GULLS AND OTHER SEABIRDS ON SKOMER, 1983

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1 INTRODUCTION

As last year the author was employed by Oxford University for the continuation of long-term monitoring of several species of seabirds on Skomer Island, Dyfed, Wales (de Wijs 1982).
Skomer was visited from 23/4 to 28/7/1983.
In the course of the season 1024 birds were ringed and 20 reringed, individually marked birds were resighted and colonies were censussed.

In this report numbers of birds ringed or reringed are given as well as numbers of colourringed birds resighted. Besides, some remarks are made on bill-age characters of Razorbills. The majority, however, is devoted to some research concerning Herring and Lesser Black-backed Gulls.

2 NUMBERS OF BIRDS RINGED

The numbers of birds ringed are given in Table 1.

Table 1 Numbers of birds ringed (RR = reringed) on Skomer (and Midland), 1983

	adult	pullus	total
Herring Gull	10	221 (29)	260
Lesser Bl.-b.Gull	16 (+2 RR)	511	527
Greater Bl.-b.Gull	--	5 (6)	11
Kittiwake	--	23	23
Razorbill	8 (+12 RR)	112	120
Guillemot	1	9	10
Puffin	17 (+6 RR)	21	38
Shag	--	3 (25)	28
Lapwing	--	3	3
Oystercatcher	--	3	3
Curlew	--	1	1

Herring Gull: like last year only small numbers could be ringed because of the large reduction in numbers. Even by extending the study plot (to North Castle) this did not produce sufficient numbers of adults. Fortunately one of the birds, ringed as chick in 1978 with a single Darvic colourring (de Wijs 1982), could be retrapped and reringed this season. All birds are also colourringed.
Lesser Bl.-b.Gull: since colourringed adults proved to be present in sufficient numbers, only few such adults were added. All birds are also colourringed.
Greater Bl.-b.Gull: Midland was visited in an attempt to add some more ringed chicks but unfortunately produced only 6 of those. This is mainly due to the extremely dense vegetation in a very inconvenient height on this islet. They are not colourringed.
Kittiwake: like last year more chicks could have been ringed by roping. All chicks are also colourringed. No adults were ringed (cf.de Wijs 1982).
Razorbill: fortunately some more birds could be obtainded this

year. Some information on ageing characters of bills in this species is given in chapter 4. Only adults are also colourringed.
Guillemot: only a few "accidentals" were ringed, but not colourringed.
Puffin: unlike 1982, most adult birds this year were obtained with the use of purse-nets, a method not favoured by the author (though it proved rather effective). All birds are also colourringed. Like last year obtaining chicks proved rather difficult without the availability of study burrows.
Shag: Midland was visited in an attempt to add a few chicks ringed in the Skomer-region. This proved rather successful. No colourrings were used.
Lapwing: only 3 chicks were ringed, not colourringed.
Oystercatcher: only 3 chicks were ringed, not colourringed.
Curlew: only 1 chick was ringed, not colourringed.

3 INDIVIDUALS RESIGHTED

Herring Gull: the hide built in 1982 in the Herring Gull study-plot proved to have lasted through the winter,and moreover proved to be actually helpful in reading colourrings! At least 47 individuals were resighted (and 2 not certain) of which later one was killed during the cull and 2 were found dead (botulism, 5.1). One individual was seen on Grassholm later on.
Apart from the one retrapped (see above), 2 more birds born in 1978 were resighted in the study plot. At least 2 made breeding attempts, of which at least 1 failed. Another similar bird was found dead near the Pool. Special effort should be made to obtain such birds in 1984 before they lose their worn (Darvic) rings (cf.de Wijs 1982). Apart from the trapped bird mentioned above (a male according to its measurements) the sex of immature, but adult looking, birds making breeding attempts could only be assessed of a male born in 1980 (year-class ring) and mating with an unringed female.
Lesser Black-backed Gull: the hide built in this study plot lasted through the winter equally well as the one mentioned above; not only did this hide prove to be rather comfortable, even in pouring rain, it also showed to be positioned rather well and enabled good views of the birds in the plot.
I have to recommend, however, to have the majority of future observations carried out mainly early in the season because of the Bracken *Pteridium aquilinum*. Of the 93 resighted individuals 2 were later found dead (Botulism ?), 8 proved to have moved slightly out of the plot and 1 was (as 1982) seen halfway Toms House and West Pond. Several immatures were seen to carry (year-class) colourrings. Some of those made breeding attempts, but none were seen to be successful. In 2 cases matings were observed of such birds, in both cases it concerned males born in 1980, in 1 case the female was born in 1979.
During the cull in the North Valley a female hybrid LB x HG was obtained, another such hybrid was seen to be mated with a HG just to the south of the LB plot. Since this pair could be clearly seen from the hide, it is known that they were unsuccessfull.
Greater Black-backed Gull: No colourringed individuals were seen, but one was found dead on Midland carrying a year-class ring.
Kittiwake: in the 3 study plots 84 individuals were certainly identified and 3 were doubtful. At least two different birds were resighted carrying 1978 year-class colourrings of which one successfully raised chicks in the little colony near South Stream (the other was seen at the main colony at South Stream). One

