REPEATED POLYGYNY BY OYSTERCATCHERS

by K.B. Briggs

Oystercatchers *Haematopus ostralegus* are usually monogamous and exhibit great nest site fidelity, but bigamy or multiple-nesting (one male with two females laying eggs in the same nest and all three birds incubating) has been reported by Barnes (1950), Ticehurst (1950), Nevin and Ticehurst (1951) and Leech (1980).

The occurrence of polygyny, where one male has 2 females that lay eggs in separate nests close together, in an area that would normally hold only one pair, has been recorded in Oystercatchers only by Harris (1967). In this note, the development and continuance of such polygyny, and reasons for its success are described.

In 1978, two monogamous pairs of Oystercatchers nested, unsuccessfully, about 20 m apart on a small (30 m x 8 m) gravel bed on the River Greta, a tributary of the River Lune, at Tunstall, north Lancashire, U.K. (Figure 1). The two females were colour-ringed, as were 73 other riparian-breeding Oystercatchers on a study site 1 km to the west, on the River Lune at Arkholme.

In spring 1979, after a very cold winter, Oystercatchers returned 15–20 days later than usual and assumed mortality (from the non-appearance of previously marked birds in the pre-breeding flock or on their known breeding territory, and from recoveries of dead marked birds) was high, at 14% (Briggs in prep.). The two Greta females (designated numbers 4 and 5 from their nesting territories) returned, but only one male was recorded at the site. In mid-May, two clutches were laid and incubated in separate nests 2.9 m apart in the gravel about 6 m from the water's edge. Only the one male was seen and the females appeared to incubate one clutch each. No other pair or male was seen in the adjacent, vacant (from the previous year) nesting territory. Attempts to trap the male failed, so picric acid-soaked pads were placed in the nest of female 5 and the male was successfully dye-marked when incubating that clutch. The male was not observed to incubate the other clutch after it had been marked.

On the main study site, presumed mortality and the delayed arrival of partners resulted in divorce and territorial changes in 1979, but no cases of polygyny were observed. The Greta trio

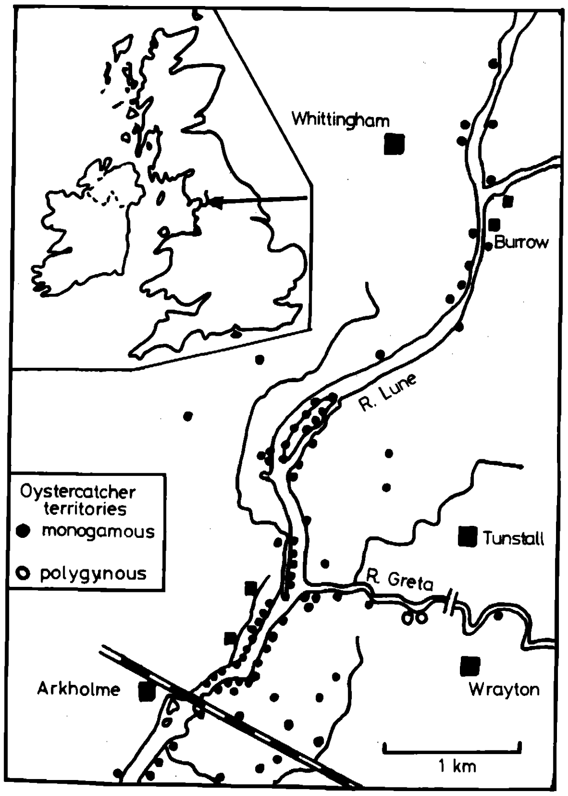

Figure 1. Distribution of Oystercatcher nesting territories on the River Lune and its tributaries in 1979.

was followed through successful incubation and fledging periods. The females foraged separately with their broods, whilst the male stood on watch from a fence-post.

The same trio of birds reappeared in 1980, and used separate nests 1.2 m apart at the same sites as 1979. The same behaviour has continued in each subsequent year, but observations have been more casual and the outcome of nesting is not known for 1981–1983. Table 1 summarises the breeding data for these pairs.

Data from the main study area in 1979 and 1980 allow some comparison between these polygynous

Table 1. Breeding data of two female Oystercatchers (Territories 4 and 5) that were monogamous in 1978 and polygynous in subsequent years at Tunstall, north Lancashire.

Year	Territory Number	Clutch size	First egg laid	Hatching date	No. of eggs hatched	Fledging date	No. of chicks fledged	Remarks
1978	4	3	9 May	Eggs lost (1 June)		——	0	No second clutch
	5	3	11 May	Eggs lost (19 June)		——	0	No second clutch
1979	4	2	17 May	15 June	2	20 July	2	
	5	3	15 May	14 June	3	20 July	2	
1980	4	3	2 May	30 May	2	27 June	2	
	5	3	6 May	Eggs lost (25 June)		——	0	Second clutch laid
	5	2	15 June	12 July	1	lost 15 July	0	
1981	4	3	c. 8 May	c. 6 June	1	unknown	?	
	5	3	c. 8 May	c. 6 June	3	unknown	?	
1982	4	3	c. 2 May	Eggs lost		——	0	Possible second clutch
	5	3	c. 2 May	30 May	2	unknown		
1983	4	3	c. 5 May	unknown	2	unknown	?	
	5	3	c. 5 May	unknown	2	unknown	?	

