SKOKHOLM

BIRD OBSERVATORY

Seabird Report 2019

YMDDIRIEDOLAETH natur WILDLIFE TRUST

South and West Wales
De a Gorllewin Cymru

A summary of the status of seabirds breeding on Skokholm in 2019.
The lower limits given here, taken from the Skokholm Island Management Plan, have been established by the Wildlife Trust of South and West Wales and endorsed by the Seabird Subgroup of the Islands Conservation Advisory Committee. A green box is an attribute above its lower limit, a red box an attribute below the lower limit stipulated in the plan.

		Whole Island or Annual Plot Total (2018-2015 in parenthesis)	Productivity (2018-2015 in parenthesis)
Storm Petrel		**Study plot population:** any measurable decrease in the population	
Population	Not set	**Productivity:** limit not yet set due to a lack of data	
		89 transect responses (83, 89, 76, 87)	0.74 (0.55, 0.50, 0.58, 0.55)
Fulmar		**Whole Island population:** not to drop below the 2014-2018 mean of 196	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.50 chicks per breeding pair	
		198 aia (217, 213, 194, 179)	0.62 (0.49, 0.45, 0.57, 0.47)
Manx Shearwater		**Study plot population:** any measurable decrease in the population	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.69 chicks per breeding pair	
		331 responses in 8000m^2 (373, 295, 297, 269)	0.72 (0.70, 0.80, 0.68, 0.68)
Great Black-backed Gull		**Whole Island population:** not to drop below the 2014-2018 mean of 89	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 1.10 chicks per breeding pair	
		86 nests (93, 93, 93, 83)	1.43 (1.40, 1.54, 1.38, 1.66)
Herring Gull		**Whole Island population:** not to drop below the 2014-2018 mean of 307	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.70 chicks per breeding pair	
		301 nests (320, 302, 322, 289)	0.69 (0.73, 0.70, 0.86, 0.66)
Lesser Black-backed Gull		**Whole Island population:** 3 in any 5 consecutive years with less than 4600 pairs	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.60 chicks per breeding pair	
		1028 aia (1069, 1123, 1397, 1486)	0.27 (0.63, 0.38, 0.23, 0.15)
Guillemot		**Whole Island population:** not to drop below the 2014-2018 mean of 3884	
Population	Not set	**Productivity:** not monitored on Skokholm	
		4654 aol (4316, 4038, 3949, 3603)	- (0.55-0.61 in 2013)
Razorbill		**Whole Island population:** not to drop below the 2014-2018 mean of 2350	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.80 chicks per breeding pair	
		2755 aol (2585, 2491, 2242, 2382)	0.63 (0.69, 0.40, 0.39, 0.21)
Puffin		**Whole Island population:** not to drop below the 2014-2018 mean of 6998	
Population	Productivity	**Productivity:** 3 in any 5 consecutive years with less than 0.74 chicks per breeding pair	
		7447 adults (8762, 7800, 6692, 6665)	0.76 (0.75, 0.80, 0.73, 0.75)

Storm Petrel *Hydrobates pelagicus* **Pedryn Drycin**
Abundant Breeder a 2016 whole Island survey predicted 1910 occupied sites
784 trapped (including 23 pulli), 49 retrapped, 41 controls
1936-1976: 18,526 trapped, 2011-2018: 4092 trapped, 321 retrapped, 162 controls

Despite the sizable Skokholm breeding population and the significant amount of time dedicated to seawatching, Storm Petrels typically prove a rare sight at sea. The only at sea sightings this year concerned a single off the Lighthouse on the evening of 16th June, 12 west off the Lighthouse during four hours of observation on 10th August and one during a five hour, 45 minute watch on 8th October. With the exception of a small number of incubating adults visible in shallow crevices or in nest boxes, all other 2019 sightings came at night, although birds occasionally called from holes during the day and vocal responses were elicited for monitoring purposes. A minimum of eight birds watched after dark on 18th April were the first to be seen this year, this 18 days earlier than the first of last year and two days earlier than the first of 2017. Two singing males were recorded in the Petrel Station four nights later. The first diurnal record was of a male singing on 15th May, seven days later than the first of last year. Nights in May saw small numbers logged at various locations around the Island and infrared viewing equipment allowed counts to be made at the Quarry of at least 100

on the 23rd and 120 on the 31st. There were further peak counts from the Quarry of at least 150 on the 6th and 22nd June and of at least 120 on 27th June.

Four playback transects established at the Quarry in 2010, along with plots in North Haven Gully and along two of the walls which radiate from the Farm, potentially provide a sound method for monitoring changes in the Skokholm population. Between 65 and 91 responses were elicited using MP3 playback at these sites in each of the years between 2010 and 2018, although a substantial rock slide in 2016 significantly reduced the area which could be surveyed that year; Quarry transect two, which holds between eight and 21 responding birds, was almost entirely destroyed in 2016 and Quarry transect one was undercut on its southern edge, rendering both transects too dangerous to survey (see the 2016 Seabird Report for photographs and further details). It would seem from the records that the 2016 Quarry rock fall was by far the largest such event for over 30 years. Visits to the Quarry in 2017 established that there had been no further significant slides on any of the transects and the decision was made to reinstate transect one entirely and to use the upper section of transect two, a situation which remained the same in 2018 and this year. It was decided in 2017 that all of the data previously collected for transects one and two would be compared directly with future years; no adjustments have thus been made for the fact that transect two was shorter during the last three years and that transects one and two were missed in 2016.

We were again joined by a Storm Petrel researcher this year, with Jodie Henderson accompanying staff and long-term volunteers to allow the survey work to be completed in the usual period. Ten

visits were made to the study areas between 15th June and 8th July. An MP3 recording of male song was played into every crevice encountered along the transects, both numbered (and therefore used previously) and unmarked, with each active crevice being recorded and marked if new. It was first noted in 2013 how some marked crevices no longer fell within the two metre wide transects, an observation which prompted regular checks to assess the drift caused by (typically) small scale rock movements (and almost certainly in a small number of cases by erroneous measurements early in the project); it should be noted in future surveys that marked crevices which were once within the two metre transects now lie outside of the survey area. There were 13 numbered sites found to have moved between five and 65cm between this survey period and the last, primarily around transect four where there had been some small scale rock slides during the winter; ten of these movements took suitable crevices from within the transect (and nine of these were still found to be active sites). The playback census this year again focused on the area delineated by marked burrows, although the results were then divided into those which fell within the two metre transects and those which fell just outside (see table below).

The total number of apparently occupied crevices (located over ten visits) responding to a recording of male song at each of the seven study sites. Numbers in parenthesis are the totals from the 2m wide Quarry transects (as stipulated in the project guidelines) as opposed to the more wayward crevices monitored since the project's inception. The mean is that from 2010-2019.

Year	North Pond Wall	Little Bay Wall	North Haven Gully	Quarry transect 1		Quarry transect 2		Quarry transect 3		Quarry transect 4		Quarry total		Total	
2019	10	23	12	18	(7)	18†	(9)†	13	(8)	44	(20)	93	(44)	138	(89)
2018	6	13	11‡	15	(5)	15†	(10)†	12	(8)	49	(30)	91	(53)	121	(83)
2017	7	20	14‡	15	(5)	13†	(7)†	10	(9)	47	(27)	85	(48)	126	(89)
2016	6	15	17	9*	(4)*	**	**	11	(8)	41	(26)	61	(38)	99	(76)
2015	7	17	17	14	(5)	21	(9)	12	(7)	42	(25)	89	(46)	130	(87)
2014	9	12	13‡	14	(5)	18	(9)	18	(12)	37	(22)	87	(48)	121	(82)
2013	8	15	22	14	(4)	15	(8)	10	(7)	46	(27)	85	(46)	130	(91)
2012	5	9	21	12	(5)	8	(4)	10	(5)	33	(17)	63	(31)	98	(66)
2011	7	5	19	11	(5)	13	(8)	10	(7)	25	(14)	59	(34)	90	(65)
2010	4	9	18	8	(5)	15	(12)	11	(8)	30	(17)	64	(42)	95	(73)
Mean	**6.9**	**13.8**	**16.4**	**13.0**	**5.0**	**15.1**	**8.4**	**11.7**	**7.9**	**39.4**	**22.5**	**77.7**	**43.0**	**114.8**	**80.1**

* Transect 1 was only visited on four occasions in 2016 due to safety concerns.
** Transect 2 was not visited in 2016 due to a rock fall.
† Transect 2 was shortened in 2017 due to the 2016 rock fall.
‡ There was substantial scouring in the winters of 2013-14 and 2016-17 and in October 2017.

There is a general consensus that the number of pairs utilising the 18th century herringbone walls on Skokholm has declined (Vaughan and Gibbons, 1996; Vaughan, 2001; Thompson, 2003; Sutcliffe, 2010), perhaps due to a loss of suitable nest sites as vegetation and soil fills gaps in the collapsing walls. Standardised survey work over the last ten years suggests that there have been no further declines, although clearly there is some variation in the number of responses elicited each year (perhaps in part due to fluctuations in the number of transient, non-breeding birds as much as fluctuations in the number of breeding pairs (Brown and Eagle, 2017)). This year saw a significant increase in the number of responses elicited over ten visits, an increase which more than reversed the declines observed last year. Indeed the number of responses along both North Pond Wall and Little Bay Wall were at a ten year high and the combined total was 59.4% up on the 2010-2019 mean (20.7 ±sd 6.6). It would seem that the walls population can still be cautiously regarded as stable.

The huge swell generated by Storm Ophelia in October 2017, the remnants of the easternmost major Atlantic hurricane on record, caused yet another scouring event in North Haven Gully. Nest

boxes installed by Whittington in 2014, the access ladder to the lower portion of the slope and the central section of boulder scree which traditionally held many active crevices were all destroyed, whilst the painted marker stones were again moved from their original locations. This was the third major change to the North Haven landscape in five years, a series of events which almost certainly contributed to a 38.9% decline in the number of occupied crevices located between 2010 and 2018. No further significant changes to the North Haven landscape were observed this year. An assessment of breeding site availability suggests that new crevices have not opened up as others have been destroyed, with recent weather events releasing soil from further up the gully which has seemingly reduced the number of open fissures. This assessment was supported by the 2019 survey work which located just 12 active sites, one more than last year but the second lowest total of the last ten years. How such a loss of available nest sites affects the Skokholm population as a whole is unclear; it would seem likely that nest sites are available away from North Haven and that the birds were not directly affected (as they were predominantly absent during the scouring events), however the impact of looking for new nest sites on adult survival is something of an unknown.

The ephemeral nature of Storm Petrel nest sites was also evident at the Quarry where there were further small scale movements, particularly along transect four. As mentioned above, these rock movements did not seemingly affect the number of crevices available overall, although they did perhaps reduce the number of crevices available along the transect. It was thus no surprise that the transect four total dropped by ten active sites (although perhaps in part a coincidence, this was just one more than the number of active sites found outside of the transect which had previously been positioned within the two metre wide strip). Nevertheless a total of 20 transect four responses was only slightly down on the 2010-2019 mean (22.5 ±sd 5.3). The number of responses within the other three Quarry transects was also close to the ten year mean; the transect one total was seven, a new high for an area which has seen a consistent number of responses over the years (there have been five responses in seven of ten survey years and the ten year mean stands at 5.0 ±sd 0.8), the transect two total was down one (almost matching the ten year mean of 8.4 ±sd 2.2) and the transect three total matched last year (and the ten year mean of 7.9 ±sd 1.8). The overall Quarry total of 44 was the lowest since 2016 (when a major rock fall reduced the survey area) and was otherwise the lowest since 2012, however it still fell very close to the ten year mean of 43.0 ±sd 6.8.

The number of crevices which have at some point been occupied over the ten year study (a total of 334), subdivided to show how many years the crevices have been apparently occupied for and the percentage of crevices occupied for a particular number of years. Crevices in the lower half of transect two, not visited after the 2016 rock fall, are not included in this table.

	Quarry Transects	The Walls	North Haven Gully	Total	% of total
1 year of apparent occupancy	54	34	29	**117**	35.03
2 years of apparent occupancy	32	8	18	**58**	17.37
3 years of apparent occupancy	19	7	5	**31**	9.28
4 years of apparent occupancy	14	7	14	**35**	10.48
5 years of apparent occupancy	19	8		**27**	8.08
6 years of apparent occupancy	14	3	2	**19**	5.69
7 years of apparent occupancy	12	1	1	**14**	4.19
8 years of apparent occupancy	14	3		**17**	5.09
9 years of apparent occupancy	6	1		**7**	2.10
10 years of apparent occupancy	7	1	1	**9**	2.69
Total	**191**	**73**	**70**	**334**	

Overall there were 89 responses elicited this year, six more than last year (the loss of nine sites at the Quarry being more than offset by 15 more sites across the walls and North Haven). The total was the second highest to date, matching 2017 and 11.1% up on the ten year mean (80.1 ±sd 9.6). It still

seems likely that, over the last decade at least, the Skokholm study population has been stable, a conclusion which is probably applicable to the Island population as a whole. This is positive news following what may have been a significant population decline between 1996 and 2010 (Sutcliffe and Vaughan, 2011; Wood *et al*., 2017). One of the most important variables highlighted this year was again nest site availability within the study areas; birds can only react to the changing landscape and maintain a stable population if further nest sites open up as others are lost. It is clear that some Storm Petrel nest crevices are short lived (as shown in the table above, just over a third of those found over the course of this study have only been occupied during a single year), however stable sites are also in existence; over a quarter of the active crevices located during the last ten years have shown signs of occupancy in five or more years and 2.69% of crevices have contained a calling bird in every year. Although changes in the positioning of rocks will mean that some crevices were only available for a single year, it is tempting to suggest that some of the crevices only occupied once are perhaps unsuitable nest sites (although they contained a calling bird, such sites may have never actually supported a breeding attempt).

The proportion of known active crevices which respond to a recording of male song during any single visit unsurprisingly fluctuates; there are several reasons for this, including the chance presence of birds of different sexes, individual variation in response rate, nest site positioning (which will influence how occupants hear the stimulus) and breeding status (non-breeders are perhaps more likely to leave a crevice unattended, to occupy multiple crevices during the study period or to respond at a different rate to breeding birds, whilst breeding status could also change during the survey period). The walls saw an average of 10.3 (31.2%) of the 33 active sites respond on any single visit, although the actual number varied between five and 15. At North Haven a mean of 4.3 (35.8%) of 12 active sites responded each visit, although the actual number was between two and seven. At the Quarry a mean of 28.0 (30.1%) of 93 active sites responded, but this was between 19 and 41 on any particular date. Despite this significant variation between dates, the mean response rates at all three sites fell within the relatively tight ranges observed between 2014 and 2018 and close to the six year means (see table below). The use of these response rates to produce a correction factor remains the best way to predict the number of birds present in a large area when ten visits are not logistically feasible (for example during the whole Island census). Based on the data collected over the last six years, the number of active sites present in an area is likely to be in the region of 3.44 times more than the number encountered on a single visit. However the variation seen in this year's figures is a reminder of how difficult it is to assess the population of a species which usually cannot be seen.

The percentage of known active crevices which responded to male song during any single visit, averaged across all visits (the resulting correction factor is given in parenthesis).

Year	The walls	North Haven	Quarry	Rock fall	Average
2019	31.2 (3.20)	35.8 (2.79)	30.1 (3.23)	30.8 (3.24)	30.9 (3.24)
2018	22.6 (4.42)	31.8 (3.14)	32.6 (3.06)	32.5 (3.07)	31.0 (3.23)
2017	21.9 (4.58)	30.9 (3.23)	28.1 (3.55)	28.5 (3.51)	27.1 (3.69)
2016	40.0 (2.50)	25.9 (3.86)	23.3 (4.30)	23.9 (4.18)	27.7 (3.61)
2015	28.7 (3.48)	37.4 (2.68)	28.9 (3.46)	30.4 (3.29)	30.1 (3.33)
2014	36.2 (2.76)	40.0 (2.50)	26.2 (3.82)	26.4 (3.79)	28.1 (3.56)
Mean	**30.1 (3.49)**	**33.6 (3.03)**	**28.2 (3.59)**	**28.8 (3.51)**	**29.2 (3.44)**

There is an obvious need to know what responding birds are actually doing; it is unclear how many of the 1910 active sites predicted during the 2016 whole Island census were actually occupied by breeding birds. Previous attempts to use an endoscope in natural sites have failed to locate a sufficiently large sample size for monitoring purposes, a failure which was repeated last year. One way to improve our knowledge is to encourage petrels to occupy accessible artificial nest sites. With

this in mind a study wall containing 119 nest holes was created during the 2016 season (with the final inspection hatches and endoscope holes being added in April 2017). Whereas attempts to lure birds towards the 'Petrel Station' were made during the previous two years, there were no such efforts this season. Ad hoc infrared observations during nocturnal guided walks revealed birds entering the Petrel Station this spring, however no close inspection was made until the standard survey period when an MP3 playback census was conducted on the same dates as the Quarry transect visits. The ten visits elicited responses from eight boxes and a mean of 1.8 responses per visit (a response rate within the range observed elsewhere, fractionally higher than that recorded at Quarry transects one and three). Confirmatory checks during the chick provisioning period revealed discrepancies between the playback results and the box contents. Four (50%) of the boxes found to be active during the survey did not contain any signs of a breeding attempt (the remaining four contained an egg stage failure, a chick stage failure and two chicks which went on to fledge, these the first youngsters to fledge from the Petrel Station). Surprisingly five additional boxes contained egg stage failures, all sites which had not been detected during the playback survey; this has obvious implications for the whole Island census as evidently some active sites were not detected over ten visits (which would perhaps suggest that the Skokholm population is larger than estimated in 2016). It should however be remembered that the Petrel Station is probably not yet representative of the Island as a whole, primarily as the majority of occupants are likely to be younger, first-time breeders. This theory is supported by the productivity estimate; of nine boxes which definitely contained breeding attempts, only two fledged young (a productivity value of 0.22 chicks per pair is well below what is expected on average (see below), as might be predicted for younger, less experienced pairs). Of the four boxes which failed at egg stage last year, only one was occupied this year (an attempt which proved successful).

An additional, albeit probably small, issue with the 2016 whole Island census came to light on the night of 4th July this year. It was an unusually still night, calm enough for Storm Petrel song to reach the Lighthouse Track from an area to the west of Dip Gully. An inspection of this fragile ground that night revealed birds calling from three burrows. Although occupancy of earthen burrows has been documented in the past, a 2016 diurnal playback census of 1000m^2 failed to locate any birds on the plateau above the Quarry and no birds had been met in this habitat type during the previous six years of regular nocturnal activities. No burrow nesters are included in the whole Island estimate.

Sound recording equipment, funded by monies donated during the 2013 Western Orphean Warbler twitch, was installed in eight Petrel Station boxes prior to the spring 2019 arrival of the birds and a

functioning infrared camera, sponsored by the British Birds Charitable Trust, was installed in a single box. Long-term goals include an analysis of adult vocalisations in an attempt to recognise birds as individuals (which would potentially allow for an annual assessment of adult overwinter survival). The results of this passive surveillance will be reported upon in due course, however a short video clip from inside a Petrel Station box is available here: www.youtube.com/watch?v=KbtAuOAdPeI

In 2013 a thermal imaging camera recorded a Short-eared Owl hunting Storm Petrels in the Quarry, an event which has subsequently been shown to be quite regular. The remains of six petrels were found that year, with 16 in 2014, 18 in 2015, 51 in 2016, 98 in 2017 (the only year on record in which Short-eared Owls have been proven to breed) and 31 last year; the majority of all these remains were thought to be the victims of Short-eared Owls, usually due to the presence of feathers or pellets (five of the 31 found last year were attributed to predation by gulls). There were only 25 Short-eared Owl bird-days logged this season, the third lowest tally of the last seven years, whilst the remains of only five Storm Petrels were located (two adults and two fledglings were taken by Short-eared Owls and one fledgling had seemingly failed to extricate itself from a dense patch of Common Nettle *Urtica dioica*). A Little Owl logged on 17th March last year was fortunately not seen again; this introduced species is a well-documented Storm Petrel predator, for example the Skokholm Bird Observatory report of 1936 includes details of a Little Owl nest containing the remains of nearly 200 Storm Petrels. A House Mouse *Mus musculus* was watched via a live infrared camera feed as it entered Petrel Station burrow 64 on the night of 18th September; it was seen to walk to the end of the entrance tunnel but did not drop down into the chamber or interact with the Storm Petrel chick, indeed neither seemingly reacted to the other's presence (Davison, *pers. comm*.).

On the night of 2nd August a leucistic or progressively greying individual was taken from the South Haven mist net; it had white throat feathering and a thin white breast band. This follows a bird taken on 25th July last year which had a white throat, a broken white breast band and a white nape patch. Of over 4500 birds handled since 2013, these are the only two to show more than a single aberrant feather. Although such individuals are clearly unusual, similar white patches are documented on occasion; a comparable bird photographed on Filfla, Malta in 2001 was recorded in a paper which mentions a few other incidences in Storm Petrels (Sultana and Borg, 2002).

There were 19 sites discovered this season where an incubating bird was evident early enough in the nesting period to allow a productivity estimate to be made (20 sites in 2018, 14 in 2017, 12 in 2016, 20 in 2015 and 13 in 2014); the Petrel Station birds were again not included as it was felt that the sample could be biased towards younger, less experienced birds. Although some early egg stage failures may have been missed, the study is biased towards birds in shallow crevices or boxes and the sample size is far from great, these visible birds provide a rare opportunity to estimate productivity on Skokholm. Away from these study sites, the first eggshell fragments indicative of a hatched chick were found along Quarry transect one on 29th June, seven days earlier than the first of last year, four days earlier than the first of 2017 and three days earlier than the first of 2016. Of the 19 monitored nests only one, in the Gantry, definitely failed at egg stage (the egg was later found to be damaged), two failed at either egg or small chick stage (but neither could be located), two failed at chick stage (one in an exposed Quarry site perished within a week of being left unattended whilst one in a North Haven crevice was nearly a month old) and 14 fledged young. Productivity was thus

calculated to be 0.74 fledglings per pair, the highest estimate of the last six years (there were 0.55 fledglings per pair in 2018, 0.50 in 2017, 0.58 in 2016, 0.55 in 2014 and 0.69 in 2014).

Although only small numbers of accessible chicks are ringed each year on Skokholm, tape luring of adult birds in South Haven is giving some indication as to their post-fledging survival. Of 32 chicks ringed between 2013 and 2015, seven (21.9%) have been mist netted in South Haven in subsequent years (at between one year, 323 days and three years, 344 days later) and an eighth bird, ringed as a chick in October 2015, was controlled at Gwennap Head, Cornwall in 2018; thus at least eight (25.0%) of the 32 survived a minimum of two winters. Intriguingly 12 of the 32 were ringed at either the Quarry or Wall's End and have not been encountered again; although this may be due to chance or differing survival rates, it is perhaps possible that young non-breeders return to sites close to their natal crevice, in this instance sites far enough from the South Haven MP3 lure that birds are not attracted. If the Quarry and Wall's End birds are removed from the equation, eight of 20 birds (40.0%) have been reencountered. If only the 2014 data is used, three of seven chicks have survived for at least one year, 323 days since being ringed (42.9%). However, of the six chicks ringed in 2016, the seven ringed in 2017 and the ten ringed last year, only singles from 2016 and 2017 had been reencountered by the end of this year (one of which was mist netted on the nearby mainland).

Adult Storm Petrels were lured to the traditional South Haven netting site on 13 nights between 15th July and 26th August, one fewer night than last year but four more than in 2017, five more than in 2016 and two more than in 2015. Along with generating some fantastic data, these nights also proved very popular with guests to the Island. The largest catch was of 169 birds on the night of 15th July; although up on the peak of 142 logged last year, the total was well down on the 252 of 24th July 2017 and the 247 of 22nd July 2016. Of 846 adults handled in South Haven this year, 10.2% were already wearing a ring (11.4% in 2018, 12.9% in 2017, 6.8% in 2016, 12.3% in 2015 and 7.5% in 2014), there were single retraps from 2013, 2015 and 2016, three from 2017 (including a bird ringed as a pullus), nine from 2018 and 41 (4.85%) had been ringed elsewhere (3.58% in 2018, 4.02% in 2017, 3.03% in 2016 and 3.45% in 2015). Additional to the birds listed below, we received news of 13 birds ringed at Wooltack Point (4km to the NNE) retrapped on Skokholm (with one retrapped after 30 days, two after 22 days, two after 21 days, one after 20 days, two after 12 days, three after eight days, one after seven days and one retrapped the following day), three birds ringed on Skokholm and retrapped at Wooltack (one ringed as a chick in 2016 which was retrapped after 1024 days and further birds retrapped after 336 and 324 days) and two birds ringed on Skomer Island (4km to the NNW) retrapped on Skokholm (one which was ringed in 2012 and retrapped after 2557 days and one retrapped after 340 days). Since ringing fully recommenced in 2013 we have now received news of 312 Storm Petrels either ringed on Skokholm and found elsewhere or ringed elsewhere and controlled on Skokholm; of these 193 have been exchanged with sites more than 10km away from the Island (see map below). Unless stated otherwise, all of the following recoveries were of birds deliberately mist netted.

Ringing recovery 2582865
Originally ringed as an adult, RUMPS POINT, NEAR POLZEATH, CORNWALL 19th July 2004
Previously recovered SOUTH HAVEN, SKOKHOLM 23rd July 2014
Recovered SOUTH HAVEN, SKOKHOLM 5th August 2019
Distance travelled 127km at 349 degrees (N)
Days since ringed 5495
At over 16 years of age, this was the oldest individual encountered this year.

