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# Increasing Grey seal numbers at the Farne Islands

by

W N Bonner

Natural Environment Research Council
Seals Research Unit,
Fisheries Laboratory,
Lowestoft, Suffolk.

## 1. INTRODUCTION

The Grey seals, Halichoerus grypus, breeding at the Farne Islands, just off the north-east English coast, constitute one of the best documented seal populations in Europe. Since 1956 reasonably accurate estimates of the number of young born each breeding season have been made and these show the population to be increasing at an average annual rate of about 9 per cent. (Table 1).

| Year | No. of births | % mortality |
|---|---|---|
| 1956 | 751 | 10.5 |
| 1957 | 854 | 16.3 |
| 1958 | 869 | 13.6 |
| 1959 | 898 | 14.5 |
| 1960 | 1019 | 16.3 |
| 1961 | 1137 | 17.9 |
| 1962 | 1116 | 15.1 |
| 1963 | 1254 | 18.0 |
| 1964 | 1436 | 19.0 |
| 1965 | 1398 | 21.0 |
| 1966 | 1715 | 20.2 |
| 1967 | 1776 | 16.9 |
| 1968 | 1793 | 17.0 |
| 1969 | 1917 | 17.3 |
| 1970 | 1956 | 21.1 |

Table 1. Numbers of Grey seal pups born at the Farne Islands, 1956-1970.

As there is no indication of migration of other Grey seals into this area the increase is believed to be endogenous. There is, however, some small scale dispersion from the Farne Islands. The small population of Grey seals found at Scroby Sands, off East Anglia, where 10 - 15 young are born

each year is believed to be derived from the Farne Islands. Increasing numbers of Grey seals seen in the Wash (where they are not yet known to breed) probably originate from the Farnes. A small group of breeding Grey seals at the Isle of May in the Firth of Forth is thought also to be derived from the Farnes stock.

The seals of the Farne Islands, together with these minor groups are thought to represent a distinct stock recognisable by the lateness of their breeding season. The next nearest major population of Grey seals is that at Orkney, where the peak of the pupping season occurs soon after the middle of October, or some three weeks before peak breeding on the Farnes. This difference in peak of pupping cannot be related to latitudinal differences as more southerly populations of Grey seals are known which breed in September-October and it is thought to indicate a significant degree of genetic isolation between the breeding Grey seals of the Farne Islands and Orkney.

The increase in the numbers of breeding seals at the Farne Islands has had effects on both the seals and their environment. Some of the effects are described in this paper.

## 2. INCREASED DENSITY AND PUP MORTALITY

Of the 13 islands in the Farnes group that are dry at high water only 4 are used regularly by breeding seals. Although the number of breeding females has approximately trebled since 1952 there has been no major movement to other islands though at least one of these is known to have supported breeding seals in the recent past. Occasional pups are found on islands other than the four main breeding grounds but it is often difficult to decide if an isolated pup was born on the spot on which it is found. It is possible, however, that incipient colonisation is beginning at one minor island (Bonner & Hickling, in press). As apart from this no new islands are being colonised it follows that the increased numbers have resulted in a greater density of seals on the breeding islands. This has been achieved both by an increase in the area used by the seals and by a decrease in the mean distance between breeding females. Because of lack of precise data from earlier years it is not possible to quantify the relative importance of these two factors.

Increased density of breeding females has contributed to increased mortality of pups on the breeding grounds. Coulson & Hickling (1964) showed that there is a correlation between the percentage mortality of young on the breeding grounds and the number of young present per 100 m of accessible shore.

The mortality of young on the breeding grounds at the Farne Islands in 1970 was 21.1%. This is greater than that recorded at any other Grey seal breeding colony. It is approached only by the conditions at North Rona, another large and crowded colony, where on 22 October 1970 a mortality of 14.5% was recorded from a population of 1,769 pups. The final onshore mortality at North Rona would probably have reached a level similar to that at the Farne Islands. In other major Grey seal breeding colonies much lower mortalities are recorded. In Orkney, for example, on the same date a mortality of only 4.4% was recorded from a total of 1,819. The final mortality in Orkney was probably a little over 7%.

Although there are some deaths associated with parturition and some caused by misadventure or traumatic injuries, the most important single cause of pup death on breeding grounds is starvation, resulting from the desertion of the pup by its mother. This will occur when the social bond between the mother and her pup is broken or fails to become established. This is generally a result of disturbance which originates endogenously amongst the seals on a crowded beach, or is caused by human interference.

Grey seal cows locate their pups by a combination of topographic, auditory, visual and olfactory cues (Fogden, 1971). If as a result of a disturbance a pup strays far from its birth site or the place where it was last left by its mother, its chances of being found again are seriously decreased. Fogden has pointed out that a congested and disturbed beach is one where a slightly confused situation may rapidly deteriorate until many mother-young bonds are confused. This may lead to more cows deserting and hence contribute further to the confusion.