colourringed adult appeared to have moved quite a way up in the South Stream colony and therefore out of the study plot; this should be kept in mind in future years.
Razorbill: in the study area 45 different individuals were resighted and one not certain. The bird mentioned last year (de Wijs 1982) with only its colourring left (and turned upside down) was still present.
One bird on the Neck had an unknown combination of colourrings. Several birds carrying year-class rings were also observed.
Guillemot: unfortunately, until later in the season, the author was unaware of the existence of adult Guillemots on Amos which were colourringed there in 1981. Although at least 3 different individuals were seen no special attention was paid to them.
Puffin: on the Isthmus at least 89 birds were individually recognised and 2 not certain. Also 16 birds ringed this season were subsequently resighted. Several individuals with year-class rings were seen too.
Shag: in Wick Basin a ringed breeder was seen, this was probably the same individual as seen there in 1982.
Fulmar: as last year a few Fulmars around the Basin were seen to carry colourrings. Among them was the bird ringed in 1982.
Oystercatcher: at least 13 different individuals were seen of which one bird had lost one of its colourrings. All these birds were ringed as adults on Skomer in 1978.

4 RELIABILITY OF AGEING RAZORBILLS

In recent publications the number of bill-ridges or -grooves on bills of Razorbills *Alca torda* is used to distinguish between age-groups (Anker-Nilssen & Rostad 1981, de Wijs 1983), which seems to be acknowledged by Glutz & Bauer (1982). Especially the separation of the age-groups W+1 and W+2 (apart from the vertical white line 1 or 2 more ridges/grooves respectively) was interesting in that respect. In order to test its reliability the adult breeding birds (re)trapped this year on Skomer were checked on these characters. In the course of the breeding season 20 adult breeders were trapped on or at nests. Of these 12 appeared to have been ringed before, 3 as chicks (so of known age), the rest as adult breeders (so with minimum age of ring-age plus 4 years, which is the minimum breeding age). The remaining 8 birds were unringed, but since they were breeders their age must have been 4 years at least.
Of all these birds the number of bill-grooves was noted. The results (Table 2) show an increase of minimum (so inaccurate) age with number of grooves ($r=0.55$, $p<0.05$) but also show that part of the adult breeders have a single groove, sometimes even up to at least 9 years of age. Therefore, the distinction between "bill-age" groups W+1 and W+2 seems to be unreliable to distinguish between sub-adult and adult Razorbills.

Table 2 Number of bill-grooves in Razorbill related with minimum age (years). Exact ages underlined. Also given are mean, n and sd of age.

number of grooves	1	1.5	2
minimum age	4(4x),8,9	4(4x),6,9(3x),<u>12</u>	8,<u>8</u>,9,<u>12</u>,17
mean of min.age	5.5	6.8	10.8
(n,sd)	(6, 2.3)	(9, 3.0)	(5, 3.8)

5 HERRING GULL AND LESSER BLACK-BACKED GULL

5.1 INTRODUCTION

In the following HG means Herring Gull(s) *Larus argentatus* and LB means Lesser Black-backed Gull(s) *L. fuscus* .
Like last year a few parts of the 1978 Gull research on Skomer were repeated and also some of last years results tested (de Wijs 1978, 1982).
In addition, some more attention was paid to the occurrence of botulism.

