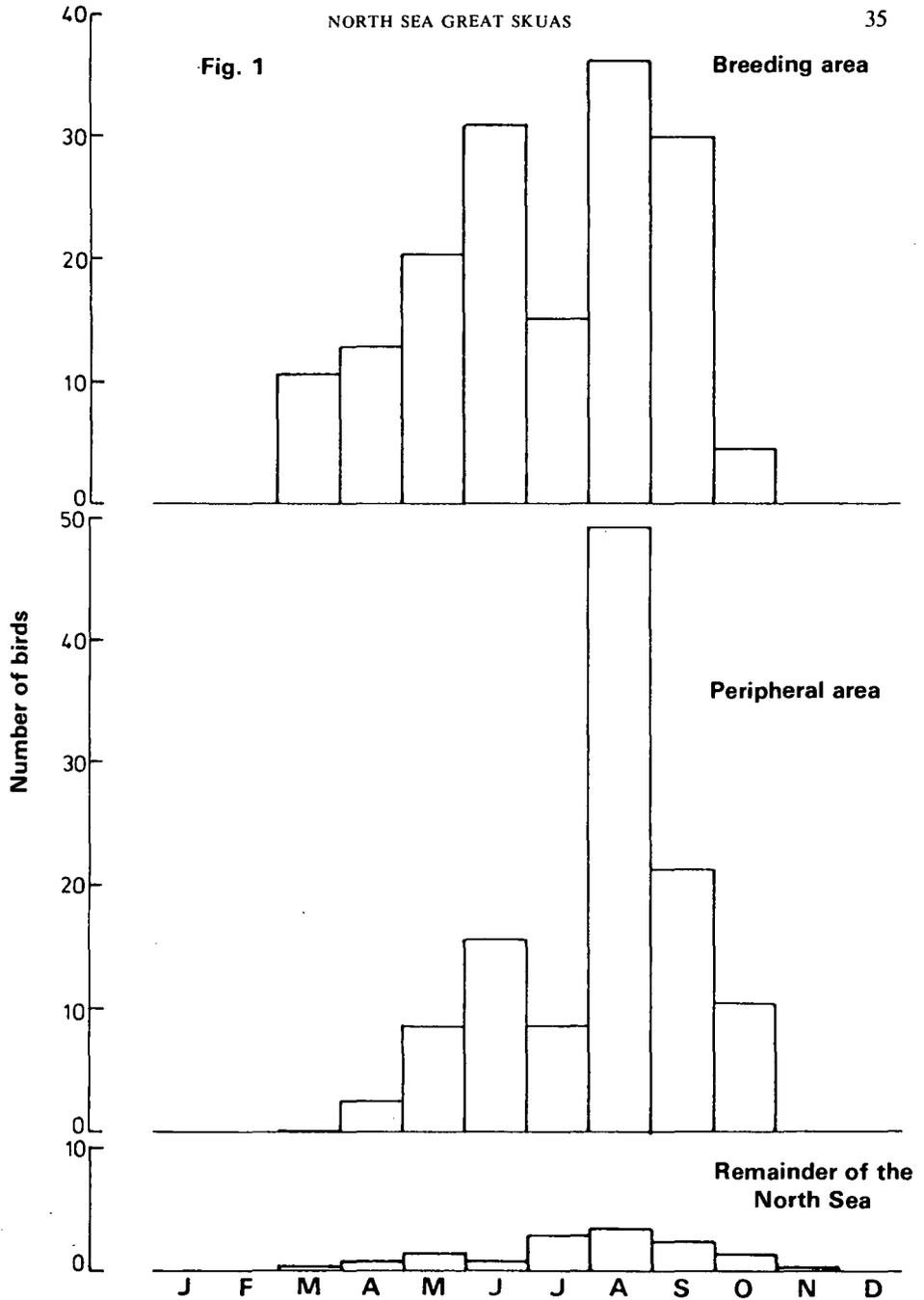


Figure 1. Average numbers of Great Skuas seen per 100 km. travelled in three areas of the North Sea (see text for area limits).