The abbreviated lactation period of the Grey seal (18-21 days) and the high rate of transfer of food from the mother to the pup constitute a very delicate system which if disturbed will greatly decrease the pup's chance of survival.

Much of the disturbance is caused by the movement of seals from their pupping sites to the sea. It follows that disturbance (and hence density dependent mortality) will be greatest when breeding sites extend far inland or where pups occur in corridors used as a means of access to the sea. Boyd et al. (1962) have commented on the high mortality of pups in the gullies leading to the sea at North Rona. Bonner & Hickling (in press) have shown that the growth rates of pups from the more densely-crowded areas is less than that of pups from areas of low density or where pupping sites formed a single rank along the shore. (Table 2).

| Locality | Growth rate (kg/day) |
|---|---|
| Inland 1 | 1.20 |
| Inland 2 | 1.32 |
| Beach | 1.70 |

Table 2. Average growth rates (kg/day) 0-20 days for groups of pups from various localities at the Farne Islands, November, 1970.

3. BEHAVIOUR OF BREEDING SEALS

Associated with the increase in numbers of breeding animals has been a change in their behaviour. At most Grey seal breeding colonies the appearance of a human observer will cause all, or nearly all, the adults to rush into the sea. This was the case at the Farne Islands until 1952 when it was noticed that a single cow remained to challenge and charge an observer. In recent years the proportion of cows which remain at, or close to, their pupping sites has increased. In 1970 in most areas about a third of the cows behaved in this way. Territorial bulls as well as cows may also hold their ground but the smaller number of bulls involved makes them less conspicuous.

As many of the animals showing site tenacity would charge observers it was suspected that this type of behaviour was associated with aggression. A comparison between the amount of aggressive behaviour in the Farne Islands and two sites, one crowded, the other uncrowded, in Orkney, was made. Three items of behaviour (open-mouth threat, lunge and bite, Fogden, 1971) were scored during observation periods of 30 minutes and the results expressed as total items of aggressive behaviour per seal per hour (Table 3). It was found that the seals at the Farne Islands showed significantly more aggressive behaviour than the Orkney seals.

| | Aggressive items per seal per hour |
|---|---|
| Orkney, uncrowded | 0.7 |
| Orkney, crowded | 1.6 |
| Farnes, locality 1 | 4.9 |
| Farnes, locality 2 v | 2.8 |

Table 3. Frequency of items of aggressive behaviour at sites in Orkney and the Farne Islands. (From Bonner & Hickling, in press).

It is probable that most of this aggressive behaviour has been developed during the lifetimes of individual seals, as the result of stress

due to crowding. If, however, there are innate tendencies towards aggressiveness these are likely to increase in the population as there are strong selective pressures towards this. This is because breeding cows that react to disturbance, provoked either by high density of seals or by human interference, with aggressive behaviour will tend to stay at their breeding sites. Animals that react with the conventional timid behaviour will desert their breeding sites (unless prevented from doing so by site topography). Deserting animals will lose contact with their young and lost pups will be affected by the density dependent mortality, leading to a lower survival. In contrast, cows which show high site tenacity will maintain contact with their young which will thus have a relatively higher survival. This will have a selective effect and if the original aggressive behaviour was genetically determined there will be a positive feedback leading to more aggressive behaviour in the population as a whole. (Figure 1).

4 EFFECT ON THE HABITAT.

The Farne Islands represent an important conservation area not only for seals but also for sea birds and maritime plant communities. Evidence of increasing soil erosion is thus viewed with alarm. The erosion is the result of destruction of the vegetation cover followed by wash-off by rain in the winter; a certain amount of wind erosion may occur in dry weather.

At the seal breeding islands the destruction of the vegetation which comprises low-growing herbs, mainly sea-campion (Silene maritima), various grasses and scurvy grass (Cochlearia officinalis), seems to be initiated by the burrowing activities of puffins (Fratercula arctica)and the trampling and pulling up of plant material by nesting gulls (Larus spp.). On the seal breeding grounds the areas damaged by the birds in the spring and summer are subjected to the pressure of the seals in the late autumn. The movement of the seals over the sward has a damaging effect on regenerating plant growth and the seals' habit of wallowing in damp depressions of the ground causes the spread of broken patches of the vegetation cover. Where wallows are fully developed the peaty cover and underlying mineral soil are churned up into a thick mud which, lacking anything to hold it together, is easily washed away by heavy rain.

The bare soil which remains is heavily manured by the seals and the following spring supports a dense cover of an annual herb, Chaenopodium sp., which hinders recolonisation by the perrenial species. As the

Chaenopodium is all dead by the late autumn bare soil patches are again affected by the seals and the process is self re-inforcing. With increasing numbers of seals increasing soil erosion is likely to occur.

