

THE COMPOSITION AND BEHAVIOUR OF THE GREY SEA COLONY OF LUNDY

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Introduction

Since 1972 a study has been carried out on the Grey Seal population on Lundy Island with a view to understanding the stability of the population on the island (Clark and Baillie 1973 and 1974), between two weeks and a month being spent during the summers of 1972-1974.

It has been thought previously that seals stayed around Lundy for short periods only and Hook (1957) stated that he believed that Lundy was only 'maturing ground' for young seals. From 1972 onwards we started to take notes on the identification of all specimens that showed distinctive markings or scars, in an attempt to find out whether Lundy was only a staging post for seals moving between the Pembrokeshire colonies and the coasts of Devon and Cornwall.

Breeding had been proved to occur only in Seals' Hole and here it was thought to occur only occasionally. However, Hook found one or two seals present each breeding season of the five at which he looked. He stated that many other caves were entered but that he found no pups. Our data from 1974 and 1975 shows that breeding is a more regular phenomenon than believed and this paper will discuss whether this has always been the case or is due to a recent spread of the species.

Topography of the Island

As Lundy is an enormous granite hub its steep cliffs make it impossible for seals to get onto the top of the island, there being no place where they can get more than about twenty feet above the tide mark.

There are two large beaches on the east side which have a portion well above high tide. The landing beach is clearly too disturbed for seals to land, people being present every day, and the quarry beach, which is made of granite boulders up to about one and a half feet across and was formed when the old quarry pier subsided. This area is now visited only during the summer by visitors sunbathing and swimming. During the early autumn when pupping occurs there are probably just enough visitors to prevent seals using this beach. It is rarely visited during the rest of the year.

There are several other small coves on the east side which have beaches allowing seals to get above high tide mark on all but the very highest spring tides.

There are large numbers of caves along the coastline which have been formed by the erosion of basalt dykes (Baillie and Clark 1974). A few of these are extremely well-known to the islanders, though rarely visited. Of the others, I have entered all but one of them on the east side and have entered or know the extent of all but two on the west side. Many of these caves are very short and have no portion above the high tide mark. Three are known which have a portion above high tide on all but the highest tides, and in all three of these pups have been found.

The only cave so far unentered on the east side is below Tibbett's Point and observations at its entrance have shown that a dominant bull holds a territory here. The cave entrance, even at low water on spring tides, is still deep enough for seals to swim in and out, and, from echoes heard, it seems likely this is the largest cave on the island.

Of the two caves on the west side which have not been entered one is probably impassable to seals, but I have seen at the entrance of the other two seals entering and leaving. These caves could be approached only by sea and, because of the lack of long periods of calm sea when a boat was available, they could not be entered during the study periods.

It is possible that there are still one or two more caves on the west side which I have not located. On the east side, however, I have walked along the entire coastline and am certain that there are no caves which have been overlooked.

The only cave at the south of the island is Seal's Hole, which is very long and winding, and has a sandy beach at the end which is just covered by some high spring tides. Pups have been found here in every year during the breeding season when the cave has been visited.

The south-east tip of the island is slate and, although there are large areas of flattish rock at sea level, it is too rough for the seals to haul-out except in one or two places. The granite rocks at sea level afford good places for hauling-out all around the island.

There are several preferred spots around the island, depending upon wind and sea conditions, the best areas being where there are rocks further out at sea which break whatever swell there is.

Counts of Numbers of Seals Hauling-Out at Low Tide

In most places seals could easily be observed and counted from the top of the island, but it was necessary to go closer to the seals to find whether any were identified specimens or not.

A standard procedure was used to count seals as far as possible to avoid sampling errors. Previous years' observations had shown that there were very few seals in the south-east section of the island. For this reason each count covered only the area north of Quarter Wall on the east side around to Shutter Point in the south-west. The count normally took between two and three hours and was conducted over the low-tide period.

The count was always started from the south and approximately equal numbers of counts were started on the east and west sides to avoid errors due to seals having different habits on different sides of the island. This meant that the northern one-third of the island was counted very close to low tide, which was advantageous as on most occasions the vast majority of the seals were in this area. On each count the numbers observed were taken from standing on headlands on the top of the island and from these points most of the coast could be seen well enough to allow the separation of bulls from cows and immatures from adults.

If I subsequently went down lower to look for identified seals and obtained a different count at my new position I did not use this count in the day's total, but used my original count from the top of the island.

I attempted to go out in all weathers and even in the worst weathers I believe my count was reasonably accurate. Only during fog was there any real problem and then I had to go down to a lower level at every point possible to get maximum coverage. There were only two or three days like this and these did not give figures that were different from those expected. I do not believe these produced any sampling errors.