TABLE 1. PERCENTAGE OF SQUARES EXAMINED IN WHICH GREAT SKUAS WERE SEEN, FOR FOUR LATITUDE BANDS, IN THE NON-BREEDING AREA OF THE NORTH SEA, WEST OF 3° EAST. (FIGURES IN BRACKETS = NUMBER OF SQUARES EXAMINED).

Latitude	Month										
	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.-Feb.	
51°-54°	6 (19)	11 (19)	5 (39)	4 (50)	38 (51)	12 (18)	12 (16)	42 (24)	5 (18)	0 (16)	
55°-56°	5 (20)	0 (16)	12 (41)	0 (15)	43 (58)	40 (37)	36 (22)	20 (31)	4 (26)	0 (31)	
57°-58°	0 (35)	4 (26)	30 (35)	11 (49)	48 (37)	57 (46)	43 (31)	- (5)	7 (30)	0 (55)	
59°-62°	3 (58)	4 (55)	54 (48)	27 (70)	39 (67)	62 (61)	57 (59)	18 (20)	0 (29)	0 (46)	

At least one hour's observation was carried out in 90% of squares.

Mean numbers of birds seen per month per 100 km. travelled in each of these three zones is shown in Figure 1. Table 1 shows percentage of rectangles, in four latitude bands in the non-breeding area (iii), in which Great Skuas were seen, for each month. Figures 2-5 show the distribution patterns for groups of months when Great Skuas were found in the North Sea. The months grouped were those where the distribution of skuas were similar.

The two zones around the breeding area showed similar patterns of numbers, with two peaks in abundance, the first in June and the second in August. These peaks were very similar in size for the inner breeding zone, but the second peak was much larger in the peripheral breeding zone. For the remainder of the North Sea, numbers were very much lower than in the zones close to the breeding colonies, and showed relatively small changes in mean numbers seen. Before June, the vast majority of records were from the breeding areas or adjacent North Sea areas, whereas in July, birds occurred throughout the western half of the North Sea. In September, numbers started to decline in all areas and the breeding area was deserted during October, with a decline also occurring in the rest of the North Sea; very few birds were seen in November.

(b) Records from oil production platforms

This species was only recorded between April and October. Figure 6 shows the mean

TABLE 2. ANALYSIS OF OCCASIONS WHEN GREAT SKUAS WERE SEEN ASSOCIATING WITH OTHER SEABIRD SPECIES. (FIGURES ARE TOTAL NUMBERS OF GREAT SKUAS INVOLVED IN AN ACTIVITY; PERCENTAGES ARE OF GREAT SKUAS INVOLVED IN AN ACTIVITY DIVIDED BY MONTH.)

Group type	Month			
	May	June	July	August
Multi-species feeding assemblage	3 (8%)	32 (55%)	16 (70%)	15 (14%)
Fishing vessel associated	29 (76%)	6 (10%)	5 (22%)	70 (66%)
Klepto-parasitism				
Gannet	4 (13%)	12 (21%)	0	9 (8%)
Kittiwake	1 (3%)	4 (7%)	1 (4%)	0
Eating dead bird	0	0	0	6 (5%)
Other	0	4 (7%)	1 (4%)	8 (7%)