5.2 NUMBER OF PAIRS BY EYE-COUNTS

Both HG and LB were censussed by eye, HG from 20-24 May and LB from 28 May to 1 June. As on previous occasions only actual incubating birds, pairs and birds defending territories were counted.

Table 3 Number of pairs by eye (results of 1983 as % of 1978)

Herring Gull	1978	1982	1983	(%)
Neck	625	255	197	(32)
Coast	1050	450	397	(38)
HG plot (24/5)	95	41	32	(34)
Inland	480	240	206	(43)
TOTAL	2155	955	800	(37) **

Lesser Bb.Gull	1978	1982	1983	(%)
Neck	720	1075	1170	(163)
Coast	400	640	630	(158)
LB plot (2/6)	81	99	104	(128)
Inland	5830	6315	6550	(112)
TOTAL	6950	8030	8350	(120)

** HG totals for 1982 and '83 do not include pairs on the seaward side of the New Stone and Garland Stone since these were not counted in 1978; add 25 and 16 pairs respectively.

Note that the figures from the plots are included in "Coast" and "Inland" respectively and therefore not separately included in the totals.

Although census results based on eye-counts are not very accurate for LB because of their dependance on visibility, which quite often is remarkably reduced by the occurrence of Bracken *Pteridium aquilinum*, this is much less the case for census results of HG.
Therefore, the continuation of the decline in HG as shown in table 3 is considered here to be the reflection of a real decline (16% from '82-'83). The probable cause of this marked decline (there is only 37% left of the 1978 population), botulism, is discussed in 5.10.
The census results for LB showed, although not very accurate, that the population slightly increased since 1982 (4%). The nest counts, as performed by the warden, M. Alexander,on the other hand showed a much larger increase. Eye counts for this species have a very limited reliability, because the bulk of the population occurs in areas densely covered in Bracken (see above). The reliability of nest counts on the other hand is much better but has its limitations as well. Although part of the party performing nest counts annually consists of the same persons, the majority however changes from year to year. Since in this method not only nests containing eggs are marked, but also "obvious" nests without, variation in results is bound to occur due to difference in opinion concerning the obviousness of empty nests. There are some indications that such differences indeed occur (5.4.1). Even so, this method will certainly produce results, which are far more reliable then eye-counts (see 7).

The population trends mentioned above are discussed in 6.

5.3 CLUTCH SIZE

Clutch size, as in both 1978 and 1982, was determined on 24/5 and 2/6 for HG and LB respectively. The results for LB (table 4) show remarkable differences for both mean clutch size (difference of '83 with '78: $t = 4.03$, $p<0.001$ and with '82: $t = 3.19$, $p<0.01$) and clutch size frequencies ($X^2 = 17.6$, $p = 0.002$). In HG on the contrary is shown that last years indication of a difference is likely to have been due to coincidence: this years result is intermediate compared with the other two.

Table 4 Clutch size in study plots on same dates 1978, 1982 and 1983.

Herring Gull (24/5)

	1978	1982	1983
3 eggs	67	25	20
2 eggs	17	7	8
1 egg	8	6	3
mean	2.64	2.50	2.55
sd	0.64	0.76	0.68

Lesser Bb.Gull (2/6)

	1978	1982	1983
3 eggs	35	47	72
2 eggs	25	32	22
1 egg	22	20	10
mean	2.16	2.27	2.60
sd	0.82	0.78	0.66

Like last year a difference was found in egg size between HG breeding in and around the HG plot on the North Coast and HG breeding at Skomer Head (5.4). To test whether such a difference has any effect on clutch size, clutch sizes of these area's were compared on two occasions.

Table 5 Comparison of clutch sizes of HG on Skomer, 1983.
"Skomer Hd": the area from Pigstone to Toms House;
"North Coast": the HG plot with direct surroundings.

2,4 May	Skomer Hd	Northcoast
3 eggs	24	18
2 eggs	4	7
1 egg	11	6
mean	2.33	2.39
sd	0.90	0.80

24-26 May	Skomer Hd	Northcoast
3 eggs	52	24
2 eggs	13	8
1 egg	3	3
mean	2.72	2.60
sd	0.54	0.65

From the results (Table 5) it appears that there is no difference in mean clutch size (t-tests), nor is there a difference in clutch size distribution (Chi-square tests).