Ringing recovery 2607359
Originally ringed as an adult, HOT POINT, THE LIZARD, CORNWALL 6th June 2019
Recovered SOUTH HAVEN, SKOKHOLM 15th July 2019
Recovered SOUTH HAVEN, SKOKHOLM 24th July 2019

Distance travelled 193km at 358 degrees (N)
Days since ringed 39 and 48

Ringing recovery 2619192
Originally ringed as an adult, COPELAND ISLAND, DOWN, NORTHERN IRELAND 20th August 2016
Recovered SOUTH HAVEN, SKOKHOLM 28th July 2019
Distance travelled 332km at 178 degrees (S)
Days since ringed 1072
Additionally 2619643, ringed as an adult at Copeland on 28th July 2018, was controlled in South Haven on 17th July 2019 after 354 days. These are the first two birds to arrive from the Copeland Bird Observatory since ringing recommenced on Skokholm.

Ringing recovery 2637141
Originally ringed as an adult, ST JUSTINIAN, ST DAVID'S, PEMBROKESHIRE 25th June 2019
Recovered SOUTH HAVEN, SKOKHOLM 23rd July 2019
Distance travelled 21km at 174 degrees (S)
Days since ringed 28
Additionally 2637147 was controlled in South Haven on 31st July 2019 after 27 days, 2637148 was controlled on 17th July after 13 days and 2637159 was controlled on 31st July after 26 days.

Ringing recovery 2647806
Originally ringed as an adult, BARDSEY ISLAND, GWYNEDD 26th July 2017
Previously recovered SOUTH HAVEN, SKOKHOLM 15th July 2018
Recovered SOUTH HAVEN, SKOKHOLM 28th July 2019
Distance travelled 122km at 197 degrees (SSW)
Days since ringed 732
Additionally 2738141, ringed at Bardsey as an adult on 2nd July 2019, was controlled in South Haven 26 days later on 28th July.

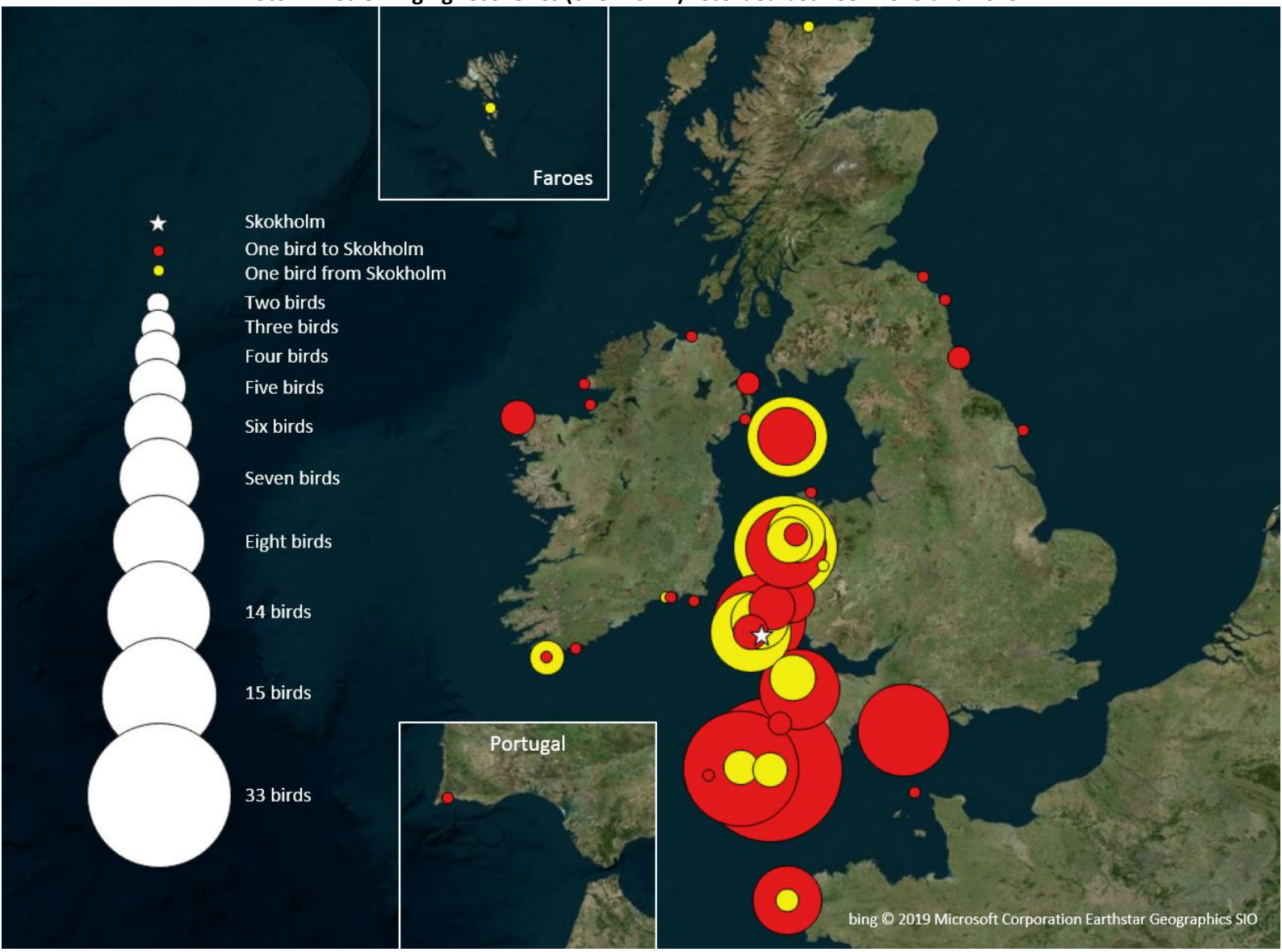
Ringing recovery 2650987
Originally ringed as an adult, SHEEPLAND HARBOUR, DOWN, NORTHERN IRELAND 22nd July 2011
Recovered SOUTH HAVEN, SKOKHOLM 16th July 2019
Distance travelled 288km at 177 degrees (S)
Days since ringed 2916
Intriguingly this is a third 2019 control of a bird ringed in Down, a county with which we have not previously exchanged a bird (see above for the Copeland Bird Observatory controls).

Ringing recovery 2683482
Originally ringed as an adult, GWENNAP HEAD, PORTHGWARRA, CORNWALL 26th July 2018
Recovered SOUTH HAVEN, SKOKHOLM 16th July 2019
Distance travelled 188km at 9 degrees (N)
Days since ringed 355
Additionally 2754614, 2754617, 2754647 and 2754666, all ringed as adults at Gwennap Head on 6th July 2019, were controlled on 24th July, 15th July, 16th July and 13th August after 18, nine, ten and 38 days respectively. 2754804, 2754815 and 2754882, all ringed at Gwennap Head on 2nd July 2019, were controlled on 24th August, 23rd July and 23rd July after 53, 21 and 21 days respectively. In the period between 2013 and 2019 there have been 15 Gwennap Head ringed birds controlled on Skokholm, more than from any non-Pembrokeshire site bar The Lizard.

Ringing recovery 2685366
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 19th July 2014
Recovered CALF OF MAN, ISLE OF MAN 10th June 2019

Distance travelled 263km at 7 degrees (N)
Days since ringed 1787
Additionally 2722965 and 2740573, ringed as adults in South Haven on 13th July and 4th August 2018, were controlled at the Calf on 5th July 2019 after 357 and 335 days respectively.

Storm Petrel ringing recoveries (over 10km) recorded between 2013 and 2019.



Ringing recovery 2685874
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 30th July 2014
Recovered LUNDY ISLAND, DEVON 28th August 2019
Distance travelled 70km at 144 degrees (SE)
Days since ringed 1855
Additionally 2746457, ringed as an adult in South Haven on 2nd August 2019, was controlled at Lundy Island on 26th August after 24 days.

Ringing recovery 2703519
Originally ringed as an adult, MALIN BEG, GLENCOLUMCILLE, DONEGAL, IRELAND 3rd July 2019
Recovered SOUTH HAVEN, SKOKHOLM 16th July 2019
Distance travelled 404km at 145 degrees (SE)

Days since ringed 13
This is the first Skokholm recovery of a bird ringed in Donegal.

Ringing recovery 2705970
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 22nd July 2016
Recovered HOT POINT, THE LIZARD, CORNWALL 6th June 2019
Distance travelled 193km at 178 degrees (S)
Days since ringed 1049

Ringing recovery 2706842
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 25th July 2017
Recovered BANNEG, LE CONQUET, FINISTÉRE, FRANCE 13th June 2018 (sic)
Distance travelled 366km at 177 degrees (S)
Days since ringed 323

Ringing recovery 2715260
Originally ringed as an adult, WHITBURN COUNTRY PARK, TYNE AND WEAR 10th July 2018
Recovered SOUTH HAVEN, SKOKHOLM 4th August 2019
Distance travelled 445km at 216 degrees (SW)
Days since ringed 390
This is the second Storm Petrel ringed in Tyne and Wear to reach Skokholm since 2013, more than from any other east coast county.

Ringing recovery 2718170
Originally ringed as an adult, CALF OF MAN, ISLE OF MAN 5th July 2019
Recovered SOUTH HAVEN, SKOKHOLM 15th July 2019
Distance travelled 263km at 187 degrees (S)
Days since ringed 10
Additionally 2718195, ringed as an adult at the Calf on 20th July 2019, was controlled in South Haven on 27th July after seven days.

Ringing recovery 2722829
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 22nd July 2018
Recovered CAPE CLEAR, CORK, IRELAND 17th August 2019
Distance travelled 294km at 265 degrees (W)
Days since ringed 391
This is the third Skokholm ringed Storm Petrel to reach Cape Clear in the last two years.

Ringing recovery 2722880
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 22nd July 2018
Recovered NAN RON, HIGHLAND, SCOTLAND 2nd August 2019
Distance travelled 764km at 5 degrees (N)
Days since ringed 376
This is the first recovery of a Skokholm ringed Storm Petrel in the highlands of Scotland.

Ringing recovery 2722970
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 13th July 2018
Recovered PORTH YSGADEN, TUDWEILIOG, GWYNEDD 14th August 2018 (sic)
Distance travelled 140km at 18 degrees (NNE)
Days since ringed 32
Additionally there were late reports of 2740528, 2740536 and 2740710, ringed as adults in South Haven on the 3rd, 3rd and 7th August 2018 and controlled at Porth Ysgaden on the 8th, 13th and 8th

August 2018 after five, ten and one day respectively (the latter movement being particularly swift).

Ringing recovery 2726235
Originally ringed as an adult, HOT POINT, THE LIZARD, CORNWALL 1st August 2017
Recovered SOUTH HAVEN, SKOKHOLM 3rd August 2019
Distance travelled 193km at 358 degrees (N)
Days since ringed 732
This was one of two Lizard ringed individuals controlled on Skokholm this year, taking the total to 33 (more than twice the number which have arrived from any other non-Pembrokeshire site).

Ringing recovery 2740004
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 14th July 2018
Recovered PORTH IAGO, LLANGWNNADL, GWYNEDD 6th July 2019
Distance travelled 134km at 17 degrees (NNE)
Days since ringed 357
Additionally there was a late report of 2740578, ringed as an adult in South Haven on 4th August 2018 and controlled at Porth Iago on 13th August 2018 after nine days.

Ringing recovery 2740254
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 19th July 2018
Previously recovered SKOMER ISLAND, PEMBROKESHIRE 29th August 2018
Recovered ST JUSTINIAN, ST DAVID'S, PEMBROKESHIRE 4th July 2019
Distance travelled 21km at 354 degrees (N)
Days since ringed 350
Additionally 2740404 and 2740752, ringed as adults in South Haven on 25th July and 9th August 2018, were controlled at St Justinian on 5th July and 25th June 2019 after 345 and 320 days respectively.

2746227, ringed as an adult in South Haven on 23rd July 2019, was controlled at St Justinian on 1st August after nine days.

Ringing recovery 2740449
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 26th July 2018
Recovered GWENNAP HEAD, PORTHGWARRA, CORNWALL 2nd July 2019
Distance travelled 188km at 189 degrees (S)
Days since ringed 341

Ringing recovery 2740735
Originally ringed as an adult, SOUTH HAVEN, SKOKHOLM 9th August 2018
Recovered BARDSEY ISLAND, GWYNEDD 29th May 2019
Distance travelled 124km at 17 degrees (NNE)
Days since ringed 293
Whilst the majority of Storm Petrels controlled on Skokholm have been ringed to our south, primarily in Cornwall and Dorset, the majority of birds ringed on Skokholm are controlled to our north. There have now been 14 Skokholm ringed birds controlled on Bardsey Island, with seven on the Calf of Man being the second highest tally.

Ringing recovery POL N06784
Originally ringed as an adult, PONTA DE ALMADENA, FARO, PORTUGAL 11th June 2018
Recovered SOUTH HAVEN, SKOKHOLM 21st July 2018 (sic)
Distance travelled 1651km at 10 degrees (N)
Days since ringed 40
Full details of the first Portuguese ringed Storm Petrel to be controlled on Skokholm.

Ringing recovery FRP SE33760
Originally ringed as an adult, LE CONQUET, FINISTÉRE, FRANCE 15th June 2019
Recovered SOUTH HAVEN, SKOKHOLM 31st July 2019
Distance travelled 375km at 355 degrees (N)
Days since ringed 46
This is the sixth individual ringed in this region of France to be found on Skokholm since 2013. The commune of Le Conquet is home to Banneg, the largest Storm Petrel colony in France, an island thought to be home to just under a thousand pairs which primarily nest in abandoned Rabbit burrows. Interestingly this nesting habitat was not found to be in use on Skokholm during the 2016 whole Island census (but see above for an intriguing 2019 observation).

Fulmar *Fulmarus glacialis* **Aderyn-drycin y Graig**
Fairly Common Breeder first bred in 1967
1 pullus trapped
1936-1976: 34 trapped, 2017-2018: 4 pulli trapped

Birds were ashore upon the return of staff on 28th February, however March saw far fewer return to the cliffs than were observed in 2018; whereas over 100 birds were ashore on ten March dates during 2018, counts of 177 on the 1st and 113 on the 2nd were the only three-figure tallies this year. Seawatching in March contributed to seven fewer three-figure daycounts than in 2018, with highs of 201 on the 1st, 154 on the 2nd and 155 on the 6th failing to match peaks of 207 and 183 logged last year. There was however only one date when no birds came ashore at all, two fewer dates than last year, and only three dates when fewer than 20 were logged, also two fewer than last year. April saw regular departures from the cliffs, with lows of between 16 and 54 noted on three dates (nine dates in 2018 and five in 2017) but three-figure counts logged on 17 (11 dates in 2018 and eight in 2017). On 23rd April a Fulmar was watched as it fed around a Great Black-backed Gull breaking up a Manx

Shearwater; this was the first observation during the last seven years of a Fulmar seemingly eating shearwater. The pre-laying exodus was less marked this year; following an already depleted 3rd May total of 81, there were ten dates with 70 or fewer birds logged, including a low of 27 on the 4th, but unseasonable highs of 96 on the 11th and 90 on the 13th. The first egg was seen at Rat Bay on 16th May, three days earlier than the first of 2018 and 2017, two days earlier than the first of 2016 and five days earlier than the first of 2015; the first egg of 2014, following prolonged and severe winter storms, was on the 28th.

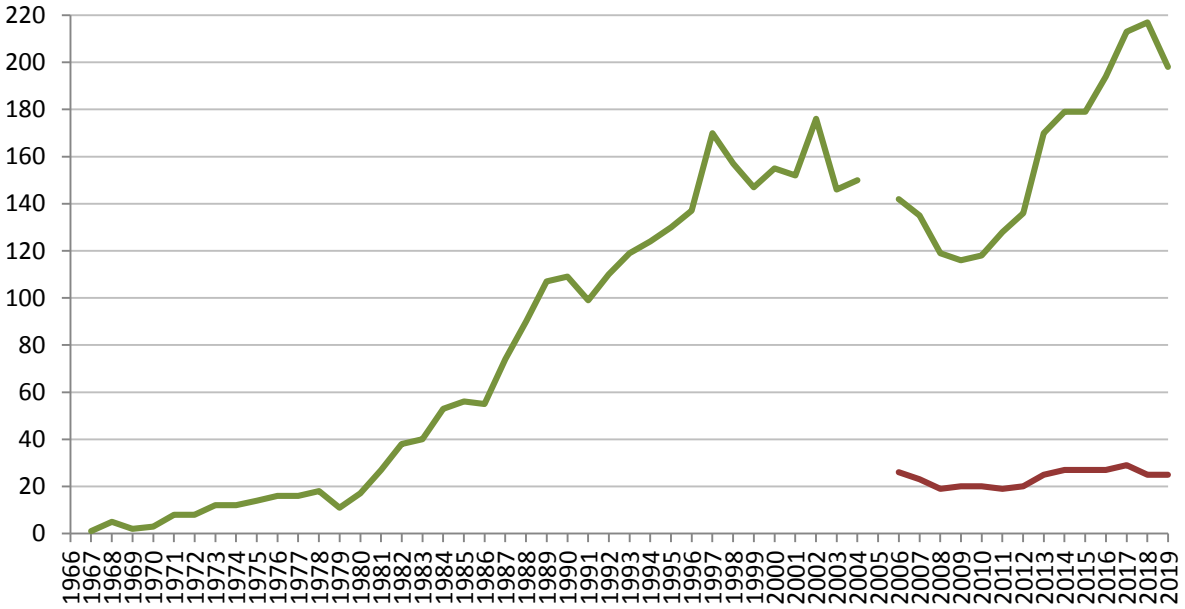
The whole Island totals (apparently incubating adults), mean plot totals, the range of totals over ten study plot visits, the standard deviation observed over the ten visits since 2013 and the percentage of the Island total made up of study plot birds. (*includes a boat-based count)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Island	118	128*	136	170*	179*	179*	194*	213*	217*	198*
Plots	20	19	20	25	27	27	27	29	25	25
Range	(17-24)	(16-22)	(16-25)	(22-28)	(23-29)	(26-29)	(25-29)	(26-31)	(23-27)	(23-27)
±SD				2.07	1.79	1.14	1.26	2.00	1.26	1.35
Plot %	17.0	14.8	14.7	14.7	15.1	15.1	13.9	13.6	11.5	12.6

The six study plots counted annually since 2006 were visited on ten dates between 24th May and 11th June, a period during which counts were regularly delayed by poor visibility and winds well in excess of the Beaufort force four cut-off. Up until the 2017 season only three of these plots had contained Fulmars, however an apparently incubating bird occupied a niche in the top third of the North Gully auk colony for five dates from 1st June that year; although Fulmars were only found in the usual three plots last year (at Little Bay, Middlerock and Guillemot Cliff), this year again saw an apparently incubating adult in the North Gully plot (although, unlike in 2017, a single record on 9th June did not influence the overall mean). A 2019 mean of 25 apparently incubating birds matched last year, a

tally four down on the 2017 record. The mean total for each of the three regularly occupied plots was the same as last year; the Guillemot Cliff total remained at five for a sixth successive year, six Middlerock sites equalled the record set in 2018 and 2016 and the Little Bay tally remained at 14 (this a plot where the number of occupied ledges has steadily declined from a high of 19 in 2013 to 18 in 2014 and 2017, 17 in 2015, 16 in 2016 and 14 in 2018). Quite why the number of apparently incubating adults is declining at Little Bay is unclear, however, given the close proximity of the Little Bay nest ledges to each other, the intraspecific interactions noted in recent years may have had an impact (see below). The number of apparently incubating adults was consistent between visits, with a range of five matching last year and 2016 as the second-tightest spread to date, only one up on a range of four logged 2015.

The total number of apparently incubating Fulmar recorded on Skokholm since breeding began in 1967 and the number within the study plots since 2006.

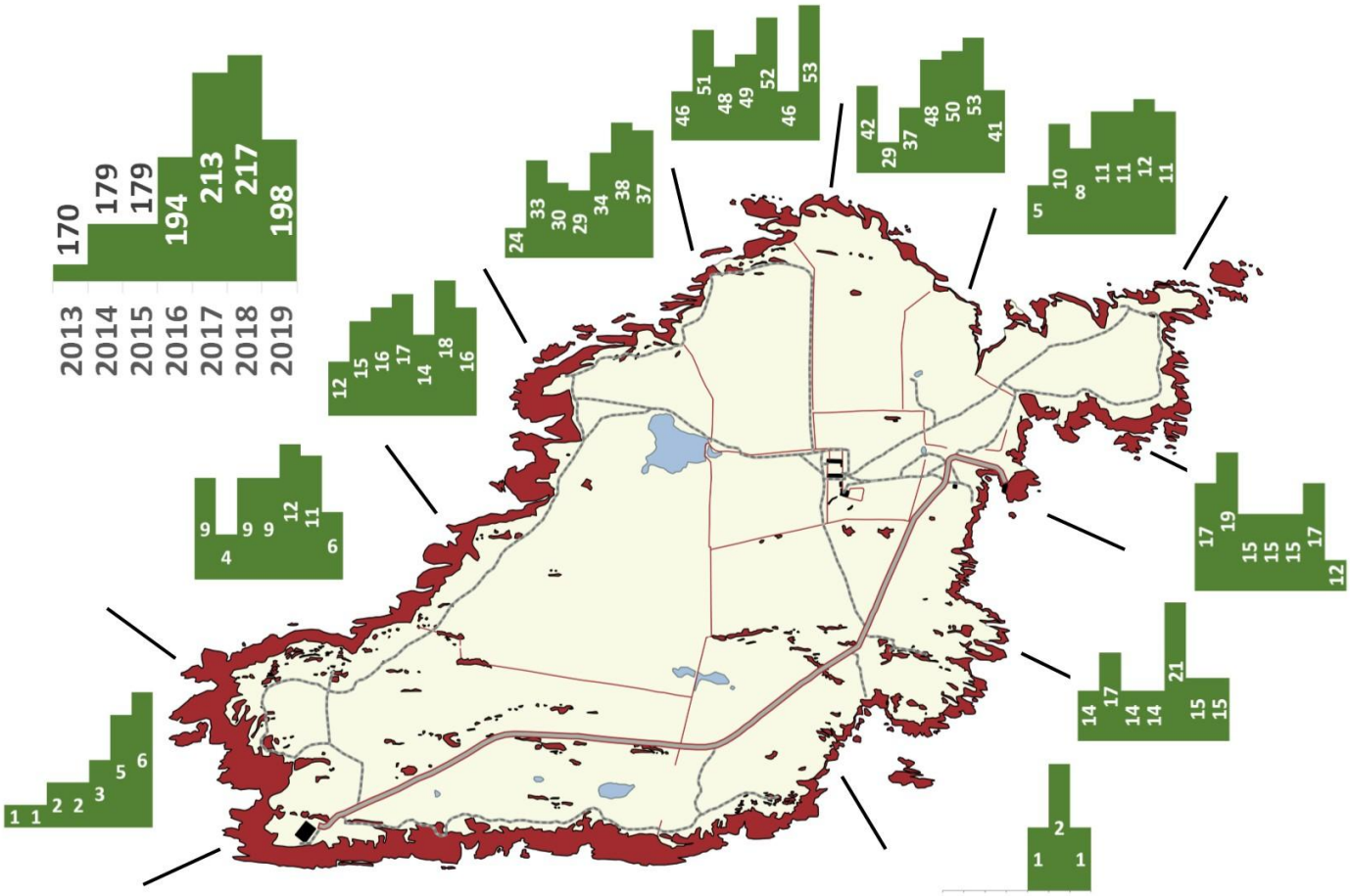


The whole Island count undertaken between 24th May and 7th June yielded an average of 198 apparently incubating adults, this an 8.8% drop on the Skokholm record of 217 counted last year but still the third highest tally to date and a total 14.3% up on the ten year mean (173.20 ±sd 35.12). The largest decline was noted along Near and Far Bays where there were 12 fewer apparently incubating adults; although this is a substantial drop, it should be noted that this is the area of Skokholm where counts are most dependent on a boat-based survey, a single visit which is inevitably prone to more error (as it is not based on an average from multiple visits and requires an accurate assessment of what is an apparently incubating adult from a moving boat). There were declines of five apparently incubating adults at the Bluffs and Peter's Bay, the latter a site which has been prone to particularly poor productivity (see below). There were further declines of between one and two in four survey areas and the Hog Bay tally remained the same as in 2018. There was however an increase of seven apparently incubating adults in the vicinity of Little Bay Point, an increase which reversed the decline logged last year, and an additional site near the Quarry took the tally for that area to six (a new record for this westerly portion of the Island).

The 2019 whole Island count includes approximately 30 pairs which would be difficult or impossible to see from the Island itself (birds seen from a boat north of North Gully, north of Wreck Cove, on the Little Neck and in hidden crevices between Smiths Bay and Little Bay Point). The drop in numbers observed between 2006 and 2012 may perhaps thus be linked to a lack of boat access, although the study plots broadly mirrored the dip in the Island total. The proportion of the Island total made up of study plot birds increased to 12.6% this year; this was, however, still the second lowest recorded

since the plots were begun (only up on the 11.5% logged last year) and probably an indication that the study plots are not representative of the Island as a whole (due to a lack of space for expansion).

The distribution of apparently incubating Fulmar 2013-2019.