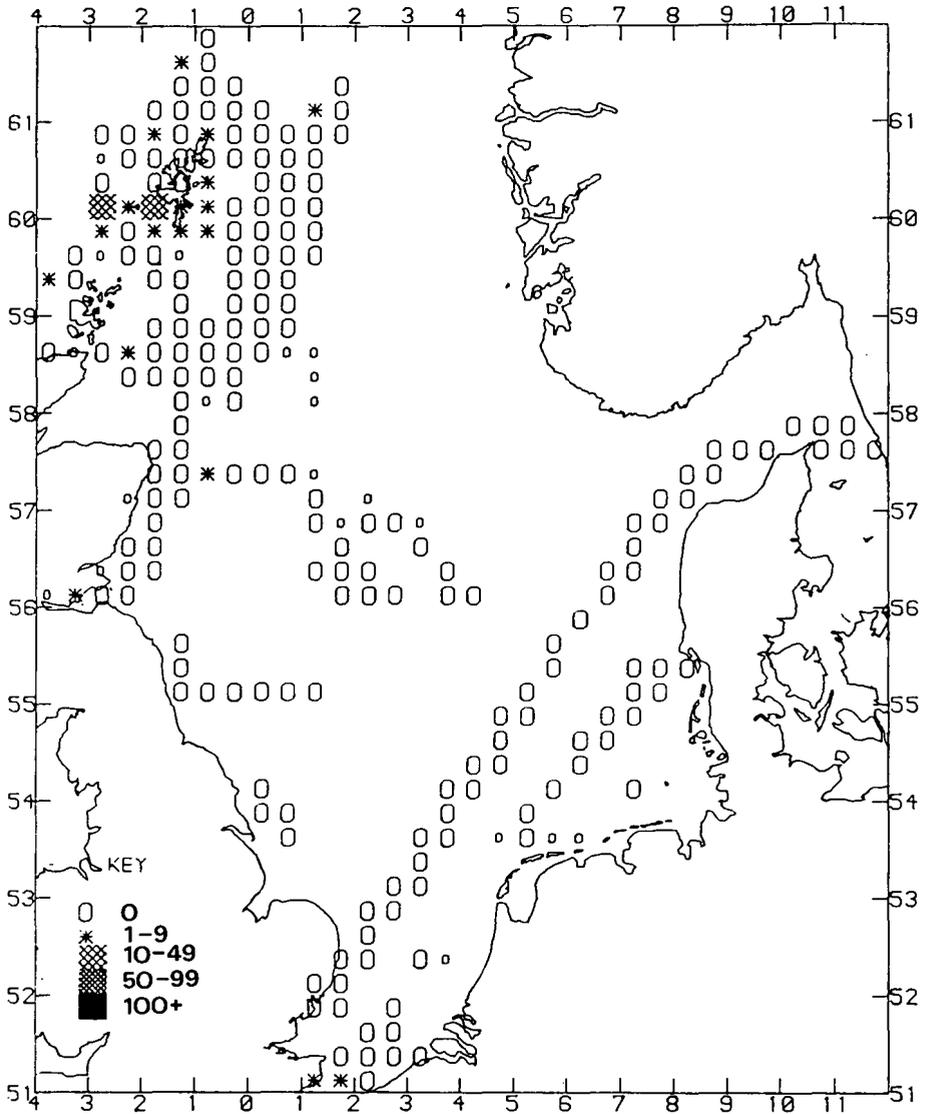


Fig. 2

Figure 2. Average numbers of Great Skuas seen per 100 km. travelled in the North Sea, March and April (total 4817 and 5238 km. travelled respectively). Small symbols on Figures 2-5 under 6 km. surveyed in square.