A few supernormal clutches were found in both species: 2 in HG and 6 in LB.
In HG a 4-egg clutch was found at Toms'House and a 5-egg clutch on Midland. In LB two 4-egg clutches were found during the cull and four more during the nest counts performed by M.Alexander cs. Several attempts were made to trap the birds involved, see 5.9.

5.4 EGG SIZE

In 1978, 1982 and 1983 eggs of both species were measured in similar area's. The Herring Gull results (Table 6) show no difference of 1983 with 1982, therefore maintaining the difference with 1978 ($t = 3.16$ and 2.23, $p<0.01$ and $p<0.05$ for length and width respectively). With this comparison we have to bear in mind that the periods involved differ slightly for 1983, as presumably did the rather high proportion of 3-clutches selected this year. Both season and clutch size effect egg size (de Wijs 1978). Nonetheless, this did not show to produce a difference with 1982.
This difference of 1982/83 with 1978, ie. rounder eggs (de Wijs 1982) in recent years, may have something to do with the recent population decline in this species (5.2).
Last year a difference was noted in egg size between two area's

on Skomer: Skomer Head and the Northcoast. This was tested this year and proved to be still true (Table 7). This time only 3-egg clutches were compared on similar dates (same day or one day difference) in early and late May (8 and 24,25/5). The difference, like 1982, was only significant for egg width ($t = 2.45$, $p<0.02$), although results for egg length were not far off being so too ($t = 1.68$, $p<0.10$).
These differences are discussed in 6.

The results for LB (Table 6) show that measurements in 1983 were intermediate between 1978 and '82, and differing significantly from 1978 for egg length and from 1982 for egg width ($t=2.2$ and 2.5, $p<0.05$ and $p<0.02$ respectively).

Table 6 Comparison of egg measurements (mm) in 1978,'82 and '83.
HG: in HG plot in '78 and extended to its direct surroundings in '82 and '83; '78: 20-30/5;'82: 24-26/5;'83:8,20-24/5.
LB: in LB plot in 1978 and '83 and including its direct surroundings in '82; '78: 14-22/6;'82: 16-20/6;'83: 9-20/6.

	Year	n	mean	sd
Herring Gull				
Length	1978	95	68.84	3.23
	1982	56	67.25	2.44
	1983	87	67.35	3.11
Width	1978	95	47.41	1.83
	1982	56	47.72	1.96
	1983	87	47.98	1.60
Lesser Bb.Gull				
Length	1978	27	64.21	2.06
	1982	30	66.61	3.10
	1983	45	65.66	2.98
Width	1978	27	45.75	1.31
	1982	30	47.20	1.61
	1983	45	46.20	1.70

Table 7 Comparison of egg measurements (mm) of Herring Gull 3-clutches from Skomer Head and Northcoast (compare table 5), 1983.

	area	n	mean	sd
Length	Skomer Hd	78	67.94	2.41
	Northcoast	78	67.35	3.11
Width	Skomer Hd	78	47.41	1.44
	Northcoast	78	48.01	1.60

5.5 FLEDGING SUCCESS IN LESSER BLACK-BACKED GULL

5.5.1 ISLAND ESTIMATES

Like last year fledging success was estimated for the Bull Hole colony as well as roughly for the whole island (de Wijs 1982). The number of nests in the Bull Hole colony was determined by a group of volunteers in the end of May (?) to be 346. On July 15th 123 chicks were ringed here. The following day 53 more chicks were ringed and 46 were found to have been ringed the previous day (including 3 chicks found dead). If we assume a random distribution and mixing of chicks within the colony the estimated total number of chicks is 123*99/46 = 265. The estimated fledging success therefore would be 0.77 chicks/pair. This is notably lower than last years figure (0.92). All figures mentioned above are rather similar compared with last years, apart from the number of nests. The latter therefore is considered to be the main cause of this difference (a 42% rise compared with '82!). As mentioned earlier (5.2) this may be due to differences in observers, especially where it concerns counting empty but "occupied" nests.