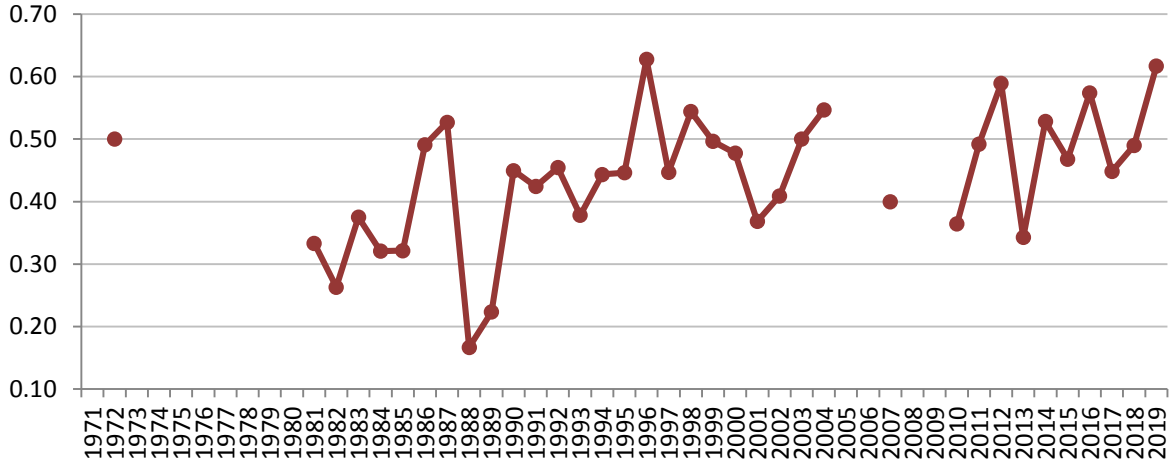


On 18th May 47 incubating adults were selected for productivity monitoring (six at Twinlet, six at North Gully, 20 around Little Bay Point, five at Rat Bay and ten at Peter's Bay); birds seen with eggs or those apparently incubating for ten consecutive days from this date were included in the sample (more birds were initially monitored but were soon discovered not to be incubating). It was again found that eggs were easier to see following heavy rain as energetically preening adults were more likely to reveal their nest scrape. There were four early egg stage failures, after approximately nine, 11, 16 and 18 days, whilst further attempts failed at egg stage after 26 and 37 days respectively. An additional 11 failures became apparent at the time that the eggs of neighbouring pairs were hatching, however the nest sites were found to be empty; although an egg had been seen at one of the nests the day prior to it going missing, none of the 11 failed sites were seen to contain abandoned eggs, hatched eggshell or dead chicks (the contents were thus removed by either the parents, by other Fulmars visiting abandoned ledges, by predators or by scavengers). There was only one definite chick stage failure this year, with an accompanied youngster at Rat Bay perishing at less than a week of age (adults, which accompanied the corpse for four days, were still present on the fifth day when the chick was missing). There were none of the large chick failures observed in 2014, 2015 and 2018.

Of the 47 monitored breeding attempts, 29 (61.70%) were successful; a productivity estimate of 0.62 fledglings per pair is 26.5% up on last year, 40.9% up on the post-1972 average of 0.44 ±se 0.02 and the second highest productivity estimate to date, only down on the 0.63 of 1996. The last six years have seen above average productivity, with a 2013 estimate of 0.34 chicks per pair the last to fall

below the mean. A high productivity estimate, coupled with the third highest number of apparently incubating adults to date, leads to a predicted 122 Skokholm fledglings in 2019, this a new high following predicted tallies of 111 in 2016 and 106 last year. Poor productivity at Peter's Bay in 2013, 2014, 2015, 2017 and 2018 influenced the overall figures for those years; Peter's Bay productivity in 2013 was 0.06 (compared with an overall figure of 0.34), in 2014 it was 0.33 (compared with 0.53), in 2015 it was 0.18 (compared with 0.47), in 2017 it was 0.31 (compared with 0.45) and in 2018 it was 0.36 (compared with 0.49). The 2016 season saw 0.54 fledglings per pair, a total virtually identical to the overall value of 0.57. Six of the ten pairs monitored at Peter's Bay were successful this year, the productivity value of 0.60 chicks per pair matching the 0.62 seen overall. The reason for this near annual discrepancy is still unclear, as is what linked the more successful 2016 and 2019 seasons; neither environmental factors, predation pressure nor the behaviour of the birds themselves have been obviously different at this site.

Fulmar productivity (total number of fledged chicks per monitored pair) for each year that it has been calculated between 1972 and 2019. The 1972-2019 mean is 0.44 ±se 0.02 fledglings per pair.



It is likely that the larger Fulmar population of recent years will have affected other species; observations during the last few years have included both adult and young Herring Gulls oiled by nesting Fulmars, adult Fulmars sat on Herring Gull nests, Razorbill adults and chicks evicted from ledges by prospecting birds and an oiled juvenile Peregrine. More intraspecific interactions were noted in 2017, with a heavily oiled adult at Little Bay and birds at both Middlerock and North Gully oiled by aggressive neighbours; in both the latter cases the egg was lost early in the breeding season (prior to the whole Island census). On 22nd April this year, two heavily oiled birds occupied ledges at

the eastern side of Middlerock; one of these was the same ledge from which an egg was lost during a similar aggressive encounter in 2017. On 16th May a heavily Fulmar-oiled bird was in Far Bay, sat very close to an agitated individual which was attempting to defend its ledge. A Raven breeding attempt to the east of North Gully failed during the incubation stage; although no interactions were witnessed, the ledge adjacent to the Raven nest was regularly visited by two Fulmar and, following their desertion, one of the Ravens seemingly had oiled plumage.

The first fledglings of the year left natal ledges in Little Bay and at the Neck on 18th August, three days earlier than the first of last year and four days earlier than the first two of 2017 and the first single of 2016 (the first departures were on the 20th in 2015, the 23rd in 2014 and the 25th in 2013). The first three of the chicks monitored for the productivity estimate had departed on 23rd August, whilst the remaining 26 departed over the following 15 days; 13.8% had fledged by 24th August (20.8% in 2018 and 38.5% in 2017), 51.7% by 29th August (50.0% in both 2018 and 2017), 72.4% by 1st September (83.3% in 2018 and 80.8% in 2017) and 82.8% by 2nd September (95.8% in 2018 and 96.2% in 2017). The last study chick fledged on 7th September, three days later than the last of 2018 and four days later than the last of 2017 but one day earlier than the last of 2016 and three days earlier than the last of 2015. The number of birds around the cliffs again dropped rapidly as the fledglings departed, although there were offshore counts of 64 on 29th August, 96 on 1st September and 63 on 4th September which led to highs of 105, 113 and 102 respectively. Daycounts then dropped steadily from 75 on the 7th to 42 on the 10th, 29 on the 12th and 23 on the 15th, although offshore rafts of 58 and 17 took the total for the 13th to 86. The last bird was seen ashore on 15th September, two days later than last year and nine days later than in 2017. There followed at sea counts of up to seven birds on seven further September dates, totalling 31 bird-days.

Seawatching during October produced the second lowest bird-days total of the last seven years; despite a cumulative 38 hours and 25 minutes spent seawatching between the 4th and 14th, singles on the 8th and 12th were the only birds logged during the period, whilst six close in around Near and Far Bays on the 25th were the only other Fulmar noted during the month. There were November records on all but two dates from the 4th, although the number of birds present varied considerably; there were eight three-figure counts during the month, including highs of 219 on the 13th, 184 on the 25th and 283 on the 28th (the latter the highest ever November daycount, eclipsing the 227 logged in 2016) but lows of five or less on six dates in addition to the two days on which birds were absent. A single was back on the cliffs on 4th November, two days earlier than the first single of 2018 and the first 33 to return to shore in 2017, six days before the first five of 2016 and seven before the first single of 2015. There were birds ashore on 19 further November dates, including peaks of 122 on the 13th, 127 on the 24th, 141 on the 25th, 128 on the 27th and a record 189 on the 28th. Daily sightings continued until the departure of staff on 3rd December, with birds ashore on all three December dates and a high of 173 on the 2nd, 101 of which were ashore.

Manx Shearwater *Puffinus puffinus* **Aderyn Drycin Manaw**
Very Abundant Breeder a 2018 census estimated 88,945 pairs (95% CI: 21,892). 2012-13 est. 63,980
2041 trapped (including 119 pulli), 1017 retrapped, 1 control
1936-1976: 169,895 trapped, 2011-2018: 10,232 trapped, 4059 retrapped, 22 controls

One west off the Lighthouse on the afternoon of 3rd March was the earliest Skokholm record since one on 27th February 2000. A further 16 went west during late afternoon on the 12th, three did likewise on the 14th, 226 were offshore on the 16th and a single was logged the following day. Although an eaten bird had been found on 15th March, it was not until the 21st that their raucous calls were heard ashore after dark, this seven days later than the first of 2018 and two days later than the first of 2017. Numbers increased quickly but, as in the previous four years, seawatching during April produced some surprisingly small counts. Nevertheless the passage of Storm Hannah on 26th April coincided with a significant increase in the number present offshore, indeed the three

highest April daycounts of the last decade were logged; there were 21,600 counted on the 26th and 13,733 the following day, whilst calmer southeasterlies on the 29th saw 19,880 logged. Calm weather during May led to lower daycounts than last year, although peak raft counts of 14,500 on the 18th, 14,000 on the 29th and 12,020 on the 31st were close to the seven year May mean. Prolonged heavy rain and near gale gusts on 16th June brought the highest daycount of the year, with up to 600 birds a minute passing the Lighthouse and a minimum of 72,000 logged; this was, despite the rather unremarkable conditions, the highest daycount ever recorded on Skokholm (although more than twice this number are thought to breed on the Island and ten times this number use the waters around the Pembrokeshire islands). The peak July counts were the lowest of the last three years, with 21,338 offshore during gale force gusts on the 21st and 23,990 offshore during a strong breeze on the 30th; these were two of only four five-figure July counts, this three fewer than last year. There were seven five-figure August daycounts, the same number as last year but four fewer than in 2017, and highs of 33,410 on the 4th, 42,868 on the 9th and 53,684 on the 16th, the latter of which was the highest August daycount since the 60,140 of 2013; all three peak counts coincided with days of heavy showers or rain, the former two with near gales and the latter with storm force southerlies.

The number of Manx Shearwaters breeding in the study plots which were encountered the following year and the number to have been found by 2019 (which were thus actually alive the following year).

	Birds found the next year		Birds found by 2019	
Birds breeding in 2018	247 of 296	83.45%		
Birds breeding in 2017	236 of 309	76.38%	244 of 309	78.96%
Birds breeding in 2016	238 of 287	82.93%	263 of 287	91.64%
Birds breeding in 2015	230 of 283	81.27%	247 of 283	87.28%
Birds breeding in 2014	215 of 278	77.34%	236 of 278	84.89%
Birds breeding in 2013	116 of 141	82.27%	125 of 141	88.65%

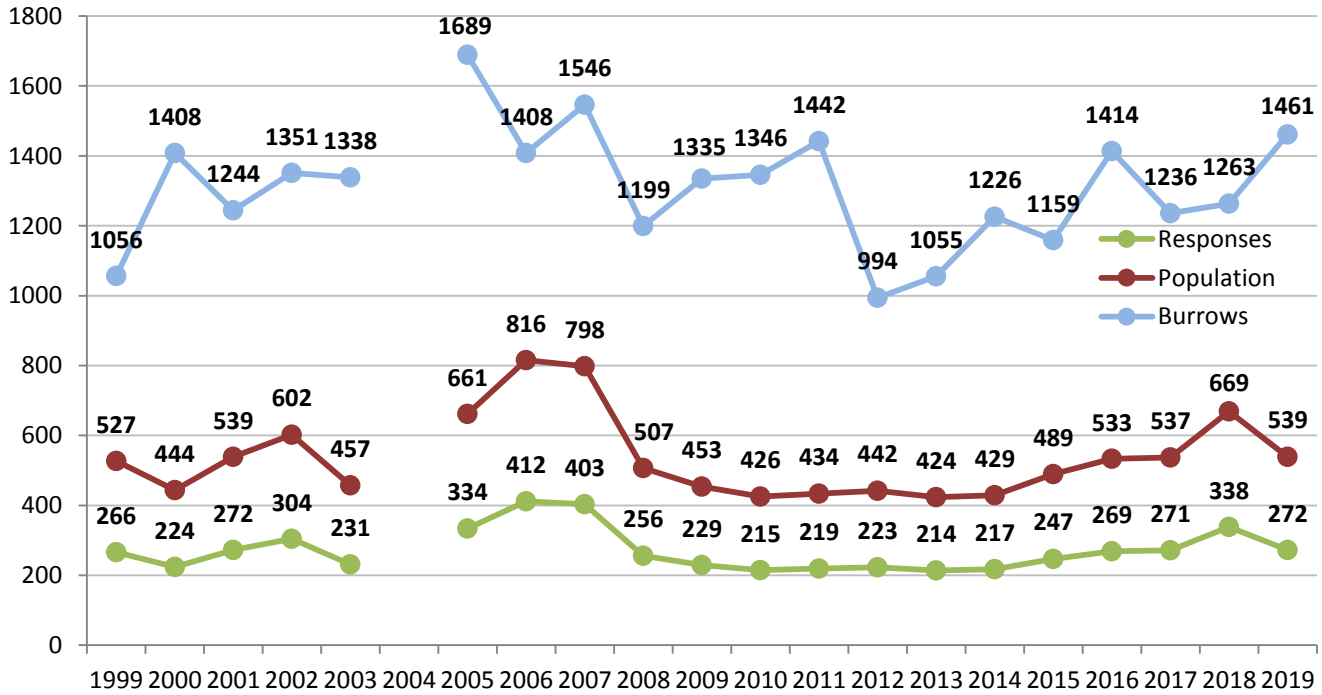
Three areas of study burrows, that is to say natural burrows where a paving slab covers a manmade access point to the nest chamber, were established in 2012 and 2013; all birds encountered within the burrows are ringed. Of 296 breeding adults bearing rings in 2018, 247 were found this year (83.45%); this was the highest next year return rate of the last six years. However this figure is not an accurate estimate of adult survival as there was little searching for marked birds in neighbouring, non-study burrows; the number of birds known to be alive will thus be revised upwards as they are

discovered in future years. For example 82.27% of 2013 adults were encountered in 2014, but we now know that at least 88.65% of birds were alive (see above table). There is a discrepancy in return rates dependent on the breeding success of the previous year; of 217 birds successful with their 2018 breeding attempt, 191 were found in 2019 (88.02%), whereas only 55 of 79 unsuccessful birds returned (69.62%). Of 67 birds which went missing in 2019, 41 (61.19%) had either failed with their 2018 breeding attempt or had been found without an egg in a burrow in which they had previously bred. Assuming that not all of the failures were due to the death of a bird, it could be concluded that some of the missing birds have rather opted for more suitable nesting sites. It was noted in 2017 that Storm Ophelia had caused considerable damage to the Lighthouse Study Plot, a destruction of burrows which no doubt led, at least in part, to the reduced number of recaptures in 2018; although eight of the missing birds were found in 2019, the return rate of 2017 breeders remains the lowest of the last six years. Ultimately the study burrows give a better insight into burrow fidelity and show an interesting correlation with the stability of the colony; in the fragile Lighthouse colony 22 of 107 marked birds were in the same burrow this year as that in which they bred in 2013 (20.6%), whereas in the more stable Crab Bay and Quarry Track colonies 26 of 55 birds (47.3%) and nine of 18 birds (50.0%) were still in their 2013 burrows respectively. The fragile nature of the Lighthouse colony, along with the high density of burrowing birds and occasional storm events, sees the structure of the breeding tunnels change annually; clearly some lose their suitability as nest sites.

A Manx Shearwater ringing transect was established in 2013. It was defined as the track between the Observatory and the Lighthouse and the length of a landing net to either side; ringers were not to deviate from the track. The aim was to see whether, by ringing birds on the surface in this defined area, the retrap data could be interpreted to provide large sample size estimates of adult survival and the recruitment of juveniles to the breeding population. This is still a project in its infancy which is producing a substantial amount of data, data which is currently difficult to examine in any detail as the British Trust for Ornithology changes its recording system from IPMR to DemOn (the latter of which still lacks the reporting capabilities of the former). Of the 8625 birds ringed along the transect between 2013 and 2019 (3308 of which were ringed as fledglings), 2066 have been retrapped or found dead on Skokholm subsequently (with these recaptured individuals accounting for 3471 separate handlings).

The study burrows facilitate an accurate assessment of breeding success on Skokholm. There were 128 burrows at the Lighthouse occupied by a pair which produced an egg, 11 burrows contained an egg along the Quarry Track and 20 pairs produced an egg inland of Crab Bay. There were thus 159 burrows this year from which productivity could be assessed (156 in 2018 and 159 in 2017). Of these 12 definitely failed at egg stage and 17 failed at egg or very small chick stage (but neither eggs nor dead chicks were found). Although an additional 15 attempts failed at chick stage, only four dead chicks were present (one of which was recently hatched and others with wing chords of 32mm, 51mm and 132mm); the remaining 11 chicks went missing, probably as the result of having been located by Great Black-backed Gulls. This year saw a significant increase in the number of Great Black-backed Gulls observed digging chicks out from burrows, indeed it seemed likely that a small number of birds were specialising in this form of hunting (although they were not ringed, making it impossible to confirm individuals, they worked the same areas of burrows from day to day); it was thus no surprise that all of the missing chicks were from the Lighthouse plot, this being one of the areas in which a gull was regularly seen digging. For a chick to be assumed to be of fledging size it was required to reach a wing length in excess of 200mm (although not ready to fledge, we have shown that chicks larger than this size may swap to a different burrow and therefore go undetected). There were 115 chicks which reached this size in 2019. Productivity was thus 0.72 fledging-sized chicks per breeding pair (72.33% of pairs produced a fledging-sized chick). This was fractionally up on the 0.70 logged last year and the 2013-2018 mean of 0.71 ±se 0.02, albeit down on the 0.80 of 2017 which was the most productive of the last seven years. It should be noted that this is the number of chicks which attained fledging size and does not reflect the number of fledglings which are lost to Great Black-backed Gull (and to a lesser extent corvid) predation as they exercise their flight muscles and make their first flights. Having said that, only one of the 115 fledglings ringed in the study plots was found eaten this year (none of the 114 fledglings were found in 2018 and only two of 135 were found eaten in 2017).

The total number of burrows, responses and the corrected population estimate for the 7000 square metres sampled annually since 1999.

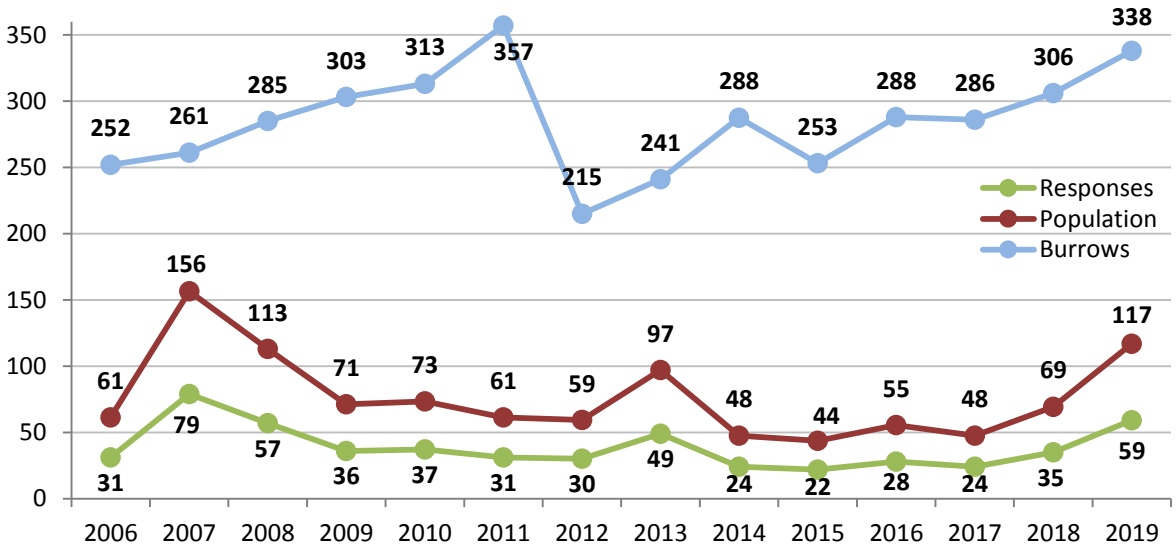


In 1999 nine study areas, each a circle of 1000 square metres, were established to allow a reasonable subset of the Skokholm Manx Shearwater population to be monitored from year to year. Two of these plots were discontinued, one in 2006 and one in 2007, as the survey work was

disturbing the Lesser Black-backed Gull colonies. New plots were established in 2006 and 2015 to maintain a good sample area, however only seven plots have been sampled for a full 20 years. On each annual visit the number of burrows within the area is counted, along with the number of burrows from which a response is elicited when the call of a male bird is played down them. The standard correction factor (1.98) is then used to estimate the population within the area (see the 2013 and 2014 Seabird Reports for checking of the correction factor).

The drop from 2007 numbers (see graph above) was previously attributed to the collapse of many burrows in the more fragile areas of Skokholm, particularly near the Lighthouse which was at one time the densest area of breeding Manx Shearwaters on the Planet (Smith *et al.*, 2001). Although this may certainly have played a role, it seems unlikely that it would be a major factor as there are considerably more burrows than pairs and the number of burrows appears to fluctuate independently of the number of tape playback responses. The eighth sample plot, begun in 2006, shows nicely the apparent lack of connectivity between the number of burrows and the apparent number of breeding pairs (see graph below); a 39.8% decline in the number of burrows between 2011 and 2012 coincided with virtually no change in the number of apparently occupied burrows, whereas a 154.8% increase in the number of responses between 2006 and 2007 coincided with an increase of just nine burrows. These discrepancies may be attributable to the number of burrows frequently being altered by Rabbits, the weather, in some areas by Puffins and perhaps most markedly in some places, the digging of non-breeding Manx Shearwaters.

The total number of burrows, responses and the corrected population estimate for the 1000 square metre plot sampled annually since 2006.



The overall number of responses across 8000m^2 was the second highest since 2007 and 7.9% up on the 2006-2018 mean (608.08 ±sd 152.52), albeit 11.1% down on last year (see table below). This was the result of a drop of between one and ten responses in five plots, a drop of 33 responses in the Quarry Track plot, no change in one plot and an increase of 24 responses in the Western Plain plot. Although a decline of 33 responses in 1000m^2 is substantial, the same area had seen a remarkable increase of 67 responses during the previous year; these fluctuations are probably explained in part by variability in the response rate rather than genuine significant changes in the number of occupied burrows. It would appear that the Skokholm breeding population can still be cautiously regarded as stable, although the observed variance in the percentage of birds which respond to the playback on any given date highlights both the degree of error in these numbers and the importance of continued monitoring (see Brown and Eagle, 2013 and 2014). That the number of pairs producing eggs in the study burrows is also rather constant supports the conclusion that the population is stable (see above).

The estimated number of pairs in the 8000 square metres sampled since 2006.

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
869	954	620	525	499	495	501	521	477	533	588	585	738	656

Whereas the annual plots are visited using cassette tapes of male song to elicit responses from occupied burrows, the latest whole Island census utilised a .WAV recording of a duetting pair as it has been shown that a dual-sex recording achieves a higher and less variable response rate (Brown and Eagle, 2018; Perkins *et al*., 2017). Bearing this in mind, along with the fact that the cassettes and playback devices are becoming harder to maintain and replace, it was felt that it was time to begin the process of changing the annual plot methodology from the use of cassettes to the use of .WAV playback. This changeover will occur over the course of several years to ensure that the data collected over the last 20 years remains comparable with that collected in the future. This year saw each of nine plots visited twice between 28th May and 13th June, five of which were first visited with the tape and four of which were first visited with the .WAV; the second playback method was used on the same day, but with a gap of at least two hours between visits, and the total number of burrows was counted on both visits to assess the repeatability of the count.

Plot	Tape			.WAV			Difference in burrow counts	Difference in the estimate
	Burrows	Responses	Estimate*	Burrows	Responses	Estimate*		
B**	107	14	28	107	16	22	**0**	**6**
C**	182	19	38	184	28	39	**-2**	**-1**
D†	235	6	12	229	16	22	**6**	**-10**
F**	42	9	18	38	8	11	**4**	**7**
H†	127	35	69	131	46	64	**-4**	**5**
I†	458	129	255	454	170	236	**4**	**19**
J**	310	60	119	310	85	118	**0**	**1**
K**	338	59	117	348	67	93	**-10**	**24**
L†	202	34	67	191	50	70	**11**	**-3**
Total	**2001**	**365**	**723**	**1992**	**486**	**675**	**9**	**48**

* the tape playback estimate is based on the standard correction factor of 1.98 (see Brown and Eagle, 2014) and the .WAV estimate is based on the Skokholm correction factor of 1.39 established during the 2018 whole Island census (the combined Skokholm and Skomer figure was 1.65).
** the tape playback visit came before the .WAV visit.
† the .WAV playback visit came before the tape visit.

The number of burrows counted on each visit was reassuringly similar, lending support to the conclusion that the often significant differences seen in the number of burrows between years (above two graphs) are genuine. Although, as anticipated, the .WAV dual-sex recording elicited more responses (as females also called back), the use of the 2018 whole Island correction factor of 1.39 led to a lower population estimate than that produced using the tape playback and standard 1.98 correction; it was predicted that there were 48 fewer occupied burrows, a 6.6% drop in the population estimate. A correction of 1.49 would need to be applied to the number of .WAV responses to predict the same number of occupied burrows as using the tape methodology. The combined Skokholm and Skomer correction of 1.65 used during the whole Island surveys predicts 802 occupied burrows, 79 more than the tape playback prediction and 127 more than the Skokholm specific 1.39 corrected total.