Table 2. Comparison of breeding success in monogamous and polygynous Oystercatchers in a riparian habitat in north Lancashire

	Monogamous		Polygynous			
			♂		♀♀	
Year	1979	1980	1979	1980	1979	1980
No. of pairs	50	43	1	1	2	2
Young fledged/pair	0.3	0.6	4.0	3.0	2.0	1.5
No. of successful pairs	11	13	1	1	2	2
Young fledged/ successful pair	1.5	1.9	4.0	3.0	2.0	1.5

Table 3. Abundance of terrestrial and coprophilous invertebrates in pastures at Arkholme in 1980 (from Briggs 1984).

	March	April	May	June	July
Earthworms/m²	400	448	189	467	326
Tipulids/m²	49	77	77	48	32
Beetle larvae/200cc of cowpats	-	-	43	32	22

Earthworm and tipulid figures are monthly means of weekly hand sorting of ten 0.1m² soil samples. Beetle larvae are the means of monthly samples of 10 three-week old cowpats examined per week.

birds and other, monogamous, breeders (Table 2). Hatching success was greater for polygynous birds because the nest site was fenced so that sheep and cattle, which cause 58% of all recorded egg loss to riparian-nesting Oystercatchers (Briggs 1984), were excluded. Moreover, successful monogamous pairs produced fewer fledged young than the polygynous birds. The polygynous male raised 1.1 to 2.5 more young than successful monogamous males, and the polygynous females also produced 0.4 more young than monogamous females in 1979, despite having to spend more time on incubation and brood care. Productivity of one polygynous male was equivalent to that of two successful monogamous males, and ten normal breeding pairs.

Why did this polygynous group arise in spring 1979, and why has it continued in an area of increasing colonisation by Oystercatchers (Briggs 1982)? When male 4 did not return in 1979, male 5 took over the territory, and the occupying female. Male 5 then excluded other males that female 4 might have introduced (see Harris 1970). Female 4 may have chosen to stay in a good breeding situation and share a mate, rather than take a possibly less-experienced male from the non-breeding flock and use a marginal nesting and feeding territory. Also, a breeding attempt with a shared partner may be better than not breeding at all.

In theory, polygynous relationships are frequent only in species where one sex has so little parental investment in the young that it can afford to mate with more than one partner at the same time. The partner must be capable of producing sufficient young to prevent reductions of future generations (Emlen and Oring 1977). In raptors (Newton 1979), the occurrence of polygyny must lead to a decrease in parental investment in the young, and so is usually associated with an uneven sex ratio in the adults or an abundance of food. Interestingly, both these points have some relevance to the polygynous Oystercatchers described here. Firstly, there may be slightly more females in the population available to breed, as annual assumed mortality for females (7.7%) is lower than that of males (11.1%), and females are capable of breeding at 3 years old, one year earlier than males (Harris 1967). This may not, however, create an imbalance in the sex ratio of birds capable of breeding. There was a flock of 33 non-breeding birds present on the site until May, and competition for nesting territories was intense. Secondly, therewere abundant soil and coprophilous invertebrates throughout the breeding season in the pastures that form the Oystercatchers' feeding territories (Briggs 1984, Table 3). Oystercatchers nesting in coastal habitats are limited to foraging during the low tide and/or flying with food collected from surrounding agricultural land. This involves heavy parental investment in terms of time and energy to ensure that the young are fledged. The young need to be fed for up to 30 days after hatching, and then to learn foraging techniques (Heppleston 1972). Young of riparian breeders are able to forage effectively for themselves 7-10 days after hatching, and parental investment is reduced to breaking open cowpats, so that chicks can feed on fly and beetle larvae within the pats (pers. obs.).

Recent studies of behavioural adaptations in waders (Charadrii) show a wide range of social systems. Most are usually monogamous, but some are polygynous, others polyandrous, a few have lek systems, and still others have "rapid multi-clutch systems". However, variations have been recorded in all cases, especially in monogamous species (see review in Graul 1973).

Polygyny in Oystercatchers, despite resulting (at least in the present case) in increased productivity, is infrequent. It occurred in only 1.6% of all known pairs in my 12 km² study area. Its continuance over a 5-year period without becoming multiple-nesting (both females laying in one nest and sharing the incubation of a 5-7 egg clutch) is perhaps unexpected in an area with limited nesting territories and a large non-breeding population. I conclude that the pair-bond between the male and both females must have become sufficiently strong to prevent other males becoming involved, and that the male may have been of high quality to be able to defend his enlarged nesting territory. Costs and benefits of this type of system require further detailed study.