From the 264 carefully checked fledged chicks on roosts all over Skomer, 7 appeared to have (colour)rings, this is 2.65% (last year: 4.2%). It would have been safer to base results on a larger sample, but since the author had to leave Skomer long before last years sample date (25/8/83) it had to be performed on 26 and 27 July. Since 511 chicks were ringed this year, roughly 264*511/7 = 19 272 chicks must have fledged from an estimated 15 500 pairs, this is 1.24 chicks/pair. Since this is not very different from last years result (1.19) it makes the Bull Hole figure even more suspect!

5.5.2 ESTIMATES RELATED TO VEGETATION

Fledging success was estimated in a similar way for the two enclosures on the Neck (de Wijs 1982). On July 10th in the Northern (N) enclosure 28 chicks were ringed, 4 were too small for this treatment; in the Southern (S) 36 chicks were found and ringed. The following day in N 8 more chicks were ringed and 14 had been ringed the previous day, these figures for S were 5 and 24.
From this the number of chicks is calculated to be 50.3 and 43.5 for N and S respectively. These figures are treated as being the "maximum" estimates, the actual numbers of chicks ringed are considered the minumum numbers (40 and 42 respectively). Since the number of nests with eggs found on 28/5 were 30 and 25 respectively the estimated number of chicks per nest were:

N 1.33 - 1.68
S 1.68 - 1.74

If also empty, but possibly occupied nests are included (N 8, S 3) the results are:

N 1.05 - 1.32
S 1.50 - 1.55

Although the level of these estimates is much higher than last years (0.3-0.6), for which no reason can be given other than differences in nest counting methods (eye count in '82, nest count in '83), it shows the opposite effect of any impact on

fledging success caused by Bracken (S is without): this season shows a possible negative effect (not significant) of the presence of Bracken, while last year indicated a positive effect, which was expected (de Wijs 1982). For this years result no other explanation can be given than the possibility of bias in the estimated number of N, caused by the immense density of Bracken in this plot. This plot therefore is bound to produce the largest variability in estimating results, we need a longer series of observations to assess any Bracken-linked effect.
It is recommended to assess the number of pairs within these enclosures by nestcounts rather than by eye, because of possible bias caused by differences in eyecount results for bracken and non-bracken plots.

5.6 VEGETATION

Like 1978 and '82 the vegetation in the LB plot was roughly mapped. The difference with 1982 is considered to be of no significance and may be within the range of inaccuracy of the mapping method (Appendix follows).
Any relationship of nest location and occurrence of Bracken was not tested this year (compare de Wijs 1982).

5.7 BODY MEASUREMENT CHANGES

Like last year a few birds ringed and measured by the author in 1978 were retrapped in 1983. Since only one such HG and 4 LB could be obtained this season, measurements of 1982 and '83 are joined and compared with those of 1978.

Table 8 Differences in body-measurements of individuals measured by the same person in 1978 and 1982/83
Differences given are of 1982/83 minus 1978.

Herring Gull (n=6)

	range	mean	sd
wing	-1 - 5	2.00	2.00
bill depth	-0.6 - 0.6	0.12	0.42
culmen	-1.8 - 5.0	3.28	1.49
headlength	-1 - 5	1.17	2.25
weight (n=4)	-65 - 25	-10.00	38.73

Lesser Black-backed Gull (n=6)

wing	-2 - 5	1.67	2.73
bill depth	-0.7 - 0.3	-0.05	0.38
culmen (n=5)	-1.1 - 3.4	0.36	1.76
headlength	-1.5 - 2.0	0.28	1.15
weight (n=5)	-10 - 55	27.00	26.37

The results (Table 8) again show, although not very conspicuous, an average increase of size with age when full grown. There may be a sex linked difference in this: in both species all (3) individuals in which the value of the discriminant (5.8) became smaller this concerned females (of 5 males 4 increased, one remained the same; of 7 females 4 increased, 3 decreased; no indication of a specific difference).
For further comments see De Wijs (1982).

5.8 DISCRIMINANTS FOR SEXING SKOMER GULLS

From 1981 onwards a cull is performed annually in an attempt to reduce numbers of Lesser Black-backs in an area in the northern part of Skomer.
In 1981 several hundreds of gulls were sexed internally and measured. Although part of the results has been published before (Alexander 1981), the author decided to reanalyse them in order to obtain

discriminant functions to sex Skomer Gulls externally, using bill depth and total headlength.