In the period between 1957 and 1997 the number of dead Manx Shearwaters located on Skokholm was recorded in the daily census log. The corpses were either stored or thrown into the sea to ensure that birds were not counted more than once. The practice was stopped in 1997 as it was felt that the removal of corpses would be impacting the species reliant on this food source. However,

with a Great Black-backed Gull population more than twice the size it was when the counting was stopped, the study was begun again in 2014. To limit the impact on the scavenging community, the birds were left in situ but their wings were painted with stock marker so that they were not double counted. This year, as in the previous four, corpses were marked by neatly slicing the flight feathers of both wings with a pair of scissors (using scissors has the added advantage that it makes it easier to check for rings in tightly inverted corpses). Although the vast majority of Manx Shearwater kills are made by Great Black-backed Gulls, a small number are also taken by Peregrines and Ravens.

The number of Manx Shearwater corpses found between 1957 and 1983 from Gynn (1984) plus data from 1984 to 1991 and 2014 to 2019. The number of Great Black-backed Gull breeding pairs is also included for each year.

	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
Corpses	2465	1886	924	1354	1089	640	688	1059	857	946	816
GBBGU	27	30	30	10	12	5	7	12	8	10	10
	1968	**1969**	**1970**	**1971**	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**
Corpses	841	829	304	606	1350	1082	869	1051	1266	1913	1820
GBBGU	3	14	11	16	12	12	7	7	7	6	10
	1979	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**
Corpses	1153	1024	1080	1479	1373	1316	1571	1068	1759	1760	1694
GBBGU	10	10	11	16	11	14	11	10	11	12	15
	1990	**1991**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**			
Corpses	1915	2703	4271	4123	3782	3449	3270	2707			
GBBGU	16	20	84	83	93	93	93	86			

As might be expected with a larger Great Black-backed Gull breeding population, the number of corpses marked over the last six years has been the most ever. However the average number of corpses per Great Black-backed Gull pair was lower this year than in all years except 1959 and 1970. One possible explanation for this reduction in kills per pair is that the breeding gulls were routinely disturbed between 1949 and 1985 which, while reducing the number of breeding pairs, probably inflated the non-breeding flock which would still be taking shearwaters. However we do not currently have an explanation as to why the number of kills per pair has fallen steadily from 50.8 in 2014 to 31.5 this year (see below table). There was a significant drop in the number of adult corpses found this year, with the total 27.4% down on last year and 44.8% down on 2014 (which was the highest total to date). Given that the Manx Shearwater population is seemingly stable or increasing (see above), this decline almost certainly does not reflect a drop in the number available to the gulls.

It is often suggested that the majority of predated shearwaters are younger, less experienced non-breeders, those which spend longer on the surface as they prospect for burrows and mates; a reduction in corpses may thus reflect a drop in abundance of these more vulnerable birds, a decline which would perhaps not be obvious during the playback and study burrow surveys but which could have an effect on the future growth of the population. However the 54 ringed adults found eaten this year do little to support this theory (see below table); although several more years of ringing data would be helpful and there is no information on the breeding status of those eaten (so they could perhaps still have been unpaired or burrowless birds spending longer on the surface), there is no evidence that the birds being eaten are younger. Other factors which may impact predation rates are vegetation heights, the number of gulls specialising in shearwaters (Westerberg *et al*., 2018), the complexities of the weather and moon cycle influencing hunting, the availability of food away from the Island and the size of the Rabbit population (Rabbits being the other main prey item on Skokholm). The prevalence of puffinosis may affect juvenile losses (see below).

The number of adult and juvenile Manx Shearwater corpses found each year since 2014, along with the number of untouched puffinosised bodies.

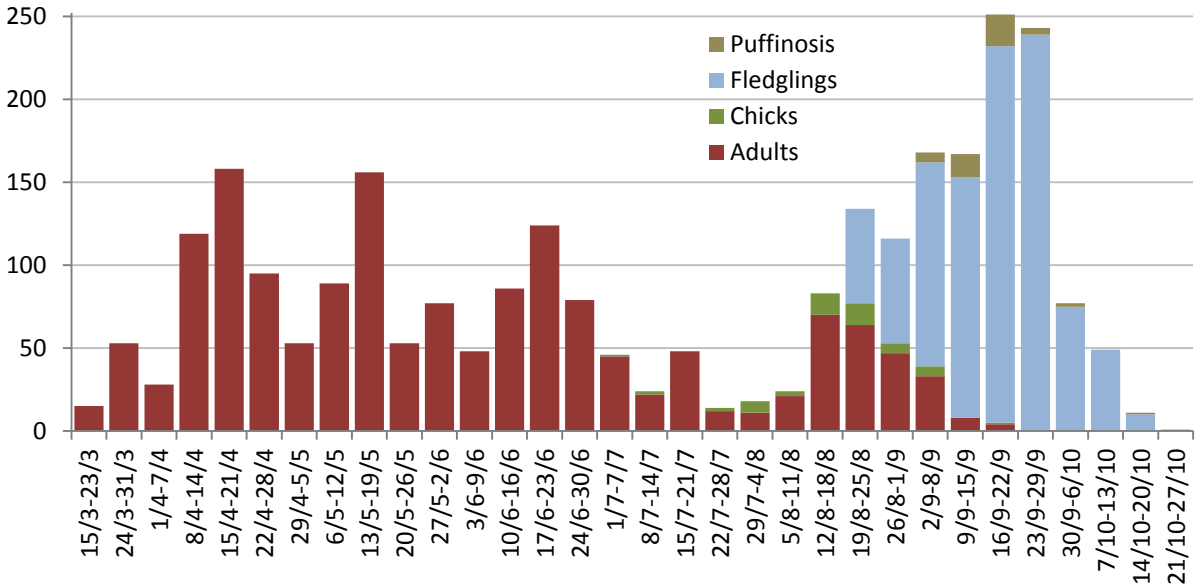
	2014	2015	2016	2017	2018	2019
Adults	2931	2702	2299	2071	2228	1618
Juveniles	1287	1324	1398	1289	971	1043
Puffinosis	53	97	85	89	71	46
Total	**4271**	**4123**	**3782**	**3449**	**3270**	**2707**

When the 54* marked adults found eaten in 2019 were ringed. Note that the pre-2013 bird was a control ringed elsewhere and that intensive ringing on Skokholm recommenced in 2013.

Fledged 2008	Adult 2013	Fledged 2013	Adult 2014	Fledged 2014	Adult 2015	Adult 2016	Adult 2017	Adult 2018	Adult 2019
1	7	3	13	1	8	3	7	10	1

* there were also 54 ringed adults found eaten in 2018.

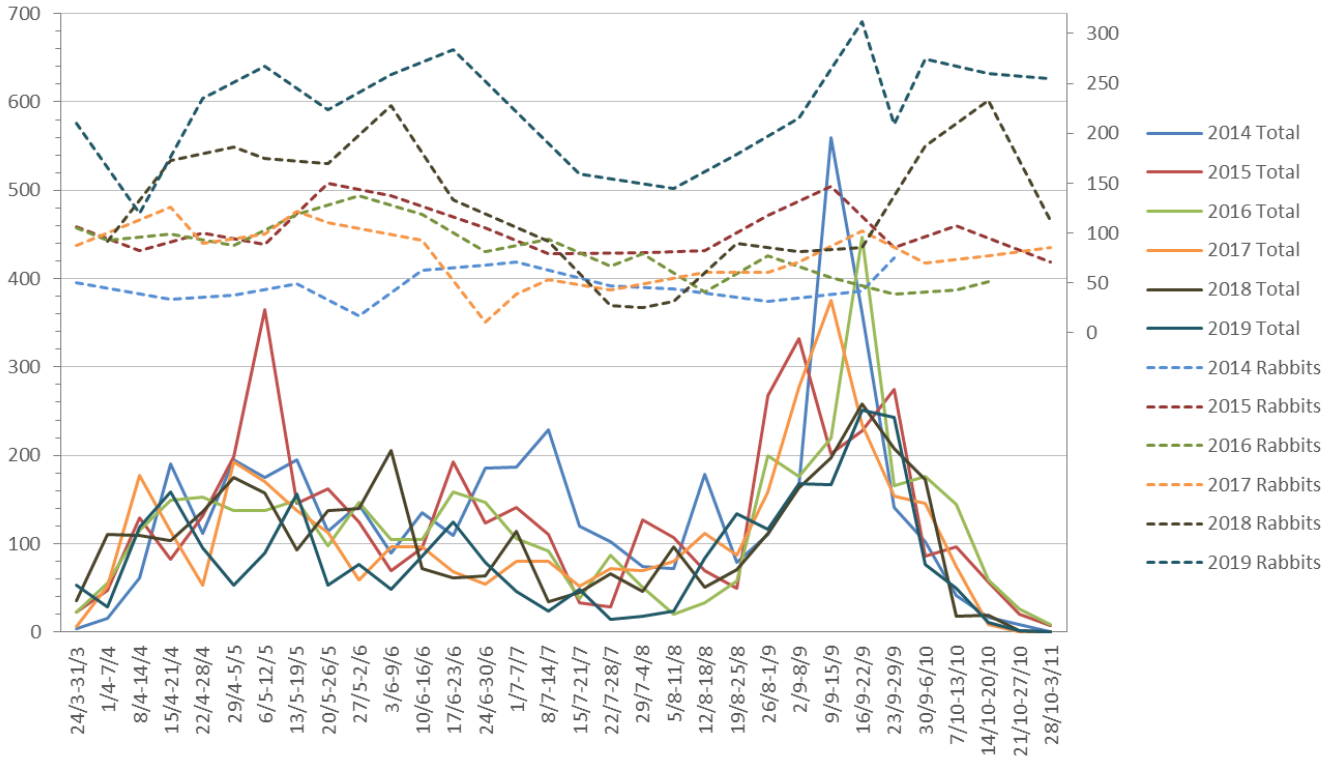
The number of corpses found during each week from 15th March until 27th October.



The data from the last six years lends some support to the theory that Rabbit numbers influence Manx Shearwater predation, with the North Plain Rabbit population being considerably lower in 2014 when adult shearwater mortality was at its highest. Likewise the increase in the Rabbit population witnessed this year, which saw the highest counts of the last six years, coincided with the lowest carcass totals logged during the same period. One potential issue with this comparison is that

North Plain Rabbit counts are probably not representative of the Island as a whole, with the effects of Viral Haemorrhagic Disease seemingly differing in different parts of the Island at different times. Another crash in Rabbit numbers linked to an increase in dead shearwaters should however be enough to confirm this apparent relationship.

The total number of Manx Shearwater carcasses found each week 2014-2019 and the number of Rabbits counted in the North Plain census plot during the same period.



A fledgling found near the Sugarloaf on the night of 13th September exhibited extremely short inner toes (below photographs). The same bird was found eaten on the morning of 17th September.

The first three fledglings were encountered on the evening of 18th August, nine days earlier than the first of last year, three days earlier than the first of 2017 and 2015, five earlier than the first of 2016 and 2013 and seven earlier than the first of 2014. The first fledgling showing signs of puffinosis was

found on the night of 25th August, seven days earlier than the first of last year but one later than the first of 2017. Puffinosis is a mysterious affliction which, possibly due to the actions of a virus which leads to bacterial infection, sees the development of conjunctivitis, blistered feet and problems with limb control; it is often fatal. The number of puffinosised birds found dead and intact has been relatively consistent over the last six years, with between 46 and 97 corpses attributed to the disease (see above table); the low came this year and coincided with the lowest survey total of the last five years (see below table). However considerably more infected birds are seen than found dead; unlike predated birds, which are usually taken to open areas, puffinosised birds may die deep in the Bracken and go unfound. In an attempt to achieve a better understanding of how puffinosised birds are distributed across Skokholm during the course of the autumn and of how the number of infected individuals changes from year to year, a transect walked by Island staff over eight September nights was established in 2015 (the 2015 report gives details of the route). The position of each fledgling is recorded using a GPS unit before they are inspected for signs of puffinosis.

The number of fledgling Manx Shearwaters encountered along the transect between 2019 and 2015, the number which showed signs of puffinosis and the proportion of encountered birds made up of those showing signs.

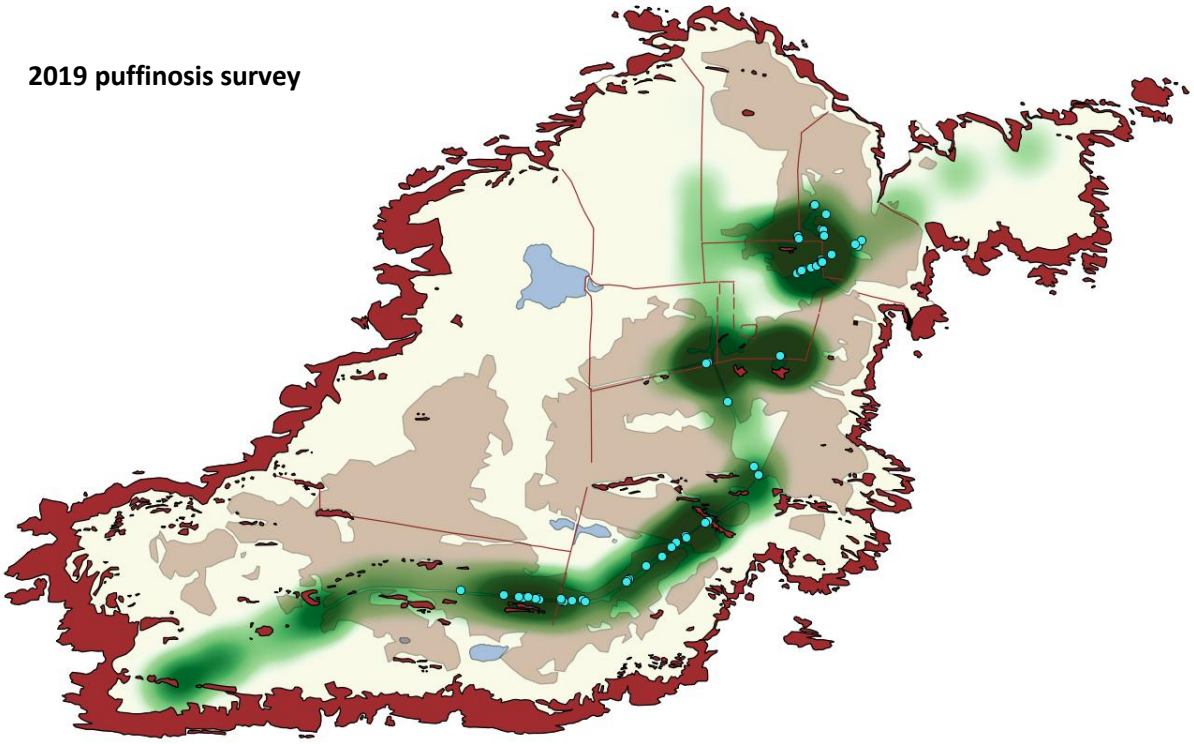
2019	1st-2nd	4th-5th	7th-8th	11th-12th	13th-14th	16th-17th	18th-19th	20th-21st	Total
Birds	120	182	100	70	55	81	34	49	**691**
Puffinosised	6	2	11	16	9	9	6	6	**65**
% Puffinosised	5.0	1.1	11.0	22.9	16.4	11.1	17.6	12.2	**9.4**
2018	**1st-2nd**	**4th-5th**	**7th-8th**	**9th-10th**	**12th-13th**	**15th-16th**	**18th-19th**	**21st-22nd**	
Birds	72	142	139	197	155	167	88	48	**1008**
Puffinosised	2	3	11	16	23	21	10	2	**88**
% Puffinosised	2.8	2.1	7.9	8.1	14.8	12.6	11.4	4.2	**8.7**
2017	**1st-2nd**	**4th-5th**	**8th-9th**	**11th-12th**	**14th-15th**	**17th-18th**	**20th-21st**	**23rd-24th**	
Birds	44	77	100	115	66	43	42	21	**508**
Puffinosised	4	13	16	10	4	16	14	1	**78**
% Puffinosised	9.1	16.9	16.0	8.7	6.1	37.2	33.3	4.8	**15.4**
2016	**2nd-3rd**	**5th-6th**	**8th-9th**	**11th-12th**	**14th-15th**	**17th-18th**	**20th-21st**	**23rd-24th**	
Birds	110	194	159	88	42	33	43	51	**720**
Puffinosised	20	18	22	13	8	5	5	6	**97**
% Puffinosised	18.2	9.3	13.8	14.8	19.1	15.2	11.6	11.8	**13.5**
2015	**1st-2nd**	**4th-5th**	**7th-8th**	**10th-11th**	**13th-14th**	**16th-17th**	**19th-20th**	**21st-22nd**	
Birds	54	164	219	155	162	101	58	41	**954**
Puffinosised	3	29	63	31	55	55	32	10	**278**
% Puffinosised	5.6	17.7	28.8	20.0	34.0	54.5	55.2	24.4	**29.1**

The number of Manx Shearwater fledglings located along the transect is likely to be different between years, not just because of fluctuations in productivity, but more critically due to differences in the weather and moon cycle which influence their surface behaviour. In total over the eight visits there were 317 fewer fledglings encountered this year than in 2018, with a total of 691 being the second lowest yet recorded. Although the number of apparently infected birds was the lowest of the last five years, the proportion of birds showing signs was fractionally up on the 8.7% of last year. As in previous years, puffinosised birds were primarily distributed in the wetter areas of Skokholm, away from more exposed aspects which also typically lack Bracken (see below maps). Given that there is seemingly a link between wet areas and diseased birds, one possible explanation for the low proportion of puffinosised individuals encountered during the last two years is that both proved to be exceptionally dry breeding seasons. That the proportion of infected birds has been lowest in the last two years, the same two years which have seen the lowest two totals of predated juveniles, is intriguing (see above); it is quite probable that puffinosised birds are easier for Great Black-backed Gulls to catch, potentially leading to higher mortality in high puffinosis years (it would usually be

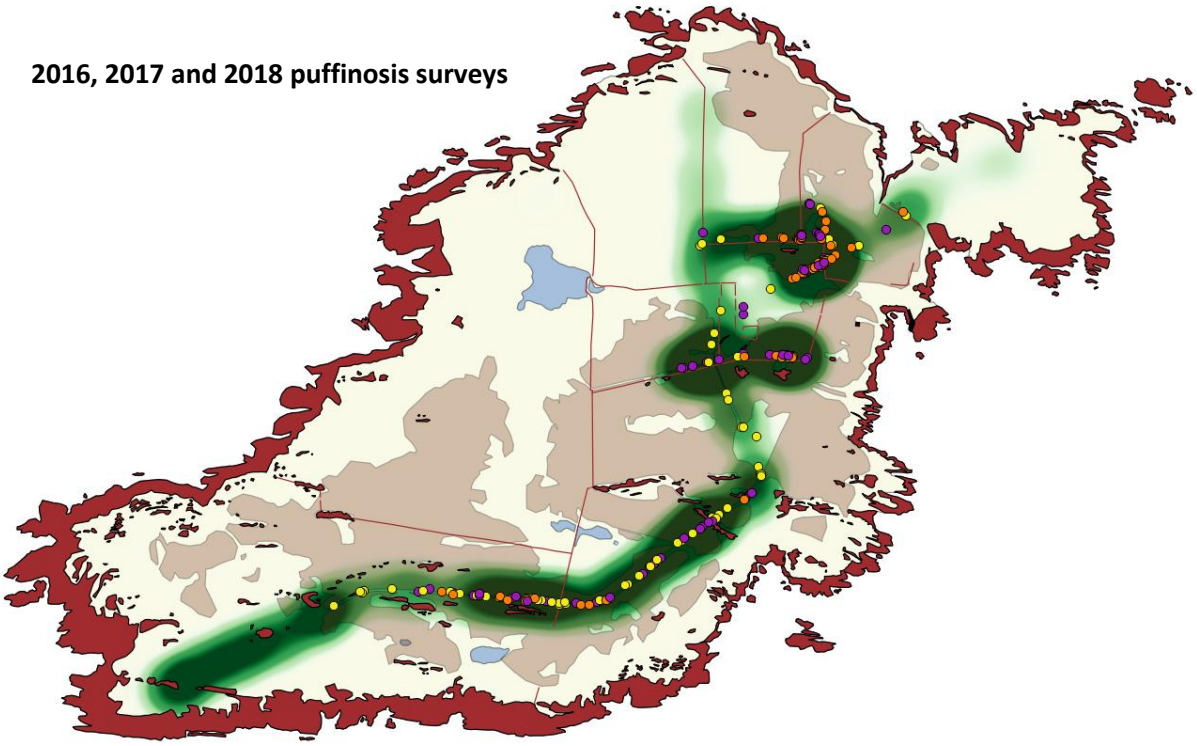
difficult to tell that an eaten bird had been suffering from disease). However the number of juvenile corpses located in 2015, the worst puffinosis year of this five year study, was not significantly higher than in 2016 and 2017 when the proportion of puffinosised birds was lower.

The 2019 and 2016-2018 puffinosis surveys. Manx Shearwater fledgling density is shown in green, with the darker areas holding more birds. Each puffinosised bird encountered over the eight visits is marked by a circle, blue in 2019, yellow in 2018, orange in 2017 and purple in 2016. The 2018 Bracken distribution is also shown.

2019 puffinosis survey



2016, 2017 and 2018 puffinosis surveys



It was an early breeding season; survey work on 11th September revealed that 90% of youngsters had departed their study burrows, this compared with 56% on the same date in 2018. Of 1215 fledglings ringed this year, only one disorientated individual was found on the mainland, a bird at Freshwater West on 6th September which was released back to sea unharmed. The last adult bird to be encountered along the study transect was trapped on 18th September, four days earlier than the last of 2018 and two days earlier than the last of 2017 (although birds were heard calling on the evening of the 23rd). Unsurprisingly, given their earlier departure, September seawatch counts were down on the previous five years, with highs of 474 on the 3rd and 408 on the 4th well down on the 20,115 counted on the 8th last year (when a minimum of 18,000 were in Broad Sound); recent September daycounts have peaked at 2260 in 2017, 732 in 2016, 645 in 2015 and 9523 in 2014. Seawatch daycounts from 5th September did not exceed 40 and 15 hours of seawatching over the last seven days of the month produced only 35 birds. The only at sea records in October were of four in one hour on the 1st, 31 during nearly 24 hours of observations between the 8th and 11th and four west in 50 minutes on the 16th; seawatches for over 12 hours between the 3rd and 6th and for five hours between the 12th and 14th failed to locate a bird. Low numbers of fledglings were seen after dark in October, with two partially downy birds on the 22nd the last of the year. Additionally birds were heard calling nocturnally on the 5th, 12th and 22nd October. A single was off the Lighthouse on 7th November, one went west through Broad Sound on the 12th, four were there on the 14th, one was off the South Coast on the 15th, two were in Broad Sound on the 16th and one there on the 20th was the last of the year; there have only been November records in ten years since 1927, including five of the last six, whilst the only later records came in 2016 and 1991 (with one on the 26th in 1991 the latest Skokholm sighting).

Ringing recovery EA11825
Originally ringed as a juvenile, SKOKHOLM 17th September 2018
Recovered PRAIA DA RIBANCEIRA, IMBITUBA, BRAZIL 26th November 2019
Finding condition Dead on beach (no information as to how long for)
Distance travelled 9852km at 206 degrees (SSW)
Days since ringed 435

Ringing recovery FB23130
Originally ringed as a juvenile, FRESHWATER WEST, PEMBROKESHIRE 12th September 2008
Recovered MANX SHEARWATER TRANSECT, SKOKHOLM 26th August 2019
Finding condition Dead, eaten by Great Black-backed Gull
Distance travelled 16km at 291 degrees (WNW)
Days since ringed 4000
Several previous Skokholm Seabird Reports have included examples of how disorientated fledglings can go on to reach maturity if returned to the sea; here is yet another.

Ringing recovery FB46740
Originally ringed as a chick, QUARRY TRACK STUDY PLOT 8, SKOKHOLM 19th August 2019
Recovered FRESHWATER WEST, PEMBROKESHIRE 6th September 2019
Finding condition Collected by ringer and released to sea
Distance travelled 16km at 111 degrees (ESE)
Days since ringed 18
Given the above recovery of FB23130, and others like it, there is no reason to believe that this individual could not go on to reach breeding age. Of 1215 fledglings ringed this year, this was the only bird to be found on the mainland (two of 1498 were found in 2018, both also returned to sea).