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FLUCTUATIONS IN THE NUMBER OF WINTERING WADERS AT BURNTISLAND BAY, THE FIRTH OF FORTH: A COMPARISON WITH BIRDS OF ESTUARIES DATA

by John and Catrina F. Barrett

INTRODUCTION

Evaluation of the importance of particular sites as wintering grounds for waders has been based largely on counts made at high water, for example for the Birds of Estuaries Enquiry (BoEE) (Prater 1981). Such counts have been carried out on set dates in order to obtain meaningful total counts for estuaries, regions and countries. In winter, little work has been done to compare the data obtained from these counts with data collected at other times, although fluctuations in numbers during spring migration have been documented (e.g. Ferns 1981). Goss-Custard (1981) showed that for Oystercatchers *Haematopus ostralegus* on the Exe estuary, south-west England, roosting and low water counts corresponded closely. However this may not be the case for other species or areas. In large estuaries, a number of individual sites may be important. Counts carried out on roosts at high water may not identify those sites which are important feeding areas for waders, and monthly counts may miss seasonal fluctuations in numbers. The purpose of this study was to establish if these variations existed, and if they could affect any conservation assessment of a site.

THE STUDY AREA

Burntisland Bay is the second largest expanse of intertidal flats (1.7 km²) on the north shore of the Outer Forth (Figure 1), the largest being Largo Bay (2.3 km²). Burntisland Bay is composed of a variety of substrates. These include sandy mud with large numbers of lug-worms *Arenicola*, cockles *Cerastoderma*, razor-shells *Ensis* and mussels *Mytilus*, silty sand with eel-grass *Zostera* and *Mytilus*, and areas of coarse-grained sand and shell-sand. Two major roost sites exist within the Bay, one on a railway embankment and the other on a sandy beach.

METHODS

Counts of waders were made from set points at various tidal stages between October 1979 and March 1980 in Burntisland Bay (Barrett 1981). For compatability, the same observer also made the BoEE counts for this site. Five counts were carried out at high water on spring tides, eight of feeding birds at low water and fourteen at high water on other than spring tides. On six of these occasions, counts of feeding birds were made at periods up to two hours on either side of high water. On each occasion the numbers counted during one day were very similar, with little immigration or emigration being observed, so the maximum count for each of these days was used for analysis. On one day (9 March 1980) a complete tidal cycle was observed to see if large numbers of birds moved to or from the Bay. Where numbers varied during this day the largest of the counts was used in the analysis.

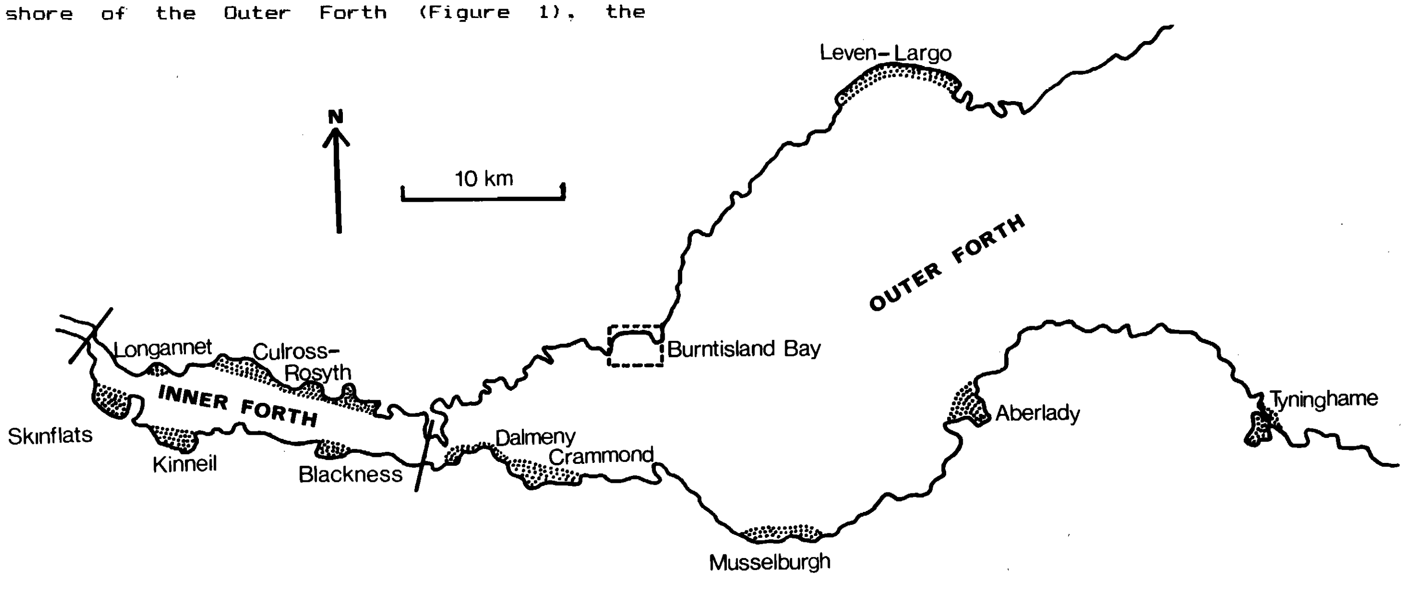

Figure 1. The location of Burntisland Bay in relation to other Firth of Forth intertidal sites