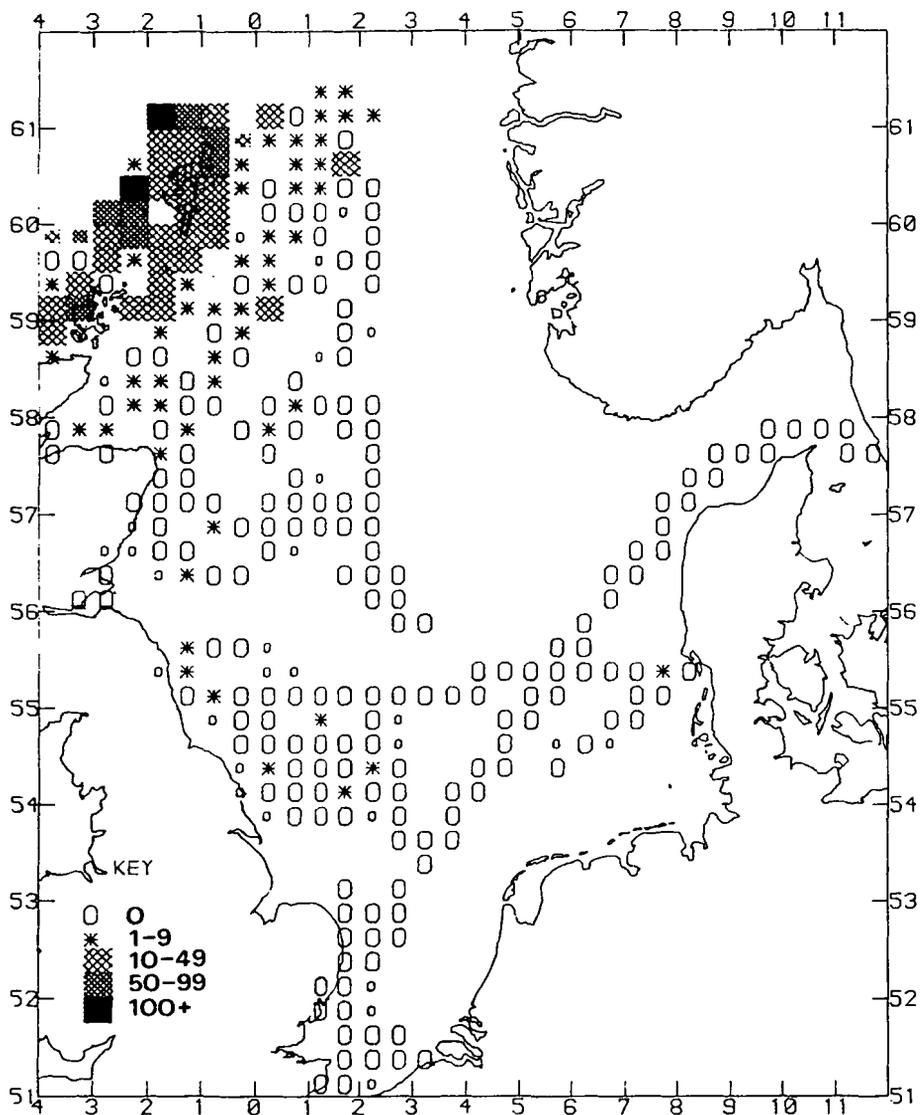


Fig. 3.

Figure 3. Average numbers of Great Skuas seen per 100 km. travelled in the North Sea, May and June (total 8731 and 6241 km. travelled respectively).