Ringing recovery FV86526
Originally ringed as a chick, QUARRY TRACK STUDY PLOT 4, SKOKHOLM 14th August 2018
Recovered MARICA, RIO DE JANEIRO, BRAZIL 23rd March 2019

Finding condition Dead on beach (more than a week old)
Distance travelled 9078km at 204 degrees (SSW)
Days since ringed 221

Ringing recovery FV86667
Originally ringed as a fledgling, MANX SHEARWATER TRANSECT, SKOKHOLM 11th September 2017
Recovered SEVERN BEACH, SOUTH GLOUCESTERSHIRE 5th February 2020
Finding condition Ring only
Distance travelled 181km at 96 degrees (E)
Days since ringed 877

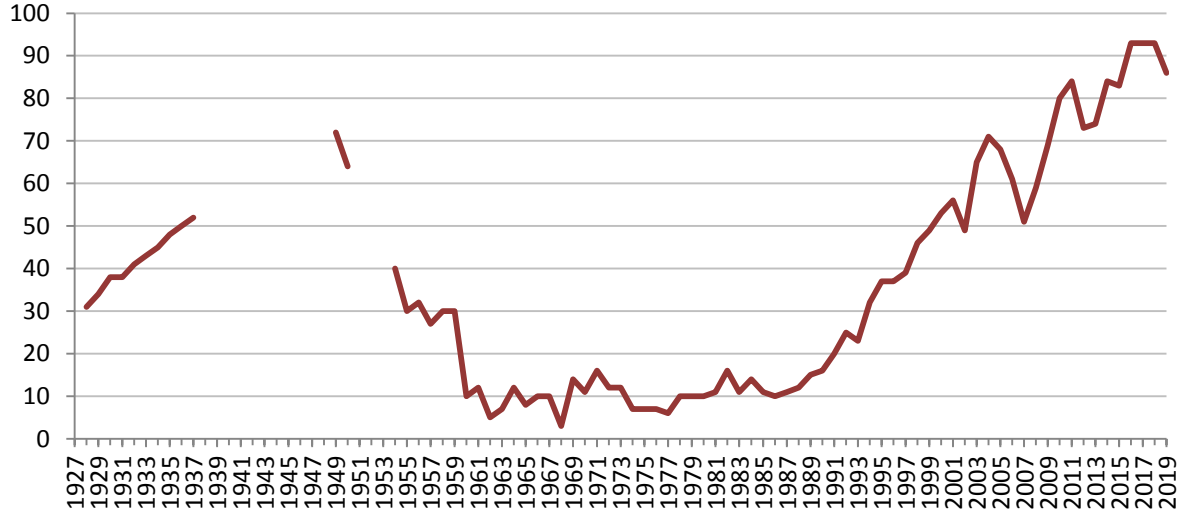
Great Black-backed Gull *Larus marinus* **Gwylan Gefnddu Fwyaf**
Fairly Common Breeder and Common Visitor
62 trapped (including 44 pulli), 3 retrapped, 1 control
1936-1976: 219 trapped, 2013-2018: 342 trapped, 12 retrapped, 4 controls

Although up to 132 were logged on each March date, the majority of birds were on territory, with maximum roost counts of only 26 on the 9th, 16 on the 25th and 38 on the 31st (including 13 subadults); March roost counts peaked at 37 in 2018, 48 in 2017 and 2016, 37 in 2015 and 34 in 2014. Similarly there were up to 144 logged on each April date, with communal roosts of 38 on the 12th, 26 on the 13th and 24 on the 17th; April roosts peaked at 50 in 2018, 58 in 2017 and 2016, 63 in 2015 and 54 in 2014. The sizable roost which formed at the Bog during the early part of the 2013 season, which peaked at 213 individuals on 3rd April, again failed to materialise. A whole Island census during the second week of May located 86 apparently incubating adults (the only nests not visited to confirm the presence of eggs were adjacent to the Bog Lesser Black-backed Gull colony and on offshore stacks); this was down on the 93 mapped in 2018, 2017 and 2016 but otherwise the fourth highest total to be recorded on Skokholm. A marked drop in adult survival is seemingly, at least in part, to blame for the decline in the size of the Skokholm breeding population (see below). A decline in the size of the April roost is perhaps indicative of a drop in the number of individuals available to recruit to the breeding population.

The recent increase in the breeding population was probably driven in part by high adult return rates; of 21 adults wearing colour rings in 2015, 19 returned in 2016 (90.5%), whilst 32 of 33 adults

returned in 2017 (97.0%) and 31 of 36 returned in 2018 (86.1%). As nearly all of the adults present on Skokholm each breeding season are checked for rings, it seems likely that these were good approximations of survival (although the sample size was still a little on the small side for a confident estimate). None of the colour ringed adults which have gone missing during the last five seasons have been rediscovered subsequently; it seems very likely that Skokholm Great Black-backed Gulls rarely take a year away from the colony or go unseen. Of 43 adults wearing colour rings in 2018, only 32 were found this year (74.4%). A return rate of 74.4% suggests that approximately 48 established adults did not return for the 2019 breeding season (26 in 2018), and that 34 new birds recruited to the breeding population. One potential issue is that the ringing of adults on the nest may be deterring them from returning to Skokholm, however if we exclude the data collected in the year after ringing (when any disturbance should take effect) the return rates remain at a very similar 89.5% in 2016, 100% in 2017, 87.5% in 2018 and 71.0% this year; it thus seems likely that disturbance at the nest is not responsible for the 2019 decline in return rate.

The number of Great Black-backed Gull breeding pairs 1928-2019 (where data exists). Control of numbers started in 1949 (destruction of both nests and adults) and stopped in 1985.



It is not clear what may have caused such seemingly high 2018-2019 adult mortality, although interactions with the fishing industry and some form of poisoning are the main areas of concern. Three of the study birds were found dead during the 2018 season; two of these adults, which formed a colour ringed pair nesting on Boundary Hill, apparently perished at approximately the same time (their outwardly undamaged bodies were both found within 50 metres of the nest site), whilst the third was also found in July, washed up dead on Freshwater West. Another colour ringed bird was found dead on the Castlemartin Range in August this year, whilst W:238 had an injured foot on 23rd July and W:282 was injured in a similar fashion on 14th August. Unringed birds this year included dead (but seemingly undamaged) adults on 28th April and 1st June, a lethargic adult found on the Neck on 15th May, a lethargic and later dead second-summer at North Pond on 23rd July and five individuals found with serious leg injuries between 16th April and 30th May (see Herring Gull for further 2019 leg injuries). In August last year an unringed adult arrived to the Lighthouse with a bloody leg which was missing its foot. Although birds can be injured during aggressive encounters with other gulls, it seems likely that undamaged corpses are usually caused by poisoning, perhaps botulism, and that many violent injuries are caused by interactions with fishing gear. Great Black-backed Gulls were again regularly observed behind fishing vessels this year, although clearly some boats were more attractive than others; the peak count was of 27 birds behind 'Boy's Pride' on 1st April. An important step in understanding the Skokholm Great Black-backed Gull population will be to discover if such anthropogenic food sources are regularly exploited; additional food, particularly during the winter or periods of low seabird and Rabbit numbers, may increase survival, however foraging around boats or mainland food sources also has the potential to seriously impact health.

Four fully formed but empty nests were present on 2nd April, although the first egg, found at South Pond, was not seen until the 18th. Three eggs were located on 10th April last year (whilst 14 further nests were empty), the first egg of 2017 was also found on 18th April, the first two of 2016 were on the 12th, the first two of 2015 on the 19th and the first of 2014 on the 10th. The first chicks of 2019 were found in the Bog on 16th May, the same date on which eggs at the Neck were seen to be hatching and four days earlier than the first of 2018. Of 30 monitored nests, 11 pairs failed, three pairs fledged a singleton, eight pairs fledged two and eight pairs fledged three. There were thus 43 young fledged and a productivity figure of 1.43 fledglings per monitored pair; productivity was 2.1% up on that of 2018, 31.2% up on the 1989-2004 mean of 1.09 and 10.9% up on the 2009-2018 mean (1.29 ±se 0.13).

Productivity estimates 2005-2019 (average number of fledglings per sample pair).

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
0.76	1.07	1.02	1.02	-	0.71	0.89	-	1.80	0.93	1.66	1.38	1.54	1.40	1.43

On 10th July a large Lesser Black-backed Gull chick was watched tapping on the gonydeal spot of an adult Great Black-backed Gull, its persistence being rewarded with a regurgitated Puffin wing (below left photograph). The Great Black-backed Gulls, which raised two of their own chicks to fledging, were seen feeding the Lesser Black-backed Gull youngster on several dates to 2nd August, a period during which the youngster was also accepted by its larger step-siblings. Given the positioning of the Great Black-backed Gull nest in question, it seems most likely that this pair adopted a Lesser Black-backed Gull chick rather than an egg, perhaps a chick which arrived as a third Great Black-backed Gull chick perished. At the same time as this was being witnessed above the Anticline, adult Great Black-backed Gull W:282 was routinely killing Lesser Black-backed Gull fledglings on North Pond and feeding them to its chick W:316.

The Great Black-backed Gulls are spectacular apex predators and an exciting component of the Skokholm seabird assemblage, however it is important that we monitor the impact that higher breeding numbers have on the Manx Shearwater population. Dead shearwaters were counted for a sixth consecutive year, the vast majority of which had been eaten by Great Black-backed Gulls (see the Manx Shearwater section for more details); a total of 2661 predated corpses, comprising 1618 adults and 1043 youngsters, were marked this year (3199 comprising 2228 adults and 971 young in 2018, 3360 comprising 2071 adults and 1289 young in 2017, 3697 comprising 2299 adults and 1398 young in 2016, 4026 comprising 2702 adults and 1324 young in 2015 and 4218 comprising 2931 adults and 1287 young in 2014). This was thus the fifth consecutive year in which the overall number of dead shearwaters has declined, with a 16.8% drop this year (following a 4.8% drop in 2018, a 9.1% drop in 2017, an 8.2% drop in 2016 and a 4.6% drop in 2015). Ad hoc observations suggested an

increase in the number of individuals digging Manx Shearwater chicks out from their burrows this year, particularly around the Lighthouse where what were believed to be the same birds were working relatively small areas over a number of July days, areas which soon showed signs of significant digging; the chicks extracted during this period would probably not be represented in the corpse counting survey as they were typically swallowed whole. Indeed there are many factors influencing the number of corpses found; observer effort has been rather consistent, but possible or certain differences between years have included the number of Great Black-backed Gulls present (which may include differences in the number of shearwater specialists (Westerberg *et al*., 2018) and differences in where the birds eat), the number of Manx Shearwaters available (which may include differences in the number of prospecting individuals likely to spend longer on the surface), the prevalence of suitable hunting conditions (governed primarily by the moon cycle and weather), the size of the Rabbit population (which may provide an alternative food source) and the prevalence of puffinosis (which may make young birds easier to catch). Although the number of dead birds currently being found represents a relatively small proportion of the Skokholm shearwater population, it seems likely that any growth in the Great Black-backed Gull population will impact the shearwaters. Ultimately more data is required to understand these relationships in greater detail.

In an effort to further understand the Skokholm population, a Great Black-backed Gull colour ringing project was begun in 2014, in part to shed light on juvenile survival and recruitment. Of 43 fledglings ringed in 2014, 29 (67.44%) have been resighted subsequently including four which have been found dead. At least 17 birds (39.53%) definitely survived their first full year, 12 (27.91%) survived their second years, ten (23.26%) survived their third years, eight (18.60%) survived their fourth years and three (6.98%) have survived at least five years (birds typically breed at five or six years). Of 52 fledglings ringed in 2015, 27 (51.92%) have been resighted subsequently, 18 (34.62%) survived their first full year, 15 (28.85%) survived their second years, 13 (25.00%) survived their third years and eight (15.38%) survived their fourth years. Of the 32 2016 ringed fledglings, 14 have been seen subsequently, whilst seven of the 39 2017 ringed fledglings and 12 of the 38 2018 fledglings have been seen again. Although these figures do not give an exact measure of juvenile survival, the birds

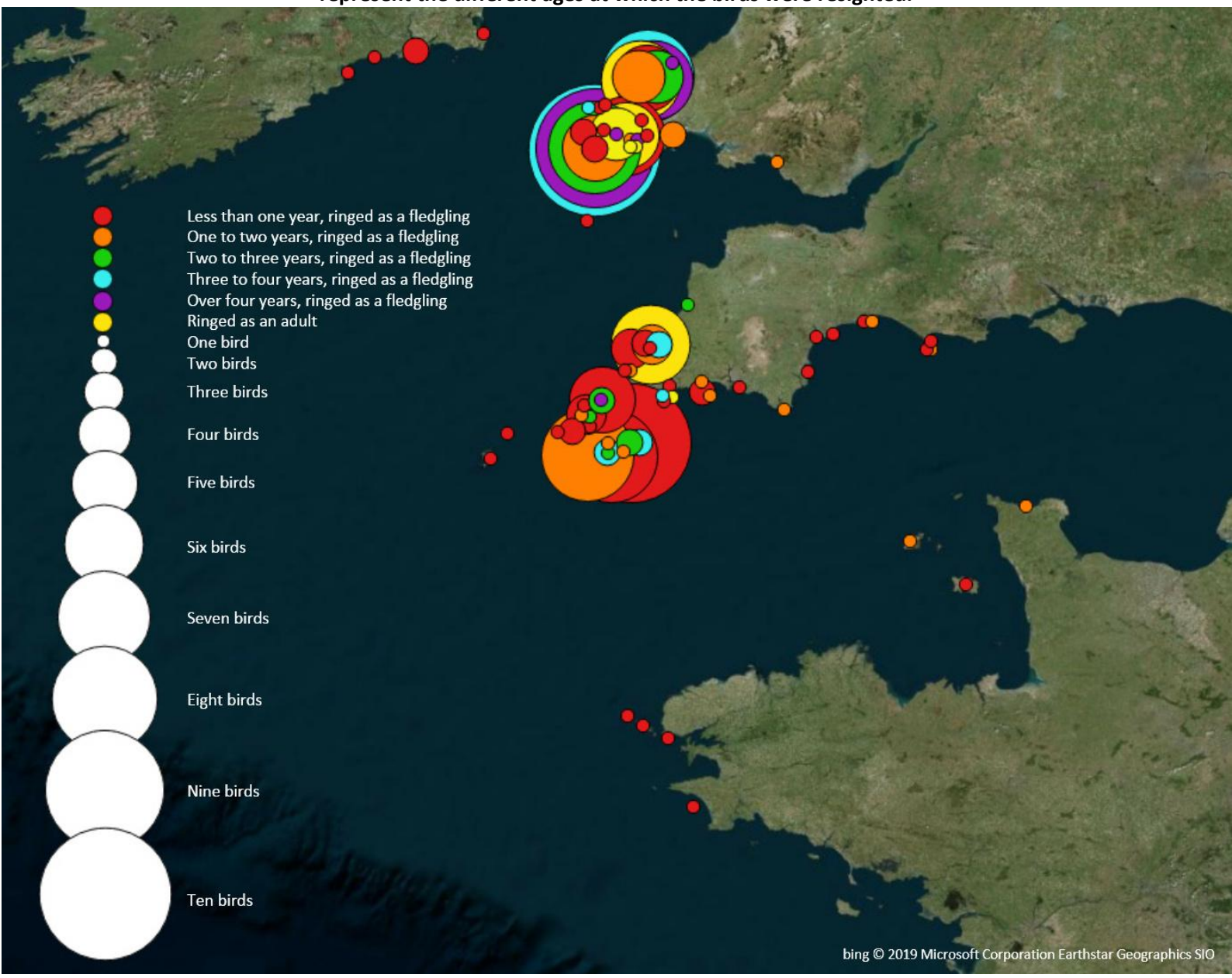
ringed longer ago (of which more have returned to Skokholm and for which there has been longer for them to be encountered on the mainland), suggest that nearly 17% of fledglings are surviving to four years of age. Only time will tell whether this study provides a sound estimate of recruitment to the breeding population, something which may well be dependent on how many birds establish territories on Skokholm or Skomer (where they should be seen) as opposed to other less studied breeding sites. Of 24 youngsters which have so far returned to Skokholm at some point, five were first back as first-summers, three as second-summers, ten as third-summers, five as fourth-summers and one as a fifth-summer; although more data will improve the estimate, birds are most likely to return in their third summer (with a mean of 3.3 a year). Although resighting records away from Skokholm will be somewhat biased by a preponderance of birders at the main roost sites in Cornwall, it seems likely that there is a genuine southerly bias to the movements of young Skokholm Great Black-backed Gulls (see map below). Birds then gravitate back towards Pembrokeshire as they get closer to breeding age (see both the table and map below). All of the records below were received since a similar table was published in the 2018 Seabird Report.

Darvic	Ring	Location	County	Age	Date
W:003	MA37970	Portland Bill	Dorset	First-winter	09/10/19
W:004	MA37971	Newquay Harbour	Cornwall	First-winter	10/08/19
W:004	MA37971	Trevose Head	Cornwall	First-winter	10/10/19
W:005	MA37972	Portreath Beach	Cornwall	First-winter	19/08/19 (dead)
W:007	MA37974	Gann Estuary	Pembrokeshire	First-winter	23/09/19
W:026	HT94871	Nevern Estuary*	Pembrokeshire	Adult	17/03/19, 21/03/19
W:026	HT94871	Dale Airfield*	Pembrokeshire	Adult	20/09/19
W:039	HT94878	Dale Airfield	Pembrokeshire	Sixth-winter	24/09/19
W:039	HT94878	Gwithian	Cornwall	Sixth-winter	05/12/19, 31/12/19
W:055	HT94917	Nevern Estuary	Pembrokeshire	Sixth-winter	12/07/19, 26/11/19
W:066	HT94926	Nevern Estuary	Pembrokeshire	Fifth-winter	26/03/19
W:068	HT94928	Nevern Estuary	Pembrokeshire	Fifth-summer	26/04/19
W:074	HT94931	Gann Estuary	Pembrokeshire	Adult	30/09/19
W:079	HT94936	Nevern Estuary*	Pembrokeshire	Adult	17/03/19, 21/03/19
W:079	HT94936	Dale Airfield*	Pembrokeshire	Adult	20/09/19
W:099	HT94962	Nevern Estuary	Pembrokeshire	Fourth-summer	02/04/19
W:116	HT94976	Nevern Estuary	Pembrokeshire	Fourth-summer	20/03/19, 09/05/19
W:127	HT94983	Nevern Estuary	Pembrokeshire	Fourth-summer	22/03/19, 19/06/19
W:140	HT94995	Castlemartin Range	Pembrokeshire	Adult	13/08/19 (dead)
W:154	MA37811	Ramsey Island	Pembrokeshire	Third-summer	25/07/19
W:213	MA37878	Coverack	Cornwall	Second-winter	28/02/19
W:230	MA37844	Dale Airfield	Pembrokeshire	Adult	25/09/19
W:231	HT94842	Gann Estuary	Pembrokeshire	Seventh-winter	27/11/19
W:237	MA37850	Dale Airfield	Pembrokeshire	Adult	20/09/19
W:254	MA37919	Nevern Estuary	Pembrokeshire	Second-winter	12/06/19, 17/11/19
W:254	MA37919	Gann Estuary	Pembrokeshire	Second-winter	21/12/19
W:264	MA37909	Coverack	Cornwall	First-summer	09/04/19, 14/04/19
W:264	MA37909	The Lizard	Cornwall	First-summer	25/04/19
W:264	MA37909	Coverack	Cornwall	First-summer	26/04/19
W:272	MA37929	Brixham	Devon	First-winter	17/02/19
W:278	MA37935	Crymlyn Burrows	Neath Port Talbot	First-summer	08/07/19
W:297	MA37966	Porthlysgi Beach	Pembrokeshire	First-winter	24/10/19 (dead)
W:299	MA37968	Coverack	Cornwall	First-winter	28/11/19
W:300	MA37969	Newlyn Harbour	Cornwall	First-winter	27/12/19

W:316	MA37990	Grassholm	Pembrokeshire	First-winter	22/10/19
W:317	MA37991	Castlemartin Range	Pembrokeshire	First-winter	30/09/19
W:318	MA37992	Gwithian	Cornwall	First-winter	05/12/19
W:321	MA37995	Gann Estuary	Pembrokeshire	First-winter	27/12/19

* W:026 and W:079 were together at the Nevern Estuary, north Pembrokeshire on the 17th, 19th and 21st March. This is the first evidence we have received suggesting that known breeding pairs may associate during the winter at what is a considerable distance from the Island (46.5km). Although not reported as together, both birds were on Dale Airfield on 20th September 2019 (6km from Skokholm).

The movements of Skokholm ringed Great Black-backed Gulls 2014-2019. The different colours represent the different ages at which the birds were resighted.



A roost of up to 35 birds, but more typically less than 30, regularly formed in the Bog during the breeding season; the smallest post-2012 breeding season roosts have occurred in the last two years, perhaps in part due to a drop in adult survival (see above). The first fledglings were recorded on 30th June, three days earlier than the first of last year, however it was not until mid-August that the

larger post-breeding roosts began to develop, with highs of 74 on the 19th and 24th, 150 on the 30th and 103 on the 31st; as is typically the case, the largest roosts formed on North Plain and the Head. The first Skokholm fledgling to be seen away from the Island was found at Newquay Harbour, Cornwall on 10th August (its sibling was found dead on Portreath Beach, Cornwall nine days later); this was 17 days earlier than the first southwest resighting of 2018, 31 days earlier than the first of 2017, 51 days earlier than the first of 2016 and 36 days earlier than the first of 2015. September roost counts were lower than in recent years, with highs of 84 on the 5th, 113 on the 9th and 80 on the 22nd being well down on peaks of 135 in 2018, 183 in 2017, 247 in 2016 (when there were also six counts in excess of 200 birds), 249 in 2015 and 355 in 2013 (the September 2014 maximum was only 52). There were three October counts in excess of 100 individuals (two in 2018 and 2017 but seven in 2016), with highs of 109 on the 1st, 111 on the 8th and 110 on the 11th (the high last year was 126). Between 12th October and the departure of staff on 3rd December, the only counts in excess of 31 were of 64 on 18th October, 43 on 2nd November and 62 on 27th November, whilst there were 32 single-figure daycounts during the same period. Both the November bird-days total of 356 and the peak daycount were the highest of the last four years, albeit well down on 2013 when highs of 270 and 243 during the first five days of the month took the total to 947.

Ringing recovery CHANNEL ISLANDS J1400 (yellow darvic with black 5AA4)
Originally ringed as an adult, TY COED, VALE MARAIS, GUERNSEY 8th June 2014
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 2nd August 2014
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 15th August 2014
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 27th February 2015
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 19th July 2019
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 7th August 2019
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 8th August 2019
Previously recovered as an adult, CHOUET LANDFILL BEACH, GUERNSEY 15th August 2019
Recovered NORTH PLAIN, SKOKHOLM 23rd August 2019
Finding condition Colour ring read in field and photographed
Distance travelled 312km at 322 degrees (NW)
Days since ringed 1902
An intriguing eight day journey from Guernsey to North Plain for a bird not previously seen away from the Channel Islands.

Ringing recovery MA02062
Originally ringed as a chick, SKOKHOLM 19th June 2012
Recovered as an adult, SKOKHOLM 20th August 2019
Finding condition Dazzled
Days since ringed 2618
Only the second 2012 ringed chick to be found back on Skokholm as an adult.

Herring Gull *Larus argentatus* **Gwylan y Penwaig**
Common Breeder abundant breeder in the 1970s
20 trapped (including 2 pulli), 7 retrapped
1936-1976: 13,164 trapped, 2013-2018: 114 trapped, 17 retrapped, 1 control

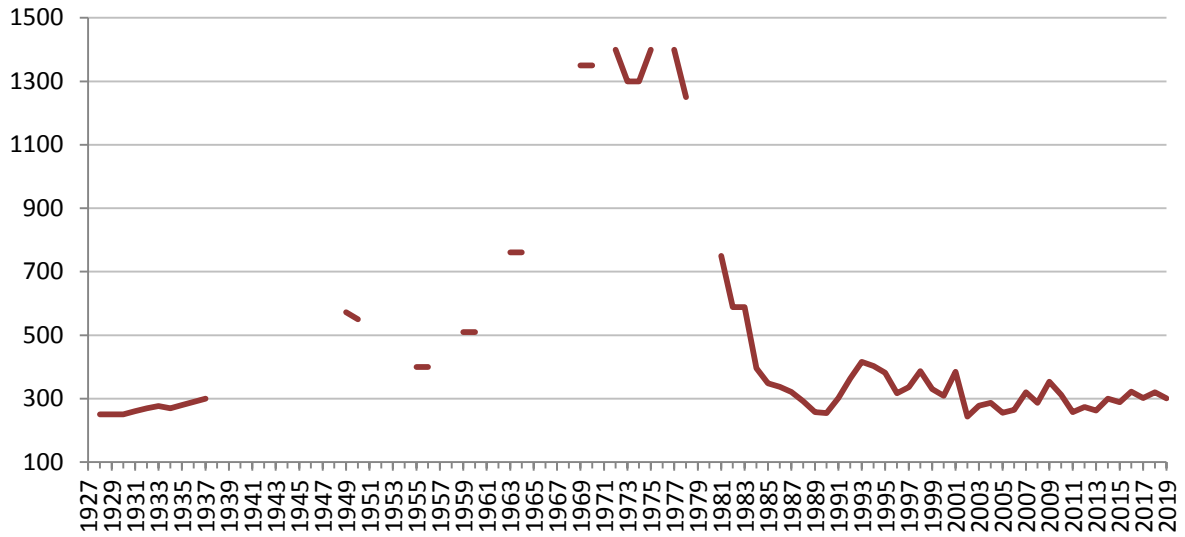
March counts again fluctuated widely, with lows of 18 on the 13th and 30 on the 28th when birds fed and roosted away from Skokholm, but highs of 204 on the 1st, 295 on the 2nd and 261 on the 30th; although the peak daycount was well down on the 439 of an inclement 2018, it was otherwise the highest of the last four Marches. In contrast with observations made of Lesser Black-backed Gulls during the same period, Herring Gull roosts again included reasonable numbers of subadult birds. The first egg was found in Crab Bay on 18th April, one day earlier than the first of 2018 and on the same date as the seven year mean (see below table). On the night of 26th April Storm Hannah

brought wind speeds of up to 80.5mph, conditions which seemingly impacted the Herring Gulls; there was considerable nest building activity during the following days, suggesting that many nests had been destroyed. Whole Island counts during mid-May located 301 active nests. This was a 5.9% decline on the 320 nests found in 2018 but a total which almost matched the 2009-2018 mean (299.2 ±sd 29.53). The number of breeding pairs has apparently stabilised at a level close to that seen in the 1930s (the 1928-1937 mean was 269.70 ±sd 17.47), counts well down on the artificial peak of the 1970s. The whole Island counts have oscillated around the mean for the last decade, with higher totals falling in even years.