No measurements were taken during the 1982 cull, but in 1983 again measurements of Gulls of known sex were obtained, this time by the author. Birds were sexed internally thanks to P. James. It was important that this time measurements were taken by the author to enable direct comparison with the live breeding birds obtained in the study plots. Besides, the results enabled to determine the sex of birds found dead (5.11).

All discriminants were calculated using SPSS on the SARA computer (Amsterdam) through the courtasy of Dr.J.Wattel (University of Amsterdam).

Table 9 Discriminants for sexing Skomer Gulls externally, using bill depth at angle of gonys and total headlength (= including bill)

Also given are numbers of males (M) and females (F) used for the analyses, the percentage of individuals correctly sexed and the mean discriminant values for males and females. Males if D>0, females if D<0.

HL = Headlength BD = Bill depth D = Discriminant

Herring Gull, adult 1981 25M 24F 90.4%
M:+2.04, F:-2.12 D=.1913216*HL + .9921725*BD - 40.41191

Lesser Blb.Gull, adult 1981 367M 355F 88.0%
M:+1.81, F:-1.88 D=.2408806*HL + .6752662*BD - 39.49011

Lesser Blb.Gull, adult 1983 47M 52F 90.2%
M:+2.18, F:-1.97 D=.2843018*HL + .6723405*BD - 44.23591

Lesser Blb.Gull, imm. 1983 18M 10F 93.5%
M:+1.90, F:-3.41 D=.2690677*HL + 1.181145*BD - 51.76354

From the results (Table 9) it appears that the LB discriminants for adults do not differ much, although they are not equal. This is mainly due to different measuring techniques by different observers (S.J.Sutcliffe in 1981, the author in 1983). From table 10 it appears that the 1981 measurements differ from 1983 in the following way: Headlength 0.6 mm larger, Bill depth 0.13 to 0.15 mm smaller and wing 1.8 to 2.7 mm smaller.
These differences are most likely due to different calipers (HL) or different techniques (BD, W). In BD this is most likely due to the amount of pressure put through the calipers on the rather soft gonys, in W this will be due to differences in amount of force one is prepared to put in stretching wings.

From table 10 it is also possible to infer sex ratios, in adult birds: HG: 0.93, LB: 0.99 and 0.81. In immature (3 and 4 year old) LB on the contrary, this was 1.90. This is significantly different from LB adults in 1983 (X^2-test, $p<0.05$). Apparently males predominate in "immature" breeding birds, as also indicated earlier (3).

Scattergrams produced of the data can be found in Appendix I.

Table 10 Measurements of Gulls obtained during culling on Skomer All measurements are in mm. M=males, F=females.

Herring Gull, adult, 1981

		n	range	mean	sd
Headlength	M	25	116 - 131	122.7	3.9
	F	24	108 - 118	112.8	2.3
Bill depth	M	25	17.8-20.1	19.12	0.62
	F	27	15.2-18.5	16.86	0.75
Wing	M	23	411 - 444	427.4	8.0
	F	20	382 - 420	406.7	9.6
Bill length	M	2	68.8-72.0	70.40	2.26
	F	7	60.5-68.9	64.90	2.92

Lesser Black-backed Gull, adult, 1981

Headlength	M	367	110 - 131	120.6	3.3
	F	355	103 - 122	110.3	3.0
Bill depth	M	372	15.9-20.5	18.15	0.75
	F	376	14.5-20.5	16.35	0.69
Wing	M	331	392 - 454	431.5	9.2
	F	318	385 - 441	411.3	8.3
Bill length	M	41	64.5-76.8	70.37	2.90
	F	56	59.3-71.2	64.03	2.36

Lesser Black-backed Gull, adult, 1983

Headlength	M	46	113 - 127	120.0	2.9
	F	52	105 - 118	109.7	2.7
Bill depth	M	48	16.6-19.8	18.30	0.76
	F	57	15.3-17.5	16.48	0.58
Wing	M	47	415 - 460	433.3	9.2
	F	59	397 - 435	414.0	9.4