## 5. SUMMARY.

Grey seals are increasing at the Farne Islands at an average rate of about 9 per cent a year. Increasing numbers have not been matched by an increase in the breeding grounds occupied so the density of the breeding seals has increased. This causes disturbance and increased mortality of young. Most of this mortality is the result of pups losing contact with their mothers and starving. An increase in the aggressive behaviour of the seals has been observed. The presence of large numbers of seals on vegetated areas damaged by birds results in the destruction of the vegetation cover and subsequent erosion of soil.

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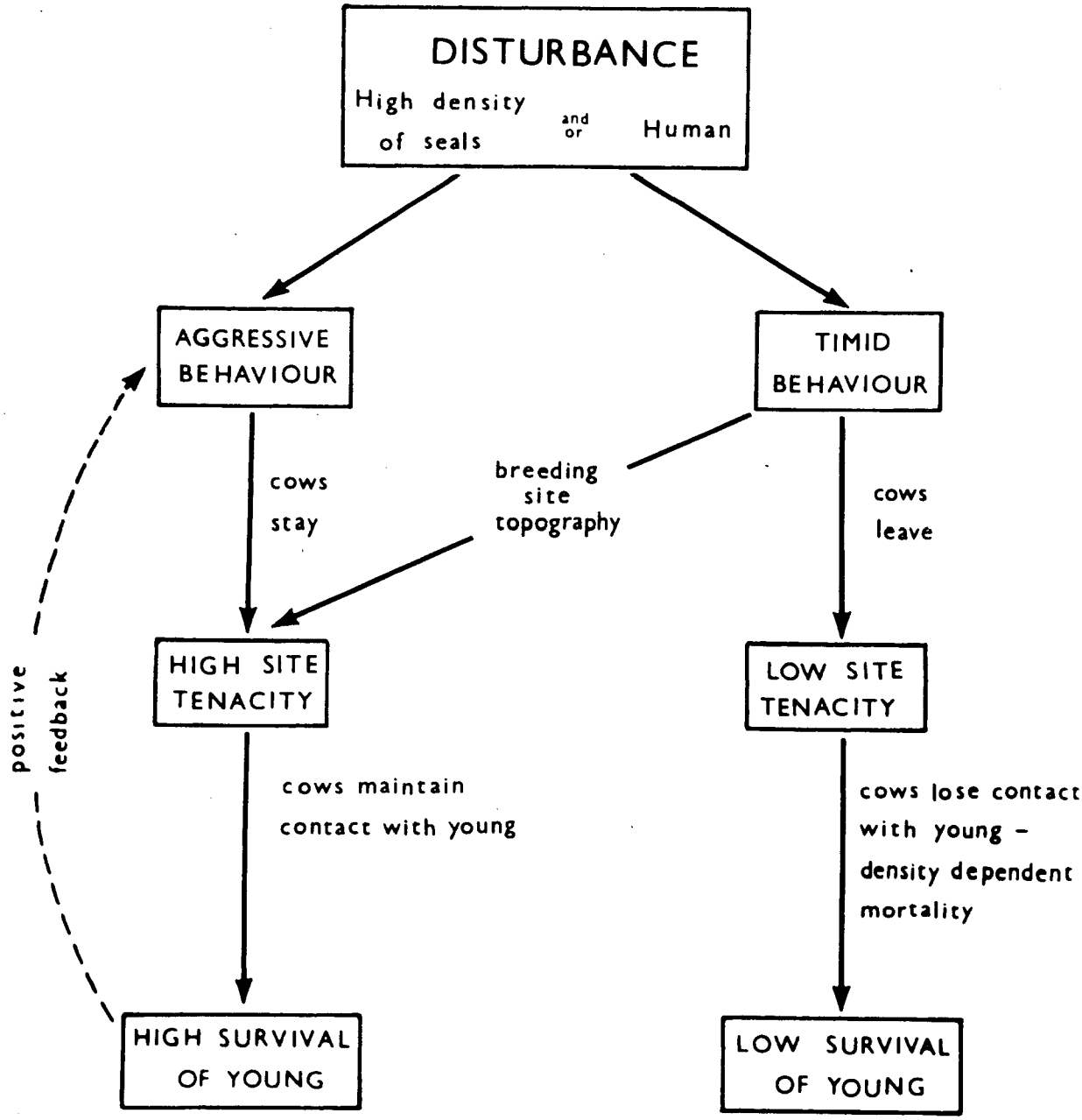


Figure 1 Effects of disturbance on behaviour of Grey seals at a breeding site such as the Farne Islands. The feed-back loop will be operative if the aggressive behaviour is genetically determined.