When the first egg was located in each year 2013-2019, along with the mean first egg date.

2013	2014	2015	2016	2017	2018	2019	Average
18th April	14th April	25th April	17th April	18th April	19th April	18th April	18th April

The number of breeding pairs 1927-2019 (where data exists). The 1970s peak was attributed to the exploitation of local fish waste and the decline to botulism (Thompson, 2007).



The number of breeding pairs and productivity estimates (average number of fledglings per sample pair) 2005-2019.

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
255	265	320	287	353	312	257	274	263	300	289	322	302	320	301
0.57	0.47	0.61	-	-	0.82	0.67	1.15	0.72	0.70	0.66	0.86	0.70	0.73	0.69

The monitoring of adult survival in Herring Gulls has been undertaken on Skomer for many years, however recent struggles with trapping sufficient adult birds to produce a reliable estimate led to the Islands Conservation Advisory Committee recommending that a project be established on Skokholm in 2017. There were 13 nesting adults trapped in 2017, 15 in 2018 and a further nine were added this year; each trapped adult was ringed with a red darvic inscribed W:9** in white, the latter two digits identifying the bird as an individual. Of the 13 birds marked in 2017, 11 returned to breed in the same areas in 2018 (84.62%). Only 16 of 26 birds were resighted this year (61.54%); two of the 16 were not found back on their 2018 territories, with one moving from South Haven to the Top Tank (but not seen to be breeding) and one not seen on the Island at all (but photographed on the Gann Estuary during winter 2019-2020). Additionally a bird breeding in South Haven in 2018 was found to be breeding at Purple Cove in 2019, a movement of over 800m across the Island; there is clearly the potential for an underestimate of survival if birds are breeding away from their ringing territories (something which is apparently not occurring in Great Black-backed Gulls). These movements do not seem to be linked to the ringing process; if we exclude the data collected in the year after ringing (when any disturbance should take effect) the 2019 return rate remains at a very

similar 63.64%. Interestingly the return rates have mirrored those seen in Great Black-backed Gulls; the Great Black-backed Gull return rate was 86.11% in 2018 but dipped to 74.42% this year, perhaps suggesting that similar factors are influencing survival in both species. The only colour ringed Herring Gull to be found dead, a bird in South Haven during July 2018, was seemingly undamaged, however non-ringed birds have exhibited various injuries this season; an adult in South Haven had a badly broken leg on 10th April, one on 1st May had a mangled leg whilst another had a stump and one on 29th May had rope around its leg. Additionally two adults were heavily impacted by a black (non-Fulmar) oil at the Lighthouse on 5th May, another was similarly covered in South Haven on 3rd June and a juvenile at Orchid Bog was covered on 27th September. It would appear that interactions with fishing gear and marine pollution are impacting survival.

For a second year, the only colour ring resightings away from Skokholm came from mainland Pembrokeshire.

Darvic	Ring	Location	County	Age	Date
W:995	GV22354	Gann Estuary	Pembrokeshire	Adult	09/10/19
W:987	GV22362	Nevern Estuary	Pembrokeshire	Adult	01/01/19
W:983	GV22390	Dale Beach	Pembrokeshire	Adult	15/10/19
W:978	GV22428	Milford Haven	Pembrokeshire	Adult	06/02/19
W:970	GV22457	Gann Estuary	Pembrokeshire	Adult	09/10/19
W:961	GV83058	Gann Estuary	Pembrokeshire	Adult	23/12/19
W:960	GR87998	Gann Estuary	Pembrokeshire	Adult	23/09/19

On 11th May and between the 25th and 26th July four adult birds were trapped for an examination of their visual fields by visiting researcher Jennifer Cantlay of the Royal Holloway University of London (NRW licence S085854/1). The birds were securely held in a dark room apparatus for between 41 and 55 minutes, during which time the extent of their visual fields were assessed using an

ophthalmoscope. It is hoped that, when analysed alongside data collected from other seabird species susceptible to bycatch (including Storm Petrel and Lesser Black-backed Gull on Skokholm), it will be possible to ascertain how various visual field characteristics influence how seabirds interact with potential anthropogenic threats. A knowledge of their sensory ecology should subsequently help improve mitigation in areas where birds are at risk (for example around fishing nets, underwater turbines, wind turbines and power lines).

The first chick was seen at Dumbbell Bay on 16th May, two days before the first of last year and six days before the first of 2017, whilst the first three flying fledglings were logged on 4th July (the first fledglings were noted on 4th July in 2018, 7th July in 2017, 30th June in 2016, 10th July in 2015, 2nd July in 2014 and 7th July in 2013). Checks of the Neck productivity plot from early July, where 132 pairs had established nests, located a maximum of 91 fledging-sized young (which equates to a productivity estimate of 0.69 fledged young per pair); this was 5.5% down on the 0.73 logged in 2018 and 11.5% down on the 2009-2018 mean (0.78 ±se 0.05). Nevertheless there have been lower productivity estimates in five of the previous 12 years with an assessment and, following good years in 2012 and 2016, it appears that current levels are sufficient to sustain a stable breeding population at this time. Herring Gull productivity remains consistently higher than that of the closely related Lesser Black-backed Gull, circumstantial evidence suggesting that this may be due to differing feeding habits. Additionally Great Black-backed Gulls seemingly target the coastal nesting Herring Gulls less frequently than they do the inland gull colonies, although predation by Greats was again witnessed this year and probably led to an underestimate of the Herring Gull population due to the emptying of nests prior to the whole Island count.

There was the customary post-breeding departure of both adults and fledglings during July and the mean daycount during August dropped to 69, although there were highs of 111 on the 7th, 180 on the 23rd and 115 on the 24th and 26th when birds were feeding on swarming ants; the maximum August daycount was the lowest of the last eight years, well down on ant swarm enticed highs of 295 in 2018 and of 348 and 409 in 2017. As is typically the case, few Herring Gulls visited Skokholm in September; there were 17 single-figure daycounts and the only totals in excess of 46 were of 74 on the 2nd, 79 on the 8th, 84 on the 14th and 75 on the 18th when ants were again being collected. October counts remained low, indeed they were the lowest of the last five years, with a high of 55

on the 28th being down on a 2018 peak of 187 and well down on the all-time record of 493 logged in 2017. Although November proved more productive, counts failed to reach those made during the previous six years; there were highs of 192 on the 17th, 206 on the 27th and 215 on the 28th, totals down on the 339 of last year and well down on the 585 of 2015, the 588 of 2016 and the November record of 612 logged on the 3rd in 2017. The lower autumn counts this year reflected a substantial drop in the number of Herring Gulls feeding in Broad Sound.

Lesser Black-backed Gull *Larus fuscus* **Gwylan Gefnddu Leiaf**
Abundant Breeder previously very abundant breeder
61 trapped (including 11 pulli), 2 retrapped
1936-1976: 12,085 trapped, 2013-2018: 518 trapped, 24 retrapped, 16 controls

A mean March daycount of 476 was the lowest yet recorded, down on the 568 of last year, the 494 of 2017 and the 823 of 2016. The number of birds within the colonies again fluctuated considerably during the day; for example the Frank's Point colony contained 135 birds on the morning of the 19th but only 24 by the afternoon, 76 on the morning of the 20th but only 14 by the afternoon and 23 on the morning of the 25th but 86 by the afternoon. Nevertheless the larger communal roosts recorded in previous years were again generally absent, with the majority of March counts being of birds on territory; the largest roosts away from the breeding colonies were of only 77 birds near North Pond on the 6th, 40 there on the 10th and 44 there on the 12th. A more detailed description of how the gulls prepare for the breeding season was available in 2015 and 2016 due to the GPS trackers fitted by the British Trust for Ornithology in 2014 (funded by the Department of Energy and Climate Change) which gave some idea as to when birds first returned to Skokholm (see the relevant Skokholm Seabird Reports for details of return dates and the range of over-wintering strategies used); the last of the functioning trackers and the base station were removed in 2017. Peak April daycounts were the lowest of the last eight years, with highs of only 686 on the 27th, 643 on the 28th and 759 on the last day of the month, whilst the largest roost away from the colonies contained only 34 birds on the 27th (although 95 birds roosted at North Pond on 2nd May, April roosts peaked at 200 in 2018 and 260 in 2017). Two nests at the Top Tank contained single eggs on 28th April and another was produced at the Neck between the 28th and 29th; the first egg was two days later than the first of 2018 but one day earlier than the seven year mean.

When the first egg was located in each year 2013-2019, along with the mean first egg date.

2013	2014	2015	2016	2017	2018	2019	Average
3rd May	24th April	4th May	25th April	1st May	26th April	28th April	29th April

Vantage point counts of all the inland breeding subcolonies and a full census of the coast nesting pairs were made between the 18th and 22nd May, during which 951 apparently incubating adults were located; this was the third lowest total in over 50 years which, although up on the 947 of last year and the 903 of 2017, was well down on the 1209 of 2016, the 1189 of 2015 and the 1407 of 2014. Walk through counts were undertaken at four subcolonies on the 21st and 22nd to check the accuracy of the point counts. A comparison of the number of apparently incubating adults and the number of nests containing eggs suggested that there was a discrepancy (see table below). All four plots contained more nests with eggs than the number of apparently incubating adults (aia), presumably due to incubating birds being hidden in vegetation; this was again most apparent to the west of Orchid Bog where there were 16.13% more nests containing eggs than aia (34.48% in 2018) and to the north of the Top Tank where there were 11.11% more nests with eggs (20.97% in 2018). The point count of the colony to the south of North Pond again proved the most accurate, again with a discrepancy of only a single nest (2.27% this year and 1.54% in 2018). On average across the four plots there were 9.28% more nests containing eggs than were located during the vantage point counts (212 with eggs compared with 194 aia during the counts); in 2018 the walkthroughs revealed 14.66% more nests with eggs than picked up during the vantage point counts, in 2017 there were

27.32% more, in 2016 18.18% more, in 2015 25.00% more and in 2014, when the vegetation was particularly low, 12.89% more. A correction factor of 1.09 (212/194) was thus applied to inland vantage point plots containing similar dense vegetation to that encountered in the walk through plots, but not to the cliff counts nor areas of very short sward.

The corrected total for the inland plots was 713 pairs. This, combined with the 212 nests with eggs encountered on the walkthroughs and the 103 birds incubating in open areas, gave a 2019 whole Island total of 1028 pairs. This was 3.8% down on the 1069 pairs recorded in 2018, down on the 1123, 1397, 1486, 1565 and 1476 pairs logged between 2017 and 2013 respectively and the lowest predicted total of the post-War era.

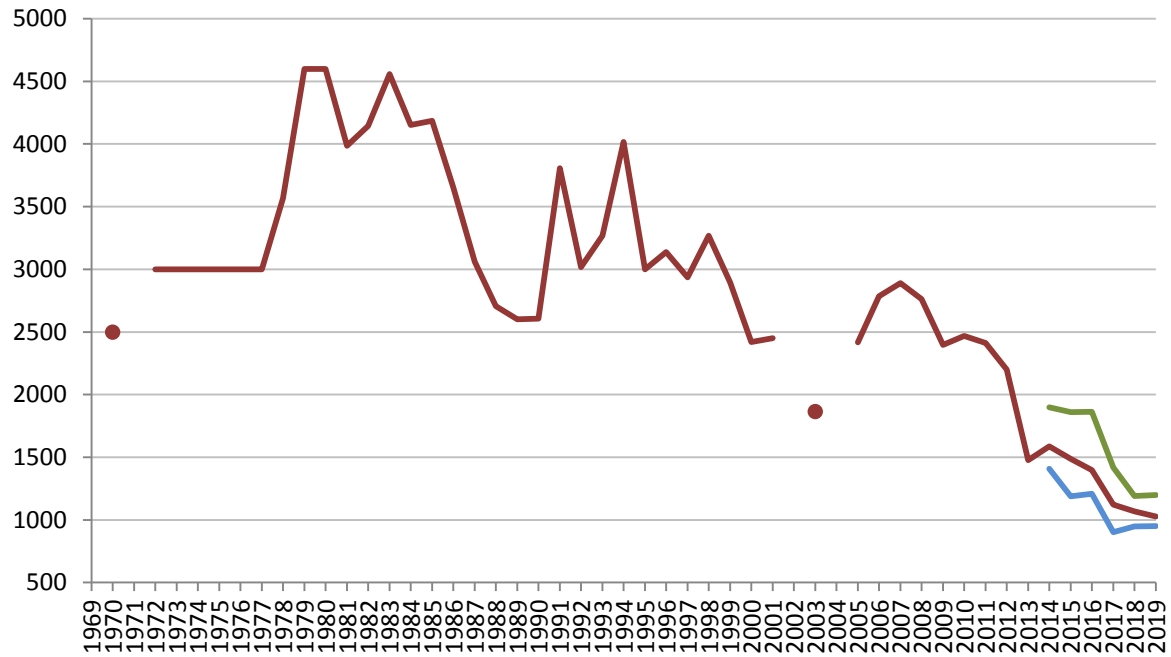
A comparison of vantage point counts (of apparently incubating adults) and walk through nest counts, along with a summary of nest contents.

	Vantage point count	Walk through count	Empty/ With egg(s)	Percentage of empty nests	Difference between counts*	Difference between counts**	Egg count	Eggs per nest with eggs
Top Tank N	54 aia	62 nests	2/60	3.23%	+11.11%	+14.81	168	2.80
North Pond	44 aia	55 nests	10/45	18.18%	+2.27%	+25.00	125	2.78
Orchid Bog	31 aia	45 nests	9/36	20.00%	+16.13%	+45.16	98	2.72
Frank's Point	65 aia	89 nests	18/71	20.22%	+9.23%	+36.92	190	2.68
Total	**194 aia**	**251 nests**	**39/212**	**15.54%**	**+9.28%**	**+29.38**	**581**	**2.74**

* How many more/less nests with eggs were present than the number of apparently incubating birds seen (%).

** How many more/less nests (including empty nests) were present than the number of apparently incubating birds seen (%).

The total number of Lesser Black-backed Gull breeding pairs 1970-2019. Control measures started in 1984 (destruction of nests) and stopped in 1998. The green line is the population estimate if all empty nests are assumed to belong to additional pairs. The blue line is the uncorrected vantage point count total.



As the four walk through plots mirrored those used in recent years, a direct comparison can be made. The most striking declines occurred to the south of North Pond where there were 21 fewer nests containing eggs than last year (a 31.8% decline) and to the north of the Top Tank where there

were 15 fewer nests than last year (a 20.0% decline). There were only three fewer nests with eggs at Orchid Bog, this a 7.7% drop on 2018. The same three colonies have declined by 43.0%, 40.0% and 44.6% since 2016 respectively. Given the poor productivity witnessed for many years, it is no surprise that the Skokholm breeding population is declining, however it has also been suggested that in some years sickness may be taking its toll. There were 21 dead adults found between 4th March and 1st August 2016 which were thought to be diseased or poisoned, with the period before death characterised by very lethargic behaviour, fine shaking and an eventual loss of limb control. Only three dead adults were logged in 2017 but 15 dead adults with no obvious injuries were located between 23rd May and 11th July last year; although aggressive interactions may have caused death in some instances, one on 9th May had a particularly dirty vent and a very weak bird handed in from a passing boat on 20th May exhibited the same symptoms prevalent in 2016. This season saw an adult with a broken wing on 10th April, dead adults with clean vents on 13th June and 2nd July, an adult with a broken leg also on 2nd July and a heavily non-Fulmar oiled adult which was bathing off the Lighthouse on 11th August (below photograph). Unusually a bird at Crab Bay on 25th May and 9th June was spinning in circles and aggressively biting its own carpal, a behaviour which was exhibited by a bird at the same site in July 2018 and June 2017.

Over the period 1991-2002 the count of empty nests varied from 11-44% of the total number of nests, with a mean of 22.7% (Thompson, 2007), however the proportion of empty nests has more recently declined. All four colonies visited this year again contained fewer empty nests than this 1991-2002 mean, however for the first time in three years the average fell within that recorded by Thompson. The Top Tank north colony again held the lowest proportion, with only 3.23% of nests being empty; intriguingly this colony has contained the lowest proportion of empty nests for the last five years, with 1.32% empty last year, 1.11% in 2017, 1.96% in 2016 and 7.45% in 2015. Overall, of 251 visited nests, 15.54% were found to be empty this year (4.98% in 2018, 9.86% in 2017, 17.62% in 2016, 17.30% in 2015, 16.32% in 2014 and 19.84% in 2013). It was unclear whether the empty nests were second nests made by the pairs present, nests which had been robbed of eggs or nests where the adults had yet to lay. The breeding season was certainly a protracted one, with the first chicks located on 22nd May (23rd May in 2018 and 24th May in 2017) but four nests in the Bog still containing two eggs each on 2nd July, only four days prior to when the first fledgling was logged at the Top Tank (the first fledgling was noted on the 5th in 2018 and the 7th in 2017). An adult was still defending a fledgling at South Pond as late as 22nd September (although the fledgling potentially had a wing injury). It would thus seem possible that, at least in some cases, the latter two of the above three explanations for empty nests may have been the case, meaning that the Skokholm breeding

population is actually higher than that calculated above. However, even if we wrongly assume that all empty nests belonged to additional pairs (the green line on the above chart), the predicted Island total would only be in the region of 1198 pairs (an extra 170 pairs and only eight more than the 2018 estimate which was the lowest in over 50 years).

The Frank's Point colony was again used for productivity monitoring this year (using BTO rings as a mark for a mark/recapture population estimate), however the ever dwindling sample size led to a poor assessment. In an attempt to increase the number of resightings, the colonies were again re-entered this season (rather than observing fledglings at a distance with a telescope, a method which was failing to locate many rings). A simple calculation was again used, (number of fledglings ringed x number checked for rings on second visit)/ number of birds found to have rings on second visit, to predict the number of fledglings within the area. Only four fledglings were ringed at the Top Tank and, of four subsequently checked for rings, only one was marked (an additional nine eggs and seven tiny chicks were located, although these almost certainly did not go on to fledge); it is thus predicted that the 60 pairs produced 16 fledglings, giving a productivity figure of 0.27. This was the lowest estimate of the last three years, however it almost matched the 2005-2018 mean (0.26 ±se 0.05). Although fledglings at North Pond could potentially have come from anywhere on Skokholm (and possibly elsewhere), a maximum of 59 on 28th July was down on the 65 of 27th July 2018, the 133 of 1st August 2017 and was the lowest peak total from this site during the last six years (it should be remembered that the breeding population has fallen considerably during the same period).

Lesser Black-backed Gull productivity estimates.

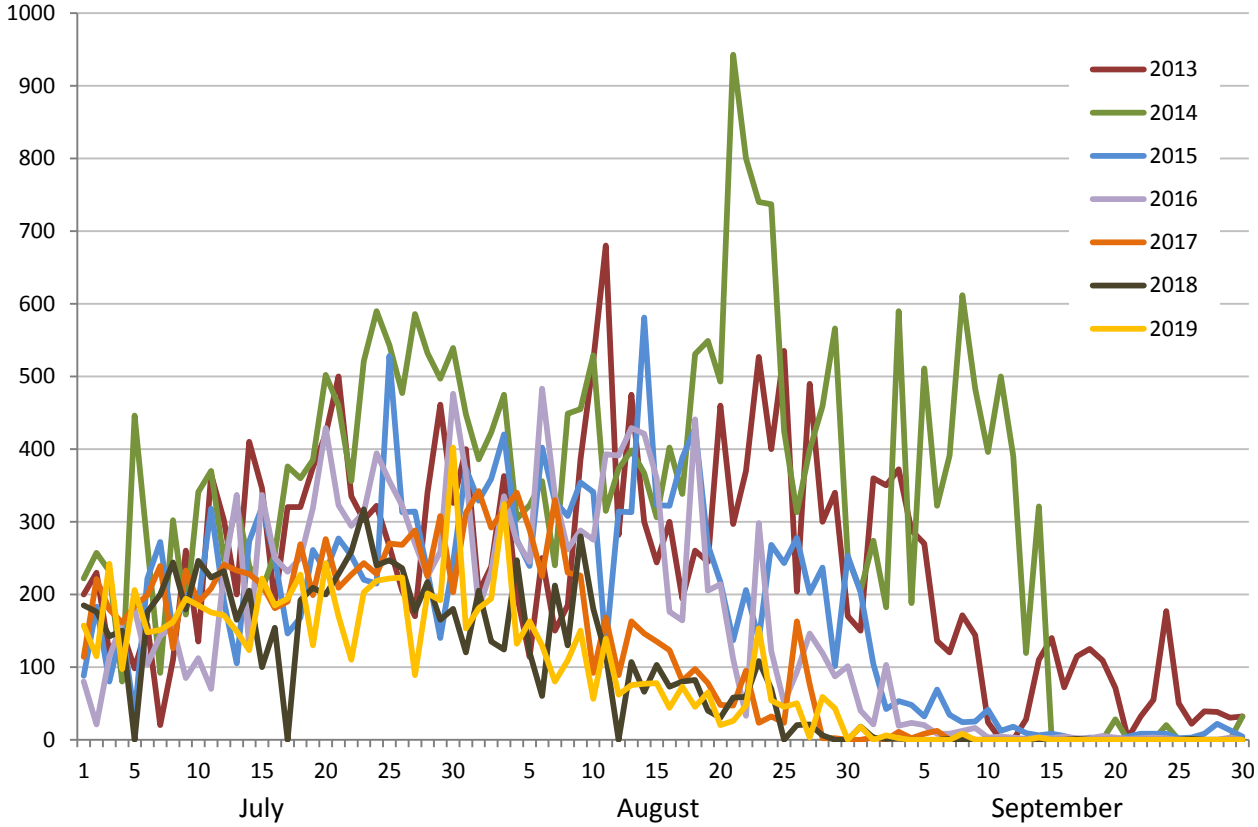
2004	2005	2008	2011	2012	2013	2014	2015	2016	2017	2018	2019
0.07	0.27	0.27	0.03	0.16	0.16	0.30	0.15	0.23	0.38	0.63	0.27

The coastal slope to the east of Purple Cove was investigated for a third year as this discreet subcolony, with very short sward or rocky substrate, is seemingly suitable for an accurate fledgling count using only a telescope; here 15 pairs produced a minimum of ten fledglings, giving a productivity figure of 0.67 fledglings per pair (14 pairs produced 17 fledglings in 2018, giving a productivity figure of 1.21 and 18 pairs produced 20 fledglings in 2017, giving a productivity figure of 1.11). That productivity is consistently higher in a smaller, coastal subcolony fits ad hoc observations made in recent years and perhaps supports the theory that birds in larger colonies are struggling in part due to intraspecific predation. Given that recent productivity estimates have been based on samples of inland colonies, it seems plausible that there will have been an underestimation for

Skokholm as a whole; nevertheless considerably more pairs nest in the main inland colonies than on the coastal slopes, suggesting that the actual figure would not change radically.

Between the 7th and 10th May, five adult birds were trapped for an examination of their visual fields by visiting researcher Jennifer Cantlay of the Royal Holloway University of London (NRW licence S085854/1). The birds were securely held in a dark room apparatus for between 45 and 60 minutes, during which time the extent of their visual fields were assessed using an ophthalmoscope. It is hoped that, when analysed alongside data collected from other seabird species susceptible to bycatch (including Storm Petrel and Herring Gull on Skokholm), it will be possible to ascertain how various visual field characteristics influence how seabirds interact with potential anthropogenic threats. A knowledge of their sensory ecology should help improve mitigation in areas where birds are at risk (for example around fishing nets, underwater turbines, wind turbines and power lines).

The number of Lesser Black-backed Gulls roosting on North Plain and in the vicinity of North Pond 2013-2019.



As is typically the case, the number of birds using traditional roost sites increased during July; North Plain and the area around North Pond again proved to be the usual site for the largest post-breeding roost, with smaller numbers congregating around the coast and at South Pond. Although the July roost peaked at 402 birds, the highest total of the last three years and 26.8% up on last year, the 2019 peak was still 31.9% down on a 2014 high of 590 and a cumulative 5660 roosting birds logged during the month was the lowest total of the last seven years. Whereas roost counts between 2013 and 2017 peaked in August, the last two years have seen a more rapid departure of birds from the Island; this year saw an August peak of 324, a total 15.7% up on last year but 65.6% down on the 2014 maximum, and a bird-days total of 2695, this also the lowest of the last seven years. September again proved exceedingly quiet, with only 19 roosting birds logged during the entire month; the last five years have seen very small September roosts, quite the contrast to 2013 and 2014 when counts were still regularly in the hundreds. A small number of birds visited Skokholm in October, with 46 logged over 14 dates and highs of nine adults on the 23rd and 28th. In November

there were sightings on 22 dates, totalling 191 birds and including highs of 29 on the 12th, 28 on the 19th and 43 on the 27th when a North Pond roost was again present; the November peak was the highest of the last three years, albeit less than half the 2015-2016 mean. Five birds on the 2nd was the only December record prior to the departure of staff on the 3rd.