Lesser Black-backed Gull, immature, 1983

Headlength	M	18	117 - 125	120.6	2.3
	F	10	105 - 115	108.2	2.9
Bill depth	M	19	17.0-19.0	17.29	0.52
	F	10	15.7-16.7	16.22	0.36
Wing	M	19	413 - 445	429.9	8.2
	F	10	407 - 430	418.3	7.8

5.9 SUPER-NORMAL CLUTCHES AND PROBABLE FEMALE-FEMALE PAIRING

From 1981 onwards a few super-normal clutches were discovered in both Herring and Lesser Black-backed Gulls. Although the majority of those will have been caused by egg-dumping by different females, the possibility exists also that homosexual female-female pairs were involved (Ryder & Somppi 1979). No evidence for this was found in the above mentioned super-normal clutches, but in 1983 a probable female-female pair was discovered and observed in Herring Gull with a normal 3-egg clutch.

5.9.1 SUPER-NORMAL CLUTCHES

In Herring Gull a 4-egg clutch was found in 1981, a 5-egg clutch in 1982 and a 4- and a 5-egg clutch in 1983.
The 1982 case could not be studied further since it was on an islet which is difficult to reach (De Wijs 1982), the same applies for one of the 1983 cases (this time on Midland).
The 4 eggs of the second 1983 clutch (at Toms House) were apparently laid by at least two different females because of combined differences in size, shape and colour. Therefore trapping attempts were made. Unfortunately, only one individual could be trapped, its sex unknown since its measurements were inconclusive according to the discriminant functions available for Skomer birds.

In Lesser Black-backed Gull super-normal clutches were not noticed before 1983. This year 6 of such were discovered, all with 4 eggs. Two could not be relocated (with hatching chicks) and two others had males involved (trapped) but were laid by more than one female because of size/shape/colour differences (egg dumping). The remaining two were found during culling operations, one involved a pair of which the only partner obtained appeared to be a female hybrid Herring x Lesser Black-backed Gull, the other probably involved a normal pair (a male was picked up about 10 m from the nest) with a single female, since all eggs were very similar in shape and colouration (although one egg was very small: 58.9 x 38.0 mm) and appeared to be in the same state of development when investigated. In the case with the hybrid another female must have been also involved, since two eggs appeared to have been freshly laid, the other two were slightly developed.
It seems interesting to note that in 5 out of 6 cases in this species nests were situated at the edge of the (sub)colony, the only exception being the one with the single female.

5.9.2 FEMALE-FEMALE PAIR IN HG

On 23/5/83 in the HG study plot along the north coast a Herring Gull was retrapped with measurements clearly indicating a female (D=-2.72 according to the 1981-discriminant function, see 5.8; mean for females: -2.12, males: +2.04). This bird was (colour)ringed here in 1979 (WTWY). On 31/5/83 on the same nest another bird was trapped (and colourringed WGyY*T) with measurements also clearly indicating a female (D=-2.80). The three eggs were similar in size, shape and colour. When the unusual fact of having two females on one nest was realised, some observations were carried out to check whether this was an actual female-female pair. Observations during an all day watch on 3/6/83 of this now both colourringed pair showed no unusual behaviour. They showed a (normal) strong pairbond with choking and a normal change-over at 17.00 hr. No other bird was seen to be involved in this pair. Although the nest was situated near a much used roosting site

(and the hide), birds coming too close were chased away, but some tolerance was shown as well. On 14/6 two eggs were still present, indicating infertilaty, on 18/6 the nest was deserted without any traces of chicks.
WTWY in 1980 was mated with WTOGy, an obvious male (bill depth 20.5 mm, bill length 59.3 mm, unfortunately no headlength available), a bird not seen since 29/4/81.
Since even the larger bird of this pair (WTWY) thus certainly was a female, this case is considered to have been a very probable female-female pair, possibly caused by a lack of sufficient males due to the dramatic decline caused by botulism, which seems to effect mainly males during the breeding season (5.11).