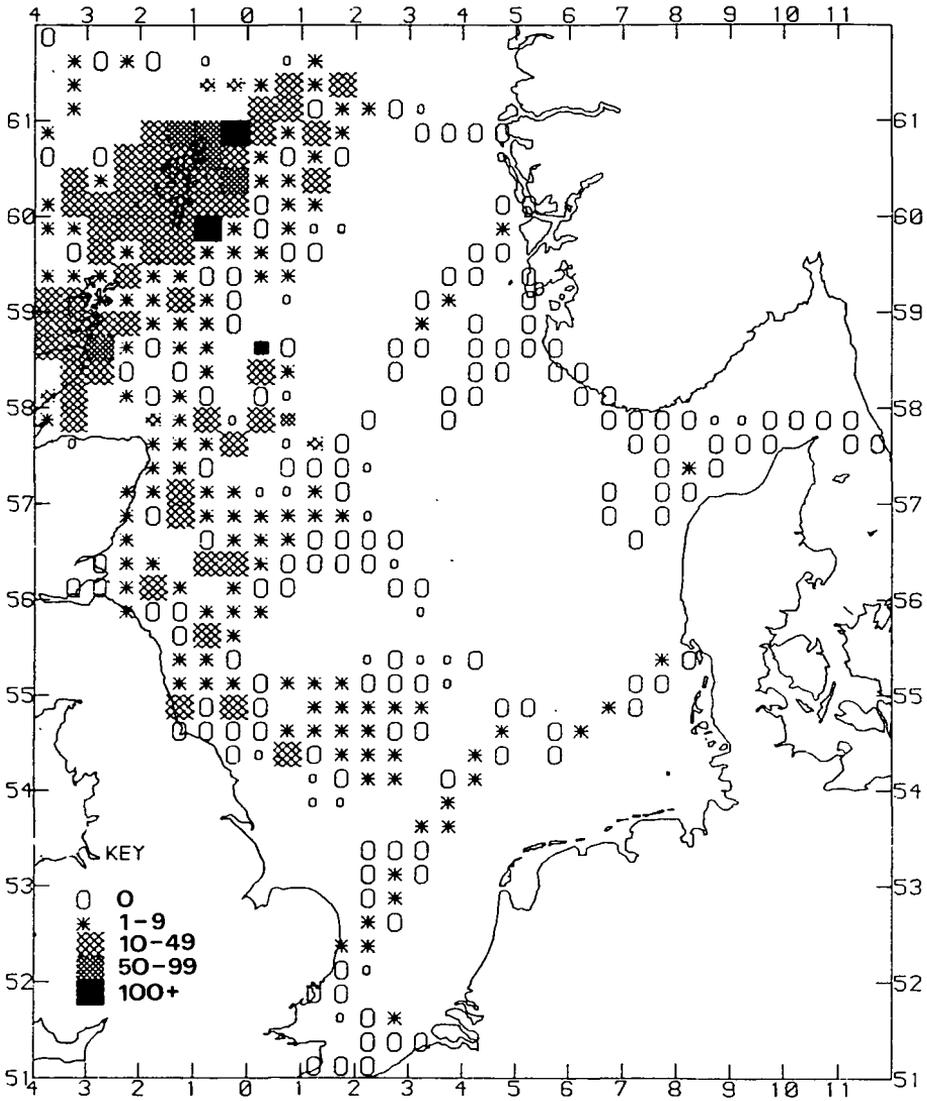


Fig. 4

Figure 4. Average numbers of Great Skuas seen per 100 km. travelled in the North Sea, July, August and September (total 7699, 7695 and 5090 km. travelled respectively).