Ringing recovery MADRID 6101133 (orange darvic with black T015)
Originally ringed as a first-winter, CTRU GOMECELLO, SALAMANCA, SPAIN 21st February 2010
Previously recovered as a third-winter, COLMENAR VIEJO LANDFILL, SPAIN 18th December 2011
Previously recovered as a third-winter, VRSU ALCAZAR DE SAN JUAN, SPAIN 21st January 2012
Previously recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 10th March 2013
Previously recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 9th February 2014
Previously recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 2nd March 2014
Previously recovered as an adult, THE LIZARD, CORNWALL 17th March 2014
Recovered as an adult, HOME MEADOW, SKOKHOLM 3rd and 19th July 2014
Subsequently recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 17th January 2015
Subsequently recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 28th February 2015
Subsequently recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 30th January 2016
Subsequently recovered as an adult, COLMENAR VIEJO LANDFILL, SPAIN 20th February 2016
Subsequently recovered as an adult, SEO SALAMANCA, SPAIN 13th January 2019
Days since ringed 3249
The further movements of a bird seen on Skokholm in 2014

Ringing recovery CHANNEL ISLANDS D9123 (black darvic with white 5FA2)
Originally ringed as a second-winter, CHOUET LANDFILL, GUERNSEY 13th May 2015
Recovered SKOKHOLM 26th August 2018 (sic)
Finding condition Colour ring read in field
Distance travelled 312km at 322 degrees (NW)
Days since ringed 1201

Ringing recovery GR98292
Originally ringed as an adult, HOME MEADOW GULL TRAP, SKOKHOLM 16th June 2014
Recovered SINTRA, LISBON, PORTUGAL 20th January 2020
Finding condition Found injured and euthanased
Distance travelled 1469km at 193 degrees (SSW)
Days since ringed 2044

The birds previously carrying GPS tags, along with an additional 48 non-tagged controls, were all fitted with yellow darvic rings with a black alpha-numeric code (number/letter:W e.g. 5A:W) in 2014. The colour ring is on the left leg and a BTO metal ring on the right. The darvic rings have yielded a fantastic number of field resightings; the 73 ringed birds have produced 164 separate resightings of 35 different individuals away from Skokholm. Nevertheless the number of resightings logged each year is unsurprisingly dropping. The following table summarises resightings received since similar tables were published in the 2014-2018 Seabird Reports. As has been shown by the British Trust for Ornithology GPS tracking project on Skokholm, and at other British Trust for Ornithology tracking sites (Ross-Smith, *pers. comm.*), Lesser Black-backed Gulls show a high degree of wintering site fidelity. This is also reflected in the colour ringing data, with 17 birds having been resighted at the same location in successive winters; records of returning birds have come from several sites in Portugal and Spain (including 8C:W and 9J:W in 2019), along with two in France and one in Morocco.

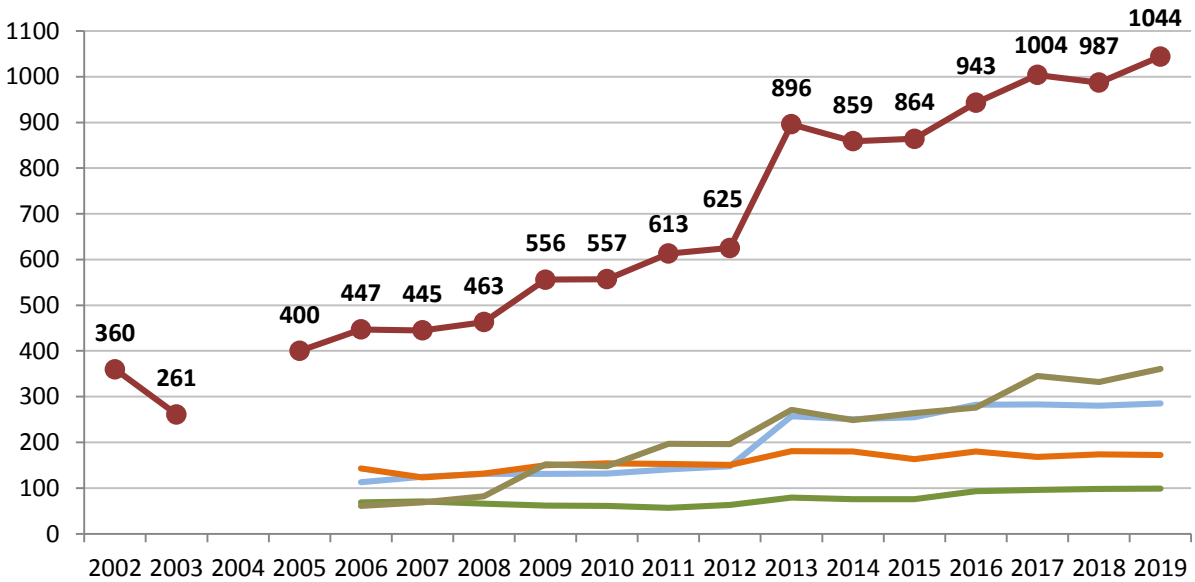
Darvic	Ring	Location	Country	Date
7N:W	GR98240	Old Sarum Pig Farm	UK	03/02/19
8A:W	GR98247	Colmenar Viejo Landfill, Madrid	Spain	11/10/19

8C:W	GR98248	Caleta de Velez, Malaga	Spain	23/12/19
9J:W	GR98265	Malaga Harbour	Spain	17/02/19, 19/11/19, 15/12/19

Guillemot *Uria aalge* **Gwylog**
Abundant Breeder
1 pullus trapped
1936-1976: 1023 trapped, 2013-2018: 4 pulli trapped, 17 controls

A single off the north coast on the 1st, seven there on the 2nd and six at sea on the 5th were the only sightings between 28th February and 5th March. There followed 12 March daycounts of 19 or less, including a further six dates without a record, however highs of 2239 on the 8th, 3835 on the 19th and 2783 on the 27th hinted at what was to come; the peak was the highest March daycount to date. Customary departures for the sea continued in April, with no birds seen at all on the 14th and 15th and six further counts of less than 600 (just eight mass departures in April was down on the 16 of 2018, the 13 of 2017, 2016 and 2015 and the 19 of 2014 and 2013). A minimum of 2834 birds were counted on 17th April and confirmation of an early breeding season came the following day when the first egg of the year was located at Middlerock. An 18th April egg is seemingly the earliest yet recorded in Wales (Birkhead, *pers. comm.*) and was perhaps the result of unusual March sea surface temperatures which were up on the previous four years (the Skokholm South Haven mean of 9.51°C was 2.02°C warmer than in the same period in 2018 and 0.98°C warmer than the 2015-2018 average (Burton, M., 2019)); the first egg of 2018 was logged on 4th May, the first of 2017 was on 29th April, the first of 2016 on 5th May, the first of 2015 on 2nd May and the first of 2014, following the prolonged storms and significant auk wrecks of the preceding winter, was on 15th May. Early eggs are likely to be at risk during spring storms. On the night of 26th April Storm Hannah brought wind speeds of up to 80.5mph; only 496 adults were counted the following day, leaving those incubating birds which managed to protect their eggs from the storm more exposed to predators. The 18th April egg was incubated until neighbouring pairs had small chicks, after which it was abandoned. A heavily oiled bird was seen on 5th May and one with oil flecked underparts was logged three days later.

The total number of adult birds in all six study plots 2002-2019 (as an average from ten visits) and the totals from the four largest plots (as an average from ten visits).



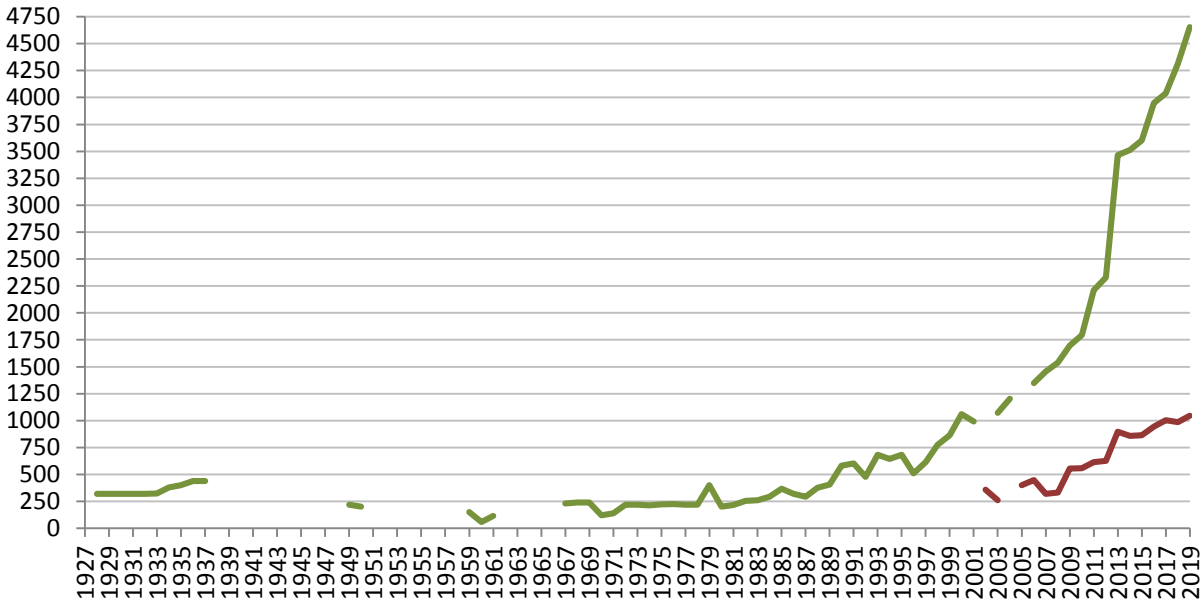
The six study plots were counted on ten dates between 24th May and 10th June. The mean total from all plots was 1044 adults on ledges; this was 5.8% up on the 2018 total and 24.4% up on the 2010-2019 mean (839.2 ±sd 177.21). Recent seabird reports have suggested that some of the study plots are seemingly close to capacity, perhaps in part due to an increase in Fulmar numbers; it seems

possible that Fulmars will halt any further expansion of auks along their current ledges and may be excluding birds from previously occupied areas. Although Fulmar-free ledges apparently suitable for colonisation by cliff nesting auks are present within the Twinlet study plot boundaries, these were not utilised this year, indeed the Guillemot Cliff mean dropped from 174 to 172 adults and the Middlerock mean remained at 55. The Steep Bay and Little Bay plots also appear to be close to capacity, with mean increases of just five and one taking the totals to an all-time record 285 and 99 adults on ledges respectively. There were larger increases at North Gully, where there was a mean of 29 extra adults (an 8.73% rise), and at the slope to Purple Cove where there were 23 extra adults (a 47.92% rise); increases at these two sites are driving the increase seen across the plots as a whole. Remarkably the plots now contain more than twice the number of adults than they did in 2008, whilst the lowest of the ten 2019 counts exceeded the highest 2015 count. The 2019 survey period proved to be an unsettled one, this in contrast with the previous season when high pressure dominated and more similar to 2017 when counts were also delayed due to inclement weather. It is possible that some higher counts, and thus the higher standard deviation observed in 2017 and this year (see table below), were due to ameliorating rough weather encouraging more birds to the cliffs; there is seemingly a trend for the highest plot counts to occur following rough non-survey days.

The whole Island totals, mean plot totals and the percentage of the Island totals made up of study plot birds 2010-2019. Also the range of plot counts since 2012 and the standard deviation observed over the ten plot visits since 2013. (*includes a boat-based count)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Island	1795	2212*	2330	3466*	3512*	3603*	3949*	4038*	4316*	4654*
Plots	557	613	625	896	859	864	943	1004	987	1044
Range			530-746	824-949	797-947	756-939	887-1003	939-1144	937-1060	982-1140
±SD				39.20	54.25	58.30	40.25	57.45	37.38	54.40
Plot %	31.0	27.7	26.8	25.9	24.5	24.0	23.9	24.9	22.9	22.4

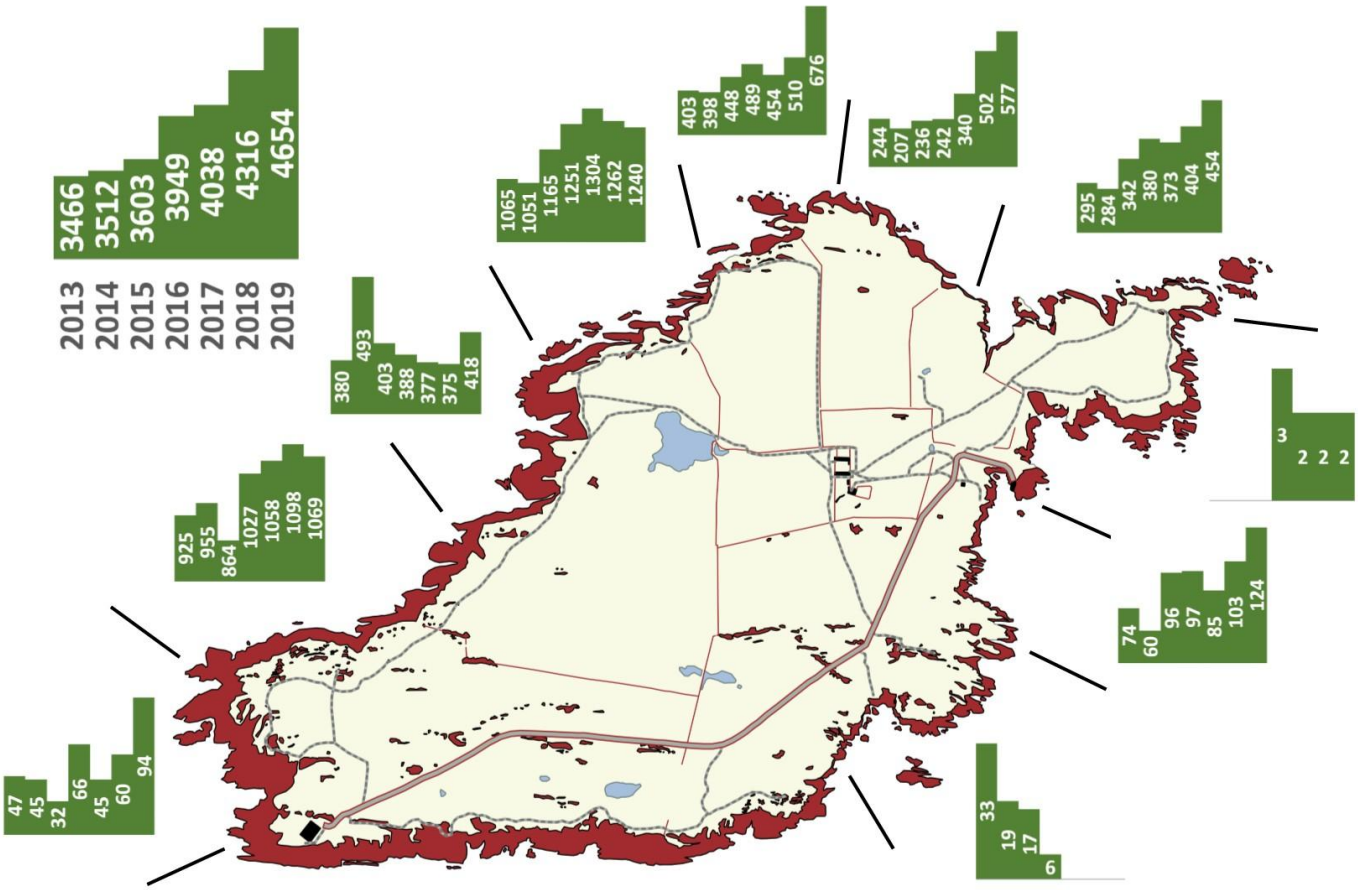
The total number of Guillemots (adults on ledges) recorded on Skokholm since 1928 and the number of birds within the study plots since 2002.



Whole Island counts were made from the land between 24th May and 7th June and calm seas allowed for a boat-based count divided between the 6th and 9th June. Boat-based surveys allow some areas to be monitored which cannot be viewed from on the Island and enable closer access to some areas which can normally only be viewed at a distance. A mean total of 4654 adults in suitable breeding habitat was a 7.8% increase on the 2018 count and the highest total yet recorded on Skokholm.

Although down on the 2010-2019 average of 11.4% growth per year, the increase was the largest since 2016 and the fourth largest of the last ten years. The proportion of the whole Island count made up of study plot birds (22.4%) was down on the 2010-2019 mean of 25.4% and the lowest yet recorded, perhaps suggesting that some of the factors influencing the more intensively studied plots (discussed above) are not impacting the whole Island population in the same way. Additionally the Island count is based on fewer visits and only one boat-based survey, meaning that the total is more likely to be further from the actual mean. As can be seen from the below map, the largest numerical increase occurred around Little Bay Point where there was an average of 166 more adults on ledges (a 32.5% increase), although the area around the Quarry saw a 56.7% jump in the population (34 more birds). The area around Near and Far Bays saw a mean increase of 75 adults on ledges, the population in this area having now increased by 138.4% in three years; the reason for such rapid growth in some areas compared with the rest of the Island is unclear, although it may reflect the availability of previously unoccupied habitat. The only declines were logged around the Bluffs and North Gully, although drops of 2.6% and 1.7% were not significant. These counts of individuals on ledges potentially include incubating adults, some of their partners, failed breeders, non-breeding adults and younger birds yet to breed; a correction factor is thus sometimes adopted to convert the count to an estimate of breeding pairs (Harris *et al*., 2015). A 2015 survey on Skokholm found the correction factor to be 0.64, a figure close to the 0.67 widely adopted in previous studies (see the Skokholm Seabird Report 2015); the latter correction factor predicts the Skokholm breeding population to be in the region of 3118 pairs, 226 more than last year.

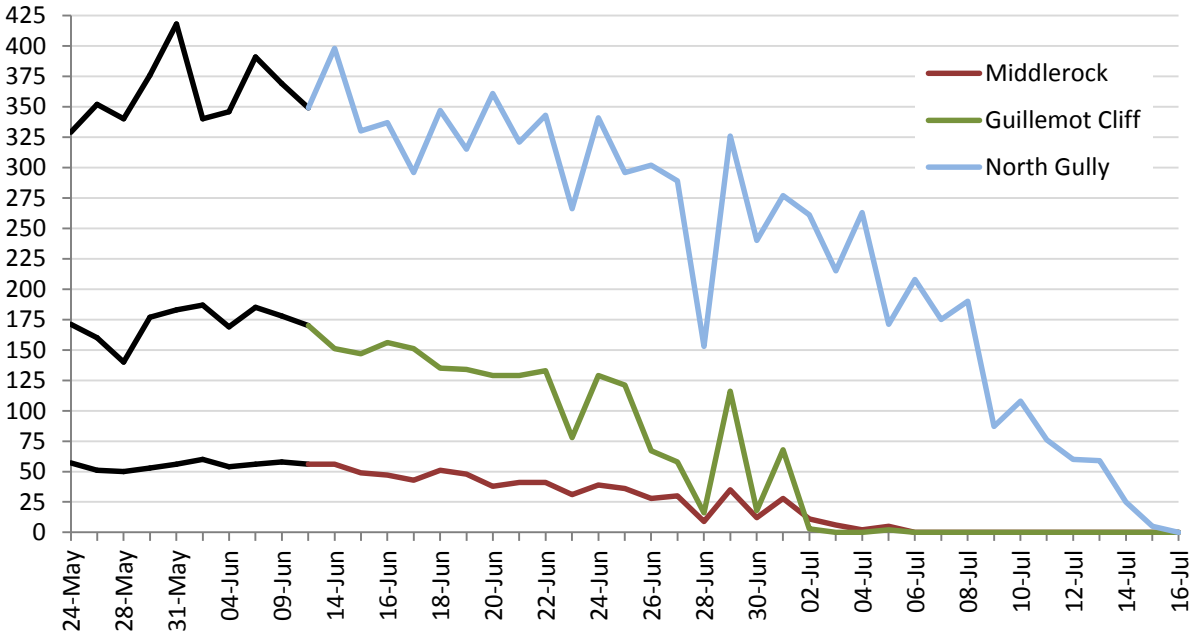
The distribution of Guillemots on suitable breeding ledges 2013-2019.



Two birds were watched arriving with fish on 20th May, but the first chick was not seen until the 23rd, 12 days earlier than the first of last year; the first chick in the period between 2018 and 2015 was logged between the 2nd and 7th June and the first of 2014, the year following the severe winter

wrecks, was on 13th June. Productivity, calculated at between 0.55 and 0.61 chicks per pair in 2013 and 0.6 in 2007, was not assessed in 2019 following recommendations from the Islands Conservation Advisory Committee. Chicks were jumping from mid-June and the number of adults recorded in the three regularly monitored plots dropped steadily from 605 on the 14th to 517 on the 22nd before sharp drops to 375 on the 23rd and 178 on the 28th (see chart below). A late spike in numbers on 29th June saw 477 birds logged, an increase observed across the Island as a whole and which was also seen in the number of Razorbills present; similar late season returns occur each year. There followed a steady departure, with 373 counted on 1st July, 221 on the 3rd, 208 on the 6th and 87 on the 9th (the total had dropped to 92 on the 13th in 2018 and to 92 on the 9th in 2017). The last birds had left Guillemot Cliff by 3rd July (the 14th in 2018 and the 5th in 2017), Middlerock by the 6th (the 17th in 2018 and the 9th in 2017) and North Gully by the 16th (the 20th in 2018 and the 17th in 2017); this was the sixth year running in which birds were later to depart from North Gully, although this may in part reflect the larger breeding population at this site (although for the last three years birds have left Guillemot Cliff before Middlerock, this despite the larger population at the former). Whole Island counts mirrored those made at the plots, with two at the Dents on 16th July the last to be seen ashore (20th July in 2018, the 18th in 2017, 23rd in 2016, 25th in 2015 and 24th in 2014). There were sightings at sea on a further nine dates to the end of the month, totalling 105 birds, and in August there were records on 23 dates, totalling 1129 individuals and with peaks of 126 on the 14th, 327 on the 15th and 156 on the 27th; although well down on last August, when a peak daycount of 1414 took the monthly bird-days total to 3841, the 2019 counts were up on any other year (a daycount of 70 and a monthly total of 178 were the pre-2018 maximums, although a boat trip four miles offshore during August 2017 revealed hundreds of rafting Guillemots).

The number of adults on ledges within three of the plots (standard study period in black).



September counts were the lowest of the last seven years, with daily records of up to 12 birds to the 5th and singles on the 17th and 29th; September 2018 saw the highest tally to be logged in this month, with sightings on all but two dates totalling 1419 birds. October proved similarly quiet with records on just six dates, including a high of 22 on the 10th which took the monthly total to 30, the lowest of the last four years. However 1570 distant, unidentified auks were logged during the same period, this the highest total since the 2055 of 2016 and the second highest October tally, perhaps suggesting that Guillemots were still lingering close to Skokholm. Indeed it went on to prove the most productive November on record, with sightings on 18 dates and highs of 508 on the 17th, 785 on the 19th and 717 on the 25th which took the bird-days total to 3441. Although a return of

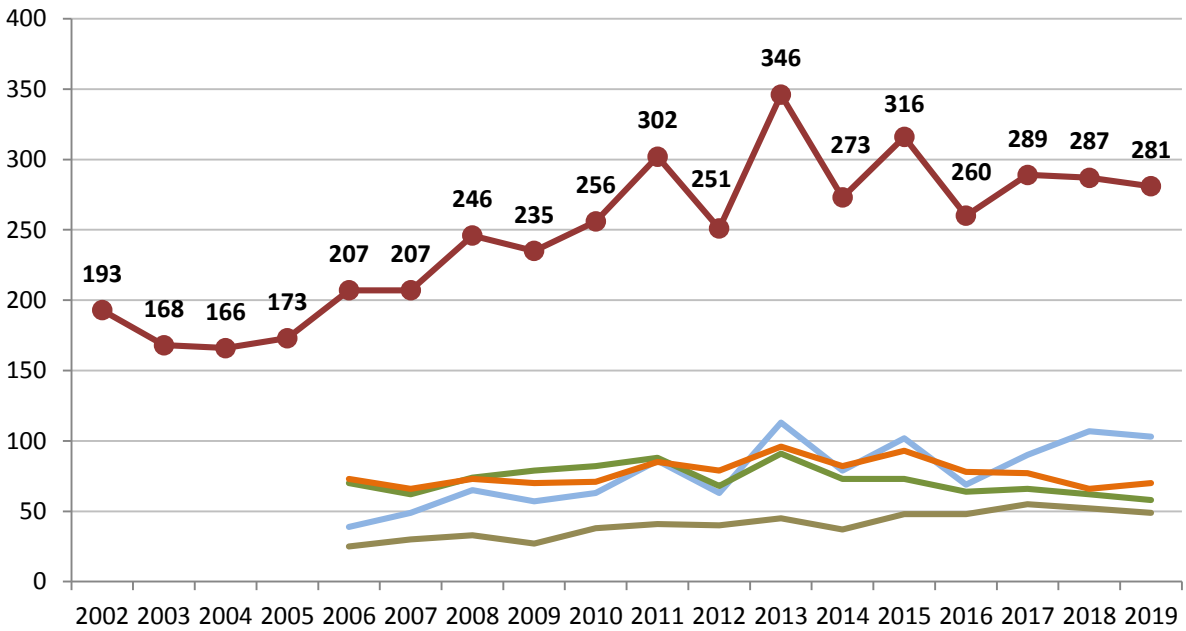
Guillemots to the breeding ledges in early winter is to be expected, there was no record of this behaviour on Skokholm between 2000 and 2014, despite the fact that staff did not depart until 24th November in 2014 and 16th November in 2013. Although November 2015 saw up to 540 birds return to the cliffs over five dates and 2016 saw up to 216 birds, again over five dates, there were no 2017 landings prior to the 9th November staff departure. Between four and 315 birds returned to the cliffs on 11 dates between the 6th and 25th in 2018. This season saw four birds ashore opposite the Jogs on 1st November, this the earliest landfall since 1999 when birds were at Steep Bay on 27th October. There were landfalls on a further 13 November dates including peaks of 225 on the 13th, 269 on the 18th, 728 on the 19th and 700 on the 25th; the vast majority of returning birds were to be found opposite the Jogs, although the largest two counts included birds at several of the bigger colonies. There were 91 ashore on 3rd December. Such a return to the colony outside of the breeding season, with the risk of being predated, must have a substantial benefit; it has been suggested that the return may be to secure the best breeding ledges and thus secure the best mate (Harris *et al*., 2006), but birds ashore may also use less energy than those at sea (Humphreys *et al*., 2007).