Counts were made as often as possible between July and mid-October, 1975, and a few counts were made in December of that year. Table I shows the number of counts per month and the number in the different age and sex classes, and their percentage of the total seals counted. Figure 1 shows smoothed data for the counts in the four classes. For this a three point sliding average was used. This means that each count is the mean of the count taken on that day and the one before and after it.

The average count appeared to show a steady decline from July to October. As had been shown at other colonies (Colson and Hickling 1964), the number of adult bulls was always less than the number of adult cows, and in the immatures there were also noticeably more cows than bulls.

It has been shown that there is an equal ratio of bulls to cows at birth, and it is believed (Hewer 1964) that the difference in the numbers of adult bulls to cows is due to differential mortality when maturity has been reached, as bulls starve for much longer periods than cows and thus one would expect to find equal numbers of bulls and cows in the immature population. It is surprising that there is any difference at all between the numbers of immature bulls and cows. There are several possible reasons which could account for this anomaly. It is possible that bulls act differently from cows at this time of year, as is shown by the average counts of the adults, in that the highest average of adult cows is

during July and the highest average of adult bulls is during September. This high count for bulls in September could possibly be explained by the fact that those that are holding territories are not feeding and are, therefore, spending more time in shore where they are counted, whereas a percentage of the cow population may be at sea, having already pupped or being about to pup. If this is the reason why there are more adult bulls observed in September one would not expect it to apply to the immatures.

It is possible that the reason why there are less cows in autumn is that many of the cows that have spent the summer on Lundy move off to other breeding colonies to pup, most probably those in South Wales.

Immature cows are not seen to be present in any numbers at the breeding colonies which have been studied (North Rona by Boyd, Lockie and Hewer (1962), and The Farne Islands by Colson and Hickling (1964)). The second possibility for the difference could be that I have used as my criteria different ages for bulls and cows. An important criteria for ageing seals was their size and I expect this might favour the situation which has occurred in that bulls grow faster than cows and for this reason some immature bulls would be classed as adults. I would find it very surprising, however, if this inaccuracy accounted for as large a deviation as appears to have occurred, especially as the ratios between immature bulls and cows have changed during the main study period. Throughout the study period I do not believe that my ageing criteria changed substantially.

When one looks at the percentage of bulls, out of all the adults (Figure 2) one finds a striking increase during September. As has already been suggested, it is possible that this is due to bulls spending more time around Lundy holding territories. However, during this period there was a noticeable increase in the number of bulls seen that were not holding territories, especially those in the area just south of Gannet's Bay where, during September, one could virtually always find two or three bulls hauled-out close together, but showing no signs of territorial behaviour. Due to the inaccessibility of this portion of coast I could not determine whether the same two or three bulls were always involved.

Factors Affecting Hauling-out

During each count undertaken the wind direction and force were noted, and also a score was given to the swell from 0 to 4. Table 2 shows the numbers of seals counted on the east and west sides, the wind direction and swell, and the percentage of seals on the east and west sides of the island, the percentage in the lee of the island and the percentage on the side of the island with the least swell. There was a higher percentage of seals on the side with lesser swell than in the lee of the island. This is interesting as it has previously been suggested by Waters (1965) from work on St. Kilda that the wind direction was the most important factor dictating when and where seals haul-out. As one would expect, on many days the side with less swell was also in the lee of the islands. However, on the occasions when this was not the case there was a strong bias to the side with the least swell.

Seal Identification

From 1972 onwards any seal with characteristic scars or markings has been recorded. Most identifications have been based upon scars supplemented by coat markings. Possibly one-quarter of the population shows major scars and using these we have been able to identify eighty-six seals to date. By the end of 1975, however, there were about forty seals which we believed we could definitely recognise if resighted. This is because some of our earlier identifications were on seals that had some small fresh cuts which would probably heal and disappear after a year or more. We have noticed with one specimen at least that even fairly small cuts do not regrow hair for at least three years.

Table 3 shows all the seals that have been identified in more than one year. It can be seen that there was one seal seen in 1972, 1973 and 1975, three, possibly four, seals seen in 1973 and 1974, one seal seen in 1973, 1974 and 1975, four in

1973 and 1975, three in 1974 and 1975, and two seen in 1975 and 1976. One-third of the seals seen in 1973 and considered to be identifiable in 1975 were identified in that year. Even with this small sample I feel justified in suggesting that there is a group of seals which is regularly based at Lundy and possibly born there.