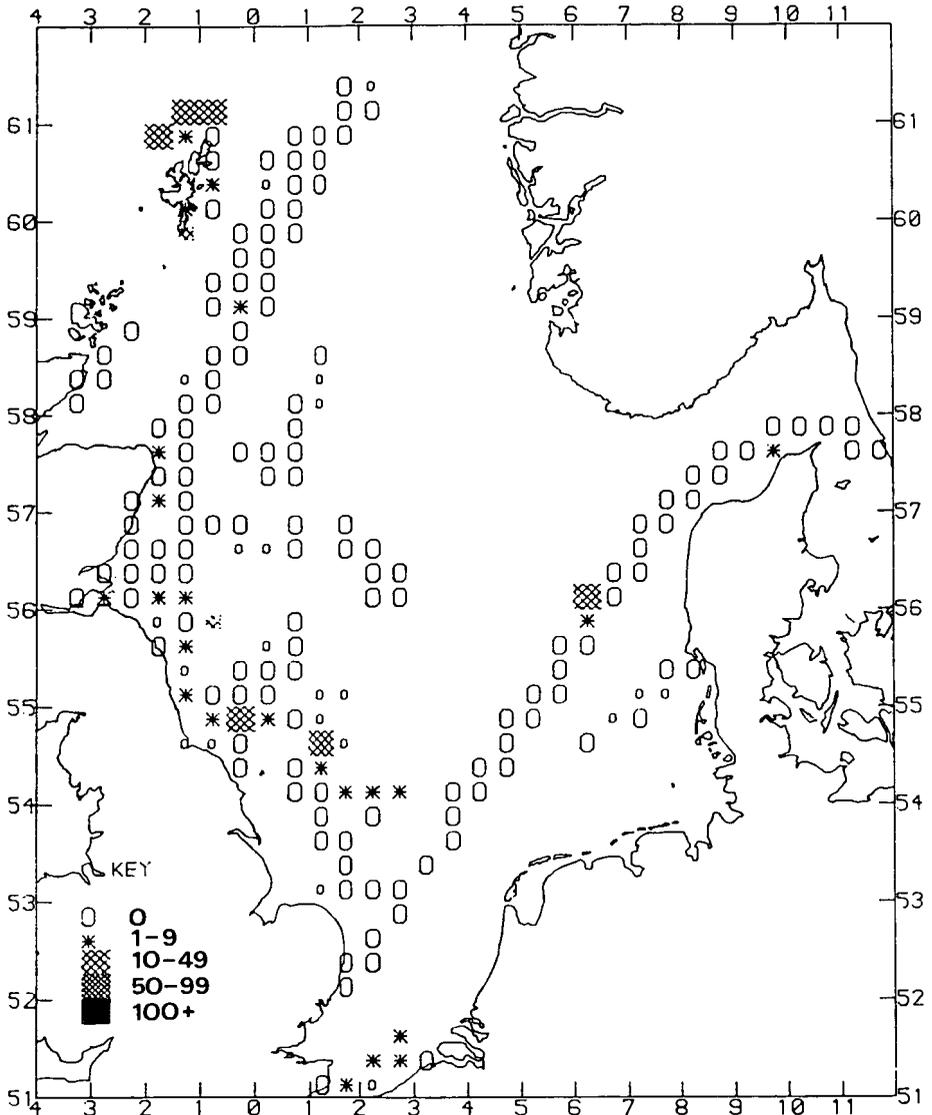


Fig. 5

Figure 5. Average numbers of Great Skuas seen per 100 km. travelled in the North Sea, October and November (total 2695 and 2268 km. travelled respectively).

maximum daily abundance of Great Skuas at the three sample sites analysed. Patterns of attendance varied between the sites. The Brent field showed a similar pattern of occurrence to that of numbers recorded in the peripheral breeding zone (Figure 1), with peaks in June and August. However, numbers recorded at Beryl rose to a peak in July and then declined steadily, whilst around Auk and Argyll fields, birds were only seen in August and September.

(c) *Association with other species*

An analysis of associations of Great Skuas with other species is presented in Table 2. Since associations normally only occurred when Great Skuas were feeding, the groups are classified by feeding activities. The analysis is only for the Orkney/Shetland waters in order to allow comparison with Furness and Hislop (1981). Few groups occurred outside this area, or outside the months of May to August. There was an apparent change from feeding around fishing vessels in May to feeding in multi-species assemblages in June and July, returning to trawler association in August. There were only four records of individual skuas feeding on their own. Analysis of the occurrences of more than two Great Skuas on the water in a single-species group, showed no records until August, when one group of twelve, one group of five and two groups of four were observed. If these figures are included as "feeding assemblages" in Table 2, the proportion of birds in feeding assemblages rises to 30%, while those around fishing vessels falls to 52%.

TABLE 3. OBSERVED VICTIMS OF KLEPTOPARASITIC ATTACKS BY GREAT SKUAS (ENTIRE NORTH SEA)

<i>Species</i>	<i>Number of attacks</i>
Gannet (<i>Sula bassana</i>)	30
Kittiwake (<i>Rissa tridactyla</i>)	16
Lesser Black-backed Gull (<i>Larus fuscus</i>)	2
Great Black-backed Gull (<i>Larus marinus</i>)	1
Sooty Shearwater (<i>Puffinus griseus</i>)	1
Manx Shearwater (<i>Puffinus puffinus</i>)	1

The obvious inherent difficulty in comparing feeding methods is the different durations of each incident; it will take less time to stage a kleptoparasitic attack on a Kittiwake *Rissa tridactyla* than it will to approach a trawler, pick up food and move away again. The likelihood of observation is therefore different for each type of feeding behaviour, although it may be assumed that the duration of a particular feeding activity will not change appreciably from month to month, making comparisons valid.