Ringing recovery X38966
Originally ringed as a pullus, SKOMER ISLAND, PEMBROKESHIRE 29th June 1997
Recovered SKOKHOLM 16th September 2019
Finding condition Metal ring only
Distance travelled 4km at 163 degrees (SSE)
Days since ringed 8114

Razorbill *Alca torda* **Llurs**
Abundant Breeder
46 trapped (including 45 pulli), 2 retrapped
1936-1976: 9220 trapped, 2013-2018: 197 trapped, 4 retrapped, 4 controls

There were low counts from the return of staff on 28th February, although 263 on 1st March and 386 on the 2nd were still the second-highest totals yet recorded on these dates (though staff are regularly absent). There followed 14 March dates with fewer than 100 birds logged, including eight without a sighting, but highs of 1669 on the 18th, 2993 on the 19th and 1545 on the 21st, the peak being the second-highest March daycount behind a remarkable 3712 recorded in 2018. Numbers continued to fluctuate during early April, with highs of 1800 on the 7th and 1797 on the 9th but lows of just nine on the 14th and 13 on the 15th when the cliffs were empty. Numbers steadily increased from 16th April and an early egg was being incubated at Middlerock on the 19th; between 2015 and 2018 the first egg was seen on either the 26th or 27th April, whilst the first of 2014 was not found until 13th May (probably again a consequence of the winter storms preceding that breeding season). Such an early 2019 breeding season was perhaps the result of unusual March sea surface temperatures which were up on the previous four years (the Skokholm South Haven mean of 9.51°C was 2.02°C warmer than during the same period in 2018 and 0.98°C warmer than the 2015-2018 March average (Burton, M., 2019)). Nine of 16 birds present in the Neck study plot on 5th May showed some black flecking to their underparts, seemingly the result of oiling; a check of neighbouring colonies failed to locate any further oiled birds and there were no further instances recorded in Razorbills this year.

The total number of adult birds in all six study plots 2002-2019 (as an average from ten visits) and the totals from the four largest plots (as an average from ten visits).



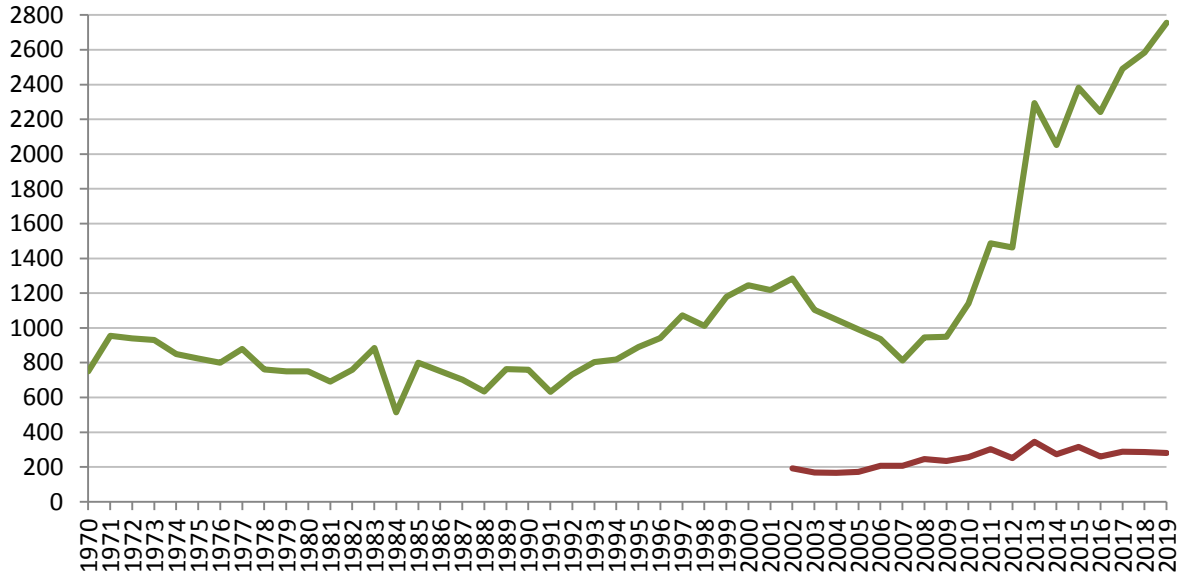
Six study plots, established in 2002, were visited on ten dates between 24th May and 10th June when every adult in suitable breeding habitat was counted. The mean single visit total of 281 adults on ledges was six down on that logged last year, the sixth lowest total of the last nine years and 1.8% down on the 2010-2019 mean (286.2 ±sd 29.3). Guillemot Cliff was the only plot which saw an increase in the mean number of birds present, with four more than last year; nevertheless a total of 70 adults on ledges equalled the third lowest total since 2006 for this site. Although there were four fewer birds in Little Bay, a mean of 103 adults on ledges was the third highest to be logged here; the total has increased by 164.1% since 2006 (the blue line on the above graph), growth which drove the combined plot total upwards. The North Gully mean dropped by three birds to 49, however this was

also the third highest total to date; although not as marked as at Little Bay, a 96.0% increase since 2006 has also driven the overall plot total upwards (the grey line on the above graph). There were four fewer birds at Middlerock, this a 36.3% decline on the 2013 peak which took the total to the lowest on record. Quite why the Twinlet plots (Guillemot Cliff and Middlerock) have declined in recent years, particularly given the general upwards trend seen at Little Bay, North Gully and across the Island as a whole, is unclear. A possible factor is that the study plots, particularly those at Twinlet, are areas shared with both Guillemots and (perhaps more importantly) Fulmars, species currently increasing on Skokholm as a whole. The number of apparently incubating Fulmar in the Middlerock and Guillemot Cliff plots has almost doubled since 2013, perhaps leading to competition with Razorbills for space within the confines of the plot boundaries. The plot counts are affected by the weather in some years; in the unsettled June of 2012 counts fluctuated between 164 and 338 birds, whereas the 2018 counts, made during a prolonged period of high pressure, fluctuated between 263 and 309 (with the lowest standard deviation of the last six years (see table below)). The 2019 survey period proved to be an unsettled one, no doubt leading to the widest spread of counts since 2012. It is possible that some higher counts, and thus the higher standard deviation observed this year, were due to ameliorating rough weather encouraging more birds to the cliffs; there is seemingly a trend for the highest plot counts to occur following rough non-survey days.

The whole Island totals, mean plot totals and the percentage of the Island totals made up of study plot birds 2010-2019. Also the range of plot counts since 2012 and the standard deviation observed over the ten plot visits since 2013. (*includes a boat-based count)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Island	1140	1486*	1463	2294*	2052*	2382*	2242*	2491*	2585*	2755*
Plots	256	302	251	346	274	316	260	289	287	281
Range			164-338	301-397	254-315	291-346	236-324	253-334	263-309	230-351
±SD				30.54	19.96	15.78	26.58	25.61	13.25	40.82
Plot %	22.5	20.3	17.2	15.1	13.4	13.3	11.6	11.6	11.1	10.2

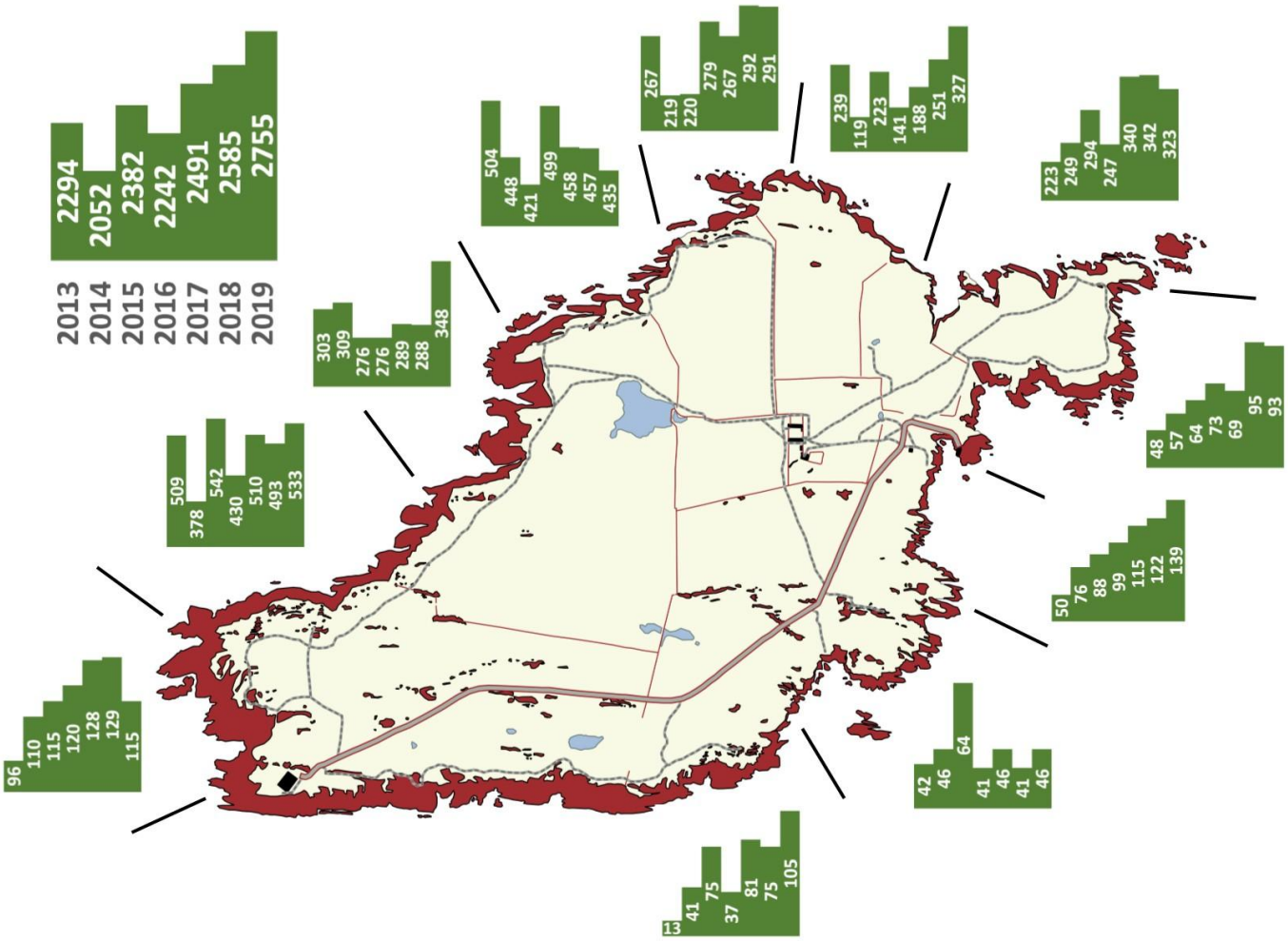
The total number of Razorbills (adults on ledges) recorded on Skokholm since 1970 and the number of birds within the study plots since 2002.



Whole Island counts were made from the land between 24th May and 7th June, whilst a boat-based count was divided between the 6th and 9th June. This was the seventh year running in which access to a boat had been available, inevitably leading to higher but more accurate whole Island counts; in 2012 rough seas meant that there was no opportunity for a boat-based count and it was concluded that 'there remains a section of North Coast that was missed, while other parts of the North Coast

and Bluffs were counted less accurately at a distance' (Gillham and Yates, 2012). A 2019 whole Island mean of 2755 adults in suitable breeding habitat was 6.6% up on the 2585 logged in 2018 and the highest total yet recorded on Skokholm (31.9% up on the 2010-2019 mean of 2089.0 ±sd 543.64). The rapid population growth witnessed between 2007 and 2013 has seemingly slowed, although the population is still increasing at a rate similar to that witnessed between 1991 and 2002. The proportion of the whole Island total made up of study plot birds was the lowest since the plots were initiated in 2002, suggesting that the plot limiting factors outlined above, particularly competition for space in the Twinlet plots, are not affecting the Island as a whole. As can be seen from the map below, the largest increases came along Near and Far Bays (76 more birds), between Twinlet and Purple Cove (60 more) and around the Bluffs (40 more); of these areas, only the ledges around Near and Far Bays saw an increase in the number of Guillemots present. There were declines in five areas, with mean drops of 19 birds along the north coast of the Neck and 22 birds between the Dents and the Jogs being the largest numerically.

The distribution of Razorbills on suitable breeding ledges 2013-2019.



Productivity monitoring was undertaken for a seventh consecutive year. There are some concerns among ICAC members that recent Pembrokeshire productivity estimates have been quite low (on Skokholm ranging between 0.21 in 2015 and 0.69 in 2018), perhaps lower than what actually occurred given the continued growth of the population and certainly too low to maintain the expansion. One explanation for low productivity estimates could be that the plots, particularly the exposed Neck plot where predation levels are often quite high, are not representative of the Island as a whole; with this in mind an additional cliff plot was established at North Gully in 2017. There were thus three survey areas this year, one a cliff below the Neck Razorbill Hide where 27 incubating

pairs were mapped by 26th May, one on ledges around North Gully where 34 pairs were mapped by 20th May and one a site among the Bluffs boulders where 46 egg sites were marked on 18th May.

At the Neck there were just three failures at egg stage, however seven chick stage failures (including the infanticide documented below) was quite a contrast to 2018 when all hatched chicks went on to jump. There were thus 17 young which reached jumping age at the Neck; the resulting productivity figure of 0.63 was unsurprisingly down on the record 0.86 of last year, however it was well up on the 0.14 recorded in 2017, the 0.03 of 2016, the 0.17 of 2015 and the 0.36 of 2014. The North Gully cliff site saw six failures at egg stage (one of which was seemingly incubated throughout the period between 26th May and 15th July, a duration far longer than typically seen before the abandonment of an egg) and four failures at chick stage, all of which went missing. There were 24 chicks which reached jumping size; the resulting productivity value of 0.71 jumplings per pair was up on the 0.62 logged at this site in 2018 and the 0.58 logged in 2017. The combined productivity estimate for cliff nesting pairs was 0.67, a figure only exceeded by the 0.74 of last year and the 0.77 of 2013.

The development of a Razorbill chick near Frank's Point. The photographs were taken at three day intervals, starting at three days of age.

Among the Bluffs boulders eight pairs failed at egg stage; in all instances this year, the eggs went missing. A further 13 pairs failed with chicks, only one of which was found dead and abandoned rather than going missing. There were 25 pairs which produced a jumping-sized chick; the resulting productivity value of 0.54 jumplings per pair was down on the 0.60 logged last year, the 0.74 of 2016 and the 0.55 of 2013, but up on the 0.48 of 2017, the 0.29 of 2015 and the 0.44 of 2014. For a seventh year running the last of the breeding attempts within the boulders were concluded before the last of the attempts on the cliffs; this perhaps reflects a tendency for large chicks among the boulders to move away from the egg site, whilst cliff chicks have little room for movement.

Combining the productivity figures for the cliff plots and the boulder plot to give an indication of overall productivity on Skokholm can be achieved in two ways, either by averaging the final values obtained for the three sites, as recommended in the Seabird Monitoring Handbook (Walsh *et al*., 1995), or by combining all the data from the three plots (that is to say by dividing the total number of jumplings at all sites by the total number of monitored sites). The former, preferred, technique

produces a productivity estimate of 0.63 jumplings per pair and the latter 0.62; although down on the 0.69 of last year and the 0.66 of 2013, the 2019 estimate was up on the 0.40 of 2017, the 0.39 of 2016, the 0.21 of 2015 and the 0.40 of 2014. Whereas predatory gulls and corvids are typically blamed when chicks go missing, other explanations are available; on 9th June a ledge usurping adult in the Neck productivity plot was watched as it attacked the head of an incubated chick before throwing it off the cliff (below photograph).

The number of adults on ledges within three of the plots (standard study period in black).

In an effort to ascertain the pattern of colony attendance during the remainder of the breeding season, daily counts at three of the plots were continued beyond the normal study period (see chart above). There were again fluctuating numbers in all three subcolonies and regular peaks when the totals were presumably augmented by the return of failed adults, successful females or non-breeding birds; interestingly these peaks were again broadly consistent between subcolonies, and to a lesser extent coincided with Guillemot arrivals, suggesting that the returning birds respond to the same environmental cues. The first jumpling had departed the productivity plots by 9th June, 13 days earlier than the first of 2018 and 2016, 11 days earlier than in 2017 and 17 days earlier than in 2015. The number of adults within the plots dropped steadily during the second half of June, with only

double-figure counts logged from the 30th (10th July in 2018, the 11th in 2017, the 14th in 2016, the 8th in 2015 and the 17th in 2014) and single-figure counts from 9th July (the 18th in 2018, the 22nd in 2017 and 2015, the 25th in 2016 and the 27th in 2014). Whereas all of the Bluffs study chicks had departed by 27th June, five cliff plot youngsters remained on 7th July (seven remained on the 7th last year) and the chick of a pair which laid on 9th June remained until the night of 27th July. Despite the very early 2019 breeding season, at least five adults were still ashore on 24th July (the date on which, between 2015 and 2017, the last adults were seen on cliffs) and the last was at North Gully on 1st August (one day later than the last of a late 2014 season but one day earlier than the last of 2018). An adult circled North Gully with fish on 2nd August, however it returned to sea without making landfall.

There were sightings of Razorbills at sea on 20 August dates, totalling 158 birds and with highs of 21 on the 22nd and 20 on the 31st; although down on last year, when a peak daycount of 114 took the total to 388, this was otherwise the most productive August to date (the bird-days total being up on the pre-2018 high of 108 logged in 1962). However September counts were significantly down on recent years, with sightings of up to 23 birds on 13 dates taking the bird-days total to just 79; the maximum 2018 daycount was 127 and the monthly total 575, whilst a record daycount of 1148 in 2017 took the September total to a record 1708. Sightings on 14 October dates, including highs of 149 on the 9th, 763 on the 10th and 105 on the 11th, produced a bird-days total of 1224; both the maximum daycount and the bird-days total were new October records, the former being up on the 320 of 1961 and the latter up on the 689 of 2014. Sightings of up to 58 birds on 11 November dates led to a rather typical 111 bird-days being logged. There were no Razorbills seen ashore for a seventh successive November, this seemingly an auk behaviour confined to Guillemots during the early winter period. Further large auks were present at sea during the autumn but they remained unidentified due to their distance from the Island; there were 149 in September, 1570 in October, 3985 in November and 709 in the first three days of December; a peak of 930 on 17th November was a new autumn daycount record.

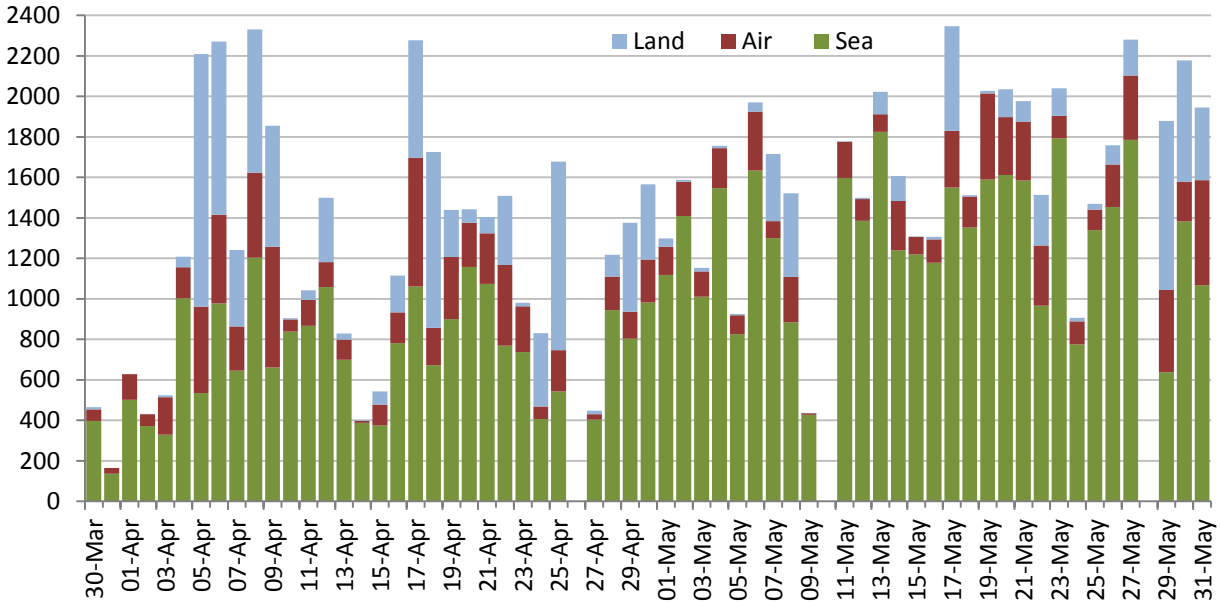
Ringing recovery K30814
Originally ringed as an adult, THE BLUFFS, SKOKHOLM 21st June 2013
Recovered CROYDE BAY, DEVON 30th May 2019
Finding condition Freshly dead on beach
Distance travelled 96km at 132 degrees (SE)
Days since ringed 2169

Puffin *Fratercula arctica* **Pâl**
Very Abundant Breeder
32 trapped, 3 retrapped
1936-1976: 5411 trapped, 2011-2018: 550 trapped, 21 retrapped, 1 control

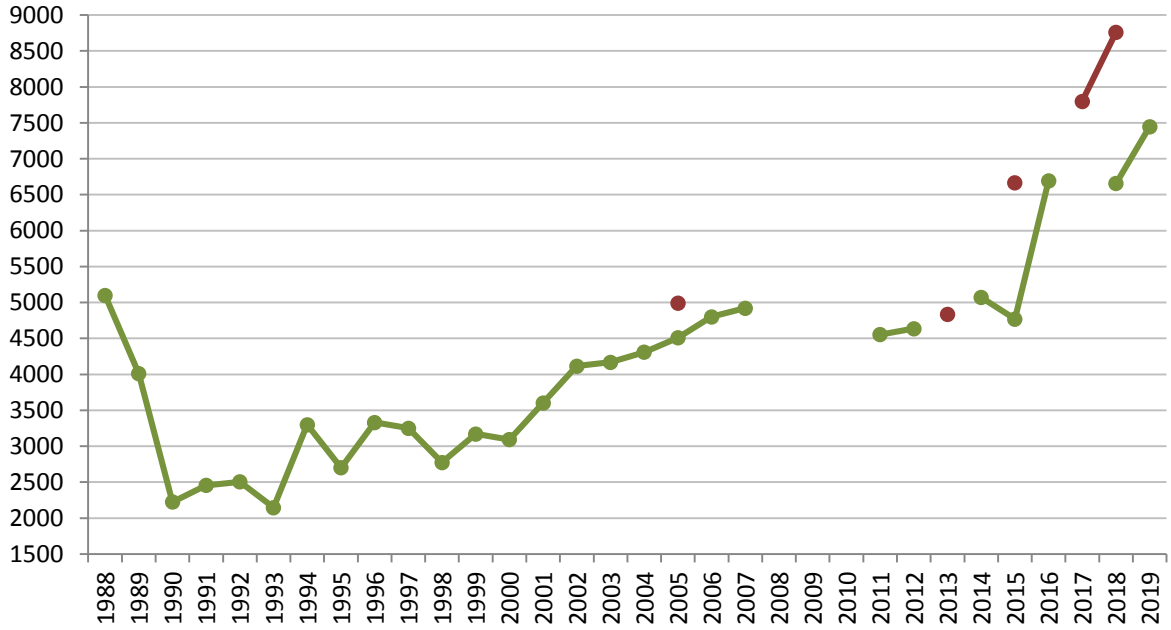
A lone Puffin swimming to the north of the Neck on 1st March was an exceptionally early sighting and a harbinger of what was to follow; although an oiled bird was found on 22nd January 1929 and a remarkable 26 were logged on 2nd February 1983, this was otherwise the earliest Skokholm record. There followed four off South Haven on the 6th and 23 offshore on the 8th, birds all earlier than the pre-2019 March record of four on the 12th in 1982. A single was off Crab Bay on the 14th, two were rafting with north coast auks on the 15th, 118 were at sea on the 16th and, following an absent day, 1019 were counted on the 18th; the latter was the earliest ever four-figure daycount. Over 500 birds made landfall on the 19th, this the earliest ever return to the cliffs (one day earlier than six birds seen ashore in 2012 and three days earlier than 28 birds last year). The same day saw a whole Island count of 7447 Puffins, this the highest ever March total by a considerable margin, well up on the 4308 logged on the 27th in 2004 (to the north there were 1178 on the sea and six in the air, to the south 3604 on the sea and 57 in the air and around the Neck 2484 on the sea and 118 in the air). Birds were ashore for the following three days, this an unprecedentedly early and lengthy return to

the land. Daily sightings to the end of the month produced a March bird-days total of 23,633, a tally massively up on the previous high of 12,074 logged in 2012. Daily counts were again made from around the Neck each evening, from 30th March until 31st May, to record the pattern of colony attendance (see chart below). April counts varied far less dramatically than in previous years and the mean April daycount was over 300 birds up on the previous 2015 high, all observations indicative of a much earlier return and breeding season in 