However, none of the seals in caves is counted and even in good weather when I have entered any of the big caves I have found several seals present. It is obvious, therefore, that the seal counts showed the minimum number present. It is possible that there are always seals in the caves and that during bad weather a larger proportion of the population sheltered in the caves than in good weather. Our entry into Puffin Gully cave in 1974 supports this view as the weather was not particularly good, there being a three or four-foot swell everywhere except at Gannet's Bay and Three-Quarter Wall Bay, and twenty-eight seals were found to be sheltering in the cave at low tide.

Two bulls, Nos. 72 and 82, took up territories during 1975, No. 72 having been present since July, 1975. They were both again seen during a brief visit in June, 1976 and No. 82 had been photographed in 1974 in the same area as it took up territory in 1975. It was most surprising to observe both of these in 1976 as only about twenty seals were seen during the entire visit. There was another seal present which I saw only briefly and I am virtually sure this was No. 49, which had been seen for the past three successive years. However, unfortunately it disappeared before I could make a positive identification. One cow, No. 69, was seen in 1974 and 1975, and on the 21st September, 1975 was found guarding a pup in Puffin Gully cave. All the above-mentioned seals clearly spent a large percentage of their time around Lundy and it would be very surprising if there were not many unidentified seals in the area.

Breeding Behaviour

The first record of pups was of five found by Hook in Seal's Hole between the years 1954 and 1957. One pup was seen from the air by members of the Seals Research Unit on the 27th September, 1973 in the 'North-east sector' of the island. We found five pups during 1974, and a further three live pups were seen by two members of Exeter University during October, 1974. During 1975 twelve pups were found, though I expect that a good many more than this were born.

Table 4 shows the dates on which all the pups were found in 1975 and, where possible, the extrapolated date of birth. It is unlikely that any seals were born, except in caves, before the 14th October and not recorded. Seals' Hole was entered twice, the second occasion being the 22nd September, and only one pup was found. However, it is possible that pups were born after this date. Langham's Cavity was entered only once, on the 8th September, and at least one pup was present. The back of the cave could not be reached since the cow barred our way. Seals were present at the entrance to this cave all through the breeding season and it is possible that it was well enough protected for pups to survive during the severe storms which batter the West Coast in Autumn. The swell at the entrance, however, was too great for another visit to be made later in the season.

Puffin Gully cave was last entered on the 5th October and a total of three pups were found, one of which had definitely survived some very heavy seas on spring tides. This leaves only the possibility of pups being born in the un-entered caves below Tibbett's Point and the ones not visited on the west coast. Three pups were found dead along the east side which had not been seen previously and I strongly suspect that all three of these pups came from the cave at Tibbett's Point, as I doubt whether any pup from the west side would float right around the island.

As can be seen from this, it is quite possible that many pups were born than were counted in 1975. From the records for 1975 the mean birthdate was thought to be about the 15th September, though this would undoubtedly be on the early side due to the lack of full coverage of some of the caves later in the breeding season. It is surprising, though, that the last pup to be born, which I saw, was on the 29th September, even although full coverage was maintained

along the coastline until the 14th October. This is a month earlier than the earliest recorded mean pupping date (that found by Davies on Ramsey) and it would definitely be interesting to find out whether an earlier pupping date was recorded in other colonies in 1975.

Territorial Behaviour

Many studies have been made of the behaviour of bulls during the breeding season and they all seem to suggest that a bull takes up a territory and attempts to hold it for a substantial length of time (at least a month). The situation on Lundy, however, seemed noticeably different. One bull, No. 82, was observed to take up a territory for at least three weeks just north of Gannet's Rock at a favourite hauling-out point for seals. He was present at low tide every day. However, he moved into Gannet's Bay, or elsewhere, at high tide, where he did not take up a territory. He spent most of the time in the water, only hauling-out for a very brief period at low tide if there were few other seals in the water. He would actively chase any adult male entering the territory and always seemed successful, although on at least one occasion he failed to notice that a bull had hauled-out. This bull was only chased off when he re-entered the water after an hour, and the impression obtained was that while hauling-out he was not considered as threatening the territorial bull, but as soon as he entered the water he was immediately chased from the vicinity. Immature bulls and cows could come and go from the territory at will and were not approached. However, any adult cow that entered the territory would be approached by the bull which displayed by bubble blowing and nuzzling up to the cow. On every occasion this behaviour was observed the cow would either attack the bull in a half-hearted manner or would 'flipper' (an action which shows displeasure and is often used when jostling for positions at a haul-out). On only one occasion did a cow approach the bull and then the bull turned away and showed no further interest in the female. No pups were born in this territory and no mating was seen to occur here. However, observation time was not long enough to be sure that the bull never mated within his territory. In all other places around the island bulls took up territories that rarely lasted for more than one low-tide period after which the bull would move elsewhere and take up a territory in a different area. While these territories were occupied, however, the bull would act in a manner identical to that described for No. 82 above. As has already been briefly mentioned, there was one area just south of Gannet's Bay where two or three bulls were regularly seen hauled-out together. Although these could not be observed at close range aggressive interactions were never seen here and the impression gained was that this was neutral ground. Very few territorial actions were noted around the high-tide period. However, on two occasions in which mating had been observed in past years and previously reported (Clark and Baillie 1974) it occurred close to high tide.

No observations were made in the caves due to the difficulty of access. However, on most occasions when they were entered a bull was either hauled-up at the back of the cave or swimming at the entrance. On no occasion during the breeding season were two adult bulls present in a cave and this indirectly suggests that territories were held inside the caves and on several occasions territorial behaviour was noted at the mouth of the caves.

Moult

During a brief visit in December, 1975 it was noticed that the seal colony was halfway through moulting as there were a few seals which had not started moulting, a large number in various stages of moult and a few which had almost completed moulting. This seems very much earlier than the dates given for other colonies (Hewer 1974), but many will fall in line with the earlier pupping date observed on Lundy.

Discussion

From the continual observation during the summer of 1975 it was quite clear that the number of seals present was roughly consistent with a hypothesis that there were about the same number of seals using the island the whole time. I strongly suspect that the decrease obtained from July to October is due to the worsening weather conditions, forcing more seals to use the caves to haul-out later in the year.

The resighting of seals in more than one year and on several occasions in the same year suggests to me that a large portion of the population is resident around Lundy. During the period of my observations similar observations were taking place on Skomer Island and I received from the warden of the island a copy of drawings of seven seals with distinctive markings seen around Skomer, and I sent to the warden a copy of the identified seals around Lundy. No findings were obtained of the same seal on both islands which indirectly suggests that there is comparatively little movement between the two islands. Hook (1957) suggested that there was a peak in the numbers of seals just before the breeding season commenced in August and that the seals then left to go to their breeding colonies elsewhere. My data does not support this hypothesis. My average July count of adult females was about 25 and if one considers the numbers missed during each count this might suggest between thirty and forty adult females around the island. I found only twelve pups. However, I would not be at all surprised if there had been 25 pups born on the island and this is very consistent with the number of females suggested if one considers that 80% of the adult females give birth each year (Hewer 1974). Although this is obviously only speculation this could help to account for the decrease of females present in September and October if they were in the few caves which I have not entered with their pups.

ACKNOWLEDGEMENTS

I would like to thank The Lundy Field Society for its financial support and encouragement during the course of the study. I would also like to thank all the residents of Lundy for their friendship and assistance while I was on the island.

I am grateful to Dr. D. T. Parkin for reading through the text and making valuable comments.

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TABLE 4

<i>Pups Found in 1975</i>		
<i>Date First Observed</i>	<i>Extrapolated Birth Date</i>	<i>Place Found</i>
8. 9.75	2. 9.75	Langham's Cavity (West side)
10. 9.75	7. 9.75	Half-Way Bay (East side)
18. 9.75	6. 9.75	Landing Bay. Found dead (East side)
22. 9.75	17. 9.75	Seals' Hole. Found dead (South end)
21. 9.75	9. 9.75	Puffin Gully Cave (East side)
21. 9.75	5. 9.75	Puffin Gully Cave (East side)
23. 9.75	22. 9.75	Half-Way Bay (East side)
29. 9.75	29. 9.75	Half-Way Bay (East side)
26. 9.75	16. 9.75	Three-Quarter Wall Bay Found dead (East side)
5.10.75	25. 9.75	Puffin Gully (East side)
11.10.75	24. 9.75	Landing Bay. Found dead (East side)
16.10.75	?	Landing Bay. Found dead (East side)

Fig. 1. Seal Counts on Lundy in 1975.

Fig. 2. Percentage of Bulls out of total adults.

TABLE 1

Counts of Seals at Lundy.

**Includes some not placed in any age class*

MONTH	No. of Counts	IMM. MALE		IMM. FEMALE		AD. MALE		AD. FEMALE		*ALL SEALS	
		Nos.	% of Monthly Total	Nos.	% of Monthly Total	Nos.	% of Monthly Total	Nos.	% of Monthly Total	Nos.	Av. per count
JULY	15	50	6.74	94	12.68	82	11.07	456	61.54	741	43.6
AUGUST	15	53	10.91	78	16.05	56	11.52	299	61.52	486	32.4
SEPTEMBER	12	52	12.84	50	12.35	77	19.01	223	55.06	405	33.8
OCTOBER	11	26	9.77	23	8.65	35	13.16	181	68.05	266	24.2
DECEMBER	5	10	6.62	13	8.61	25	16.56	103	68.21	151	30.0
TOTAL	60	191	8.90	258	12.02	275	12.81	1262	58.78	2049	37.0

TABLE 2.

Site Preference of Seals at Lundy.

MONTH	No. of Days Observations	No. of Days with		Count		Cumulative Swell		% Lee			% Side with least swell	TOTAL No. OF SEALS
		East Wind	West Wind	E.	W.	E.	W.	E.	W.	Lee		
APRIL	2	0	2	93	0	0	2	100.0	0.0	100.0	100.0	93
JULY	16	5	11	528	213	9	20	71.2	28.8	83.5	91.4	741
AUGUST	15	4	9	293	195	9	25	60.0	40.0	79.5	88.2	488
SEPTEMBER	12	1	11	361	44	7	26	89.0	11.0	89.0	96.0	405
OCTOBER	10	2	4	261	3	9	20	98.5	1.5	83.8	100.0	264
DECEMBER	5	5	0	105	46	4	0	69.5	30.5	30.5	83.3	151
TOTAL	60	17	37	1641	501	38	93	76.6	23.4	80.4	93.3	2142

TABLE 3

All Seals Seen in More Than One Year

SEAL	11-25	14 July	1-9	1-24	APRIL	JULY	AUGUST	SEPT.	OCT.	DEY.	2-6
	July, 1972	1973	Aug. 1973	Sept. 1974			1 9 7 5	7 5			June, 1976
1	†	1			1	2	1				
44		5	2	†*							
46		2				2	1				
48		1		†							
49		2		†		3					
50		2	2	†							
55		1				1					
57		4	1			2		3			
61		1						2			
62		3						1			
68			2	†							
69				†		3		1**			
70				†		2		1			
72						7	2		1		1
82				†				4	1		1

Number denotes number of times seen in that period.

†Denotes presence.

*Not seen after late Spring, 1974.

**Seen with Pup.

FIG 1. SEAL COUNTS ON LUNDY : 1975

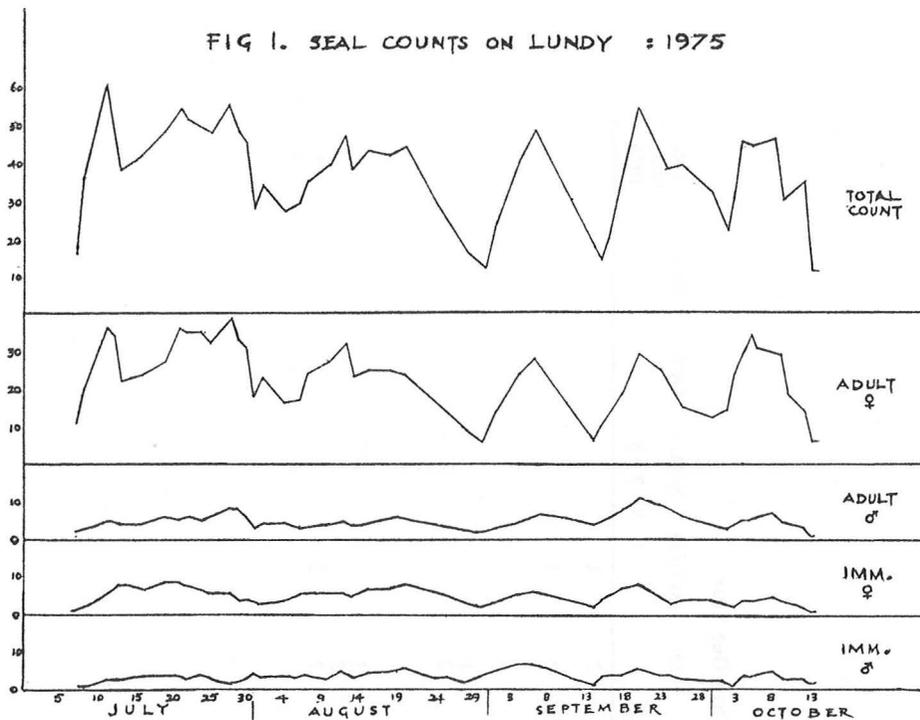


FIG 2. PERCENTAGE OF BULLS OUT OF TOTAL ADULTS