Kleptoparasitic attacks were seen most frequently in June. A list of bird species attacked and the observed frequencies of these attacks are given in Table 3. These figures will probably be biased by conspicuousness and duration of each chase. For example, Gannets *Sula bassana* are very obvious and chases of this species are likely to last longer than for other species.

DISCUSSION

There have been relatively few studies of Great Skua distribution in the North Sea. Joiris (1978) found them to be present in only the northern half of the North Sea in July. In February 1978, none was seen (Joiris 1983). Observations at Helgoland showed very few records from January to March, none in the early summer, then a build up from July to a peak in October, with only one being seen in November (Kuschert 1981). This pattern was

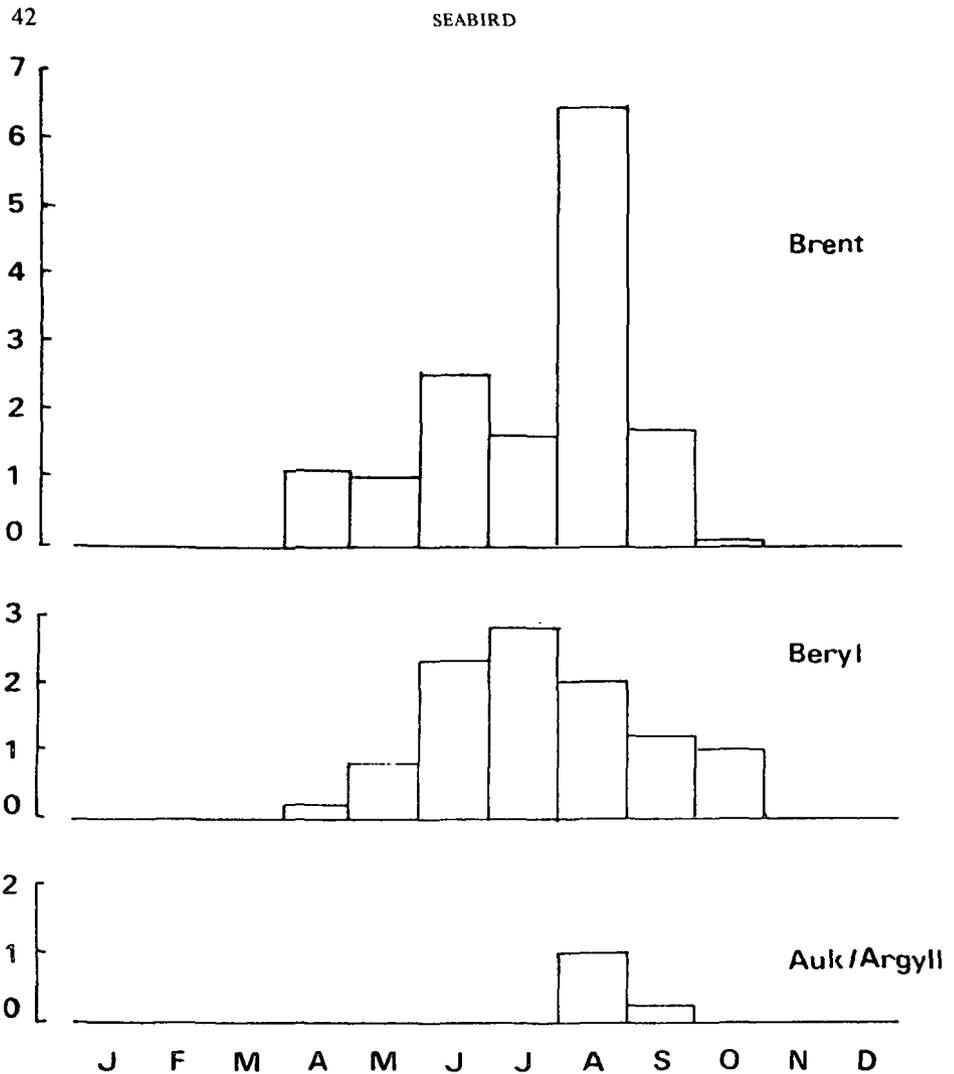


Figure 6. Mean maximum daily abundance of Great Skuas at three oil platform sites in the North Sea.

also found in observations made off West Denmark (Meltofte 1979). Between 1900 and 1978, only 42 birds were seen from Helgoland indicating the rarity of the species in the south-east of the North Sea.