5.10 BOTULISM

The continuing decline in the Herring Gull (5.2) is generally considered to be caused by botulism (de Wijs 1982). To test whether this is indeed the case guts and bloodsamples of a few Gulls, both HG and LB, were examined by Dr.G.R.Smith (Nuffield Laboratories of Comparative Medicine, Zoological Society of London) through Dr.R.M.McCleery. Of three Herring Gulls found freshly dead the gut contained toxin of *Clostridium botulinum* type C. Of 4 Herring Gulls found dying on Skomer three bloodsamples again contained this toxin, one was negative. Two bloodsamples of Lesser Blackbacks found dying were both positive. So 8 out of 9 tested gulls contained this toxin. Although this does not PROVE that these birds actually died because of this (corpses can be contaminated after death) it is very likely they did, especially concerning the blood samples. This is further discussed in 6.

5.11 SEX LINKED MORTALITY

Like previous years several dead (and dying) gulls (mainly HG) were found. In last years report was suggested that the majority of such birds might be males (for explaining super-normal clutches linked with possible female-female pairing). Since several of these corpses were in rather developed states of decay, they were sexed externally using bill measurements and the discriminant functions (5.8).
Of the 28 Herring Gulls found dead along the Skomer coast in the period 25/4 to 30/6, 21 proved to be probable males and 7 probable females (Chi-square test for goodness of fit, X^2= 7.0, p= 0.008). Of 9 HG found dead on 25/7 on inland roosts however, only 2 were probable males and 7 females (X^2= 2.8, p= 0.092). Both samples together showed no significance.
Of 14 LB found dead in the period 2/6 to 25/7 all over inland Skomer, 10 proved to be probable males and 4 females (X^2= 2.6, p= 0.105).
From these results it appears that last years assumption may be right for coastal HG from the breeding period, but (probably) not for inland individuals from the period directly afterwards.
For LB found at the end of the breeding period again a (probable) predominance of males was found.

6 DISCUSSION

The different trends in population size of HG and LB in recent years remain remarkably interesting. The dramatic decline in HG numbers seems to be strongly related with the occurrence of botulism in this species. This decline seems to be also related with differences in egg shape (5.4) and also possibly with sex linked mortality (5.11) and the occurrence of super-normal clutches and female-female pairs (5.9, 5.10). Knowing the probable cause of the decline in HG does not necessarily mean solving its occurrence. All remarks made in last years report (de Wijs 1982) still apply. It is most likely that the disease is got at either rubbish tips or Milford Havens Fish market. Since both are places where human beings are allowed to come this should be a case for the health authorities !! Although these birds died of type C, which is harmless to *Homo sapiens*, this does not imply that other, more dangerous types, do not occur! Further research in this matter is important concerning both health of *Homo sapiens* and the interesting aspects of changes/adaptations of a HG population trying to survive.

In LB the situation is rather the opposite. Although at least a few birds die of botulism (5.10) this does not have a showing effect on population size, on the contrary, this shows a remarkable increase (especially the results of the nestcounts by M.Alexander). This difference between the species is widely accepted to be caused by differences in feeding behaviour (cf.de Wijs 1982).
The remarkable difference in clutch size in LB (5.3), with a strong surplus of 3-egg clutches in 1983, may be linked with this increase, but egg size apparently was not effected by this.

From the sex-linked mortality (5.11) we may conclude that any occurrence of female-female pairs or egg-dumping by different females (de Wijs 1982, 5.9) may at least partly be due to a lack of sufficient males, caused by high male mortality. It is possible that females dying at the end or after the breeding season do so at roosts away from the colonies where they were unable to find male partners, but found lots of aggressive and competitive other females.

This year no effect was found of Bracken on fledging success, but this may be due to chance caused by small sample size (small plot size) or inaccuracy of the method (5.5.2). Anyhow, continuation of this will show whether there is such an effect at all or not.

7 RECOMMENDATIONS

As stated last year the need to carry out further research into the occurrence and cause of botulism in HG is obvious.
Apart from this I would like to recommend to change the nestcount method slightly. The best method will be a count of nests containing eggs only and therefore minimising differences in opinion concerning empty nests, which may cause considerable bias (5.2, 5.5.1). I suspect that including empty nests for reasons of inconsistant timing of the counts does not improve its reliability, but only makes it relatively difficult to carry out. Reliability can be even better improved by having the counts in an annually consistant period, preferrably just after the peak of egg laying (end of May to mid June, de Wijs 1978).

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Stormpetrel, Basin 26/6/83

Eur. Stormvogeltje

I

II

Hydrobates pelagicus