Using the life table in Furness (1977), it has been calculated that at any one time in the entire Great Skua population there will be around 1735 non-breeders to every 1000 breeders (Furness pers. comm.). This high figure is due both to the longer immaturity of the Great Skua, which on average breeds first in its eighth year, and to the current

expansion rate of the population. Bearing in mind that most individuals in their first year do not return to their home waters (Furness 1978), it is likely that 55% of the birds present in northern latitudes are non-breeders.

Ringed recoveries show that immature birds return to the breeding areas later than breeding adults (Furness 1978). Counts of club sites within colonies (these birds are probably immature) have shown an increase in numbers during June to a peak in July, followed by a rapid decline in August.

Most of the Great Skuas seen between March and May in the North Sea will be breeding birds since very few ringed immature birds have been recovered before June. Birds seen outside their breeding areas at this time are probably moving between their southern wintering areas and breeding grounds. In June numbers at sea reach a peak around the colonies, possibly reflecting the return of immature birds to breeding areas. The decline in numbers at sea during July may be the result of a large influx of these younger birds into the club sites within the colonies. This movement presumably more than compensates for the increased amount of time that adults have to spend at sea foraging for food for their newly hatched young (Furness and Hislop 1981).

The departure of the immatures from club sites in August, together with fledging of young and adults leaving their territories, probably accounts for the peaks in numbers seen at this time of the year in virtually all areas and platforms. The decline in numbers in the North Sea during September was presumably associated with the birds moving south.

Although seabirds must spend much of their time at sea either feeding or actively searching for food, Great Skuas were rarely observed feeding offshore; most birds recorded were either flying or sitting on the water. Great Skuas feed using a variety of methods, the most notable of these is the kleptoparasitism of other seabirds, particularly the Gannet. They are also known to kill and eat seabirds (e.g. McKenzie 1981), and have recently been observed feeding on refuse tips in Shetland (Furness *et al.* 1981). Furness and Hislop (1981) examined the diet and feeding ecology of Great Skuas at colonies in Shetland during the breeding season. They found that birds preferred different foods, which varied according to the stage of the breeding season, and to the age of the bird. The population as a whole appeared to prefer discarded whitefish (normally gadoids) from trawlers early and late in the breeding season while preferring sandeels (*Ammodytes* sp.), caught at the surface by birds in multi-species feeding flocks, during June and early July (this pattern varied slightly from year to year). These findings would correspond well with the observed feeding behaviour at sea, if multi-species feeding assemblages are assumed to be related to irregularly occurring, large surface swarms of sandeels (Furness and Hislop 1981). It is unknown why this seasonal change in diet occurs but it may be related to a change in availability of sandeel during late July and August.

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SUMMARY

The distribution and occurrence of the Great Skua in the North Sea is described using records made from ships and oil production platforms. The species was a summer migrant to the area and no birds

were recorded between mid-November and late March. Most sightings were made in the vicinity of breeding colonies in Shetland and Orkney. The large immature component of the population probably caused the large influx to other areas of the North Sea. These young birds probably also accounted for seasonal changes in numbers at sea near breeding sites. Observations made on feeding behaviour agree with previous studies of Great Skua diet during the breeding season, and indicate that birds may be feeding mainly on sandeels in June and July, but discarded whitefish at other times.

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Mark L. Tasker, Peter Hope Jones, Barry F. Blake and Tim J. Dixon. Nature Conservancy Council, 17 Rubislaw Terrace, Aberdeen, Scotland, AB1 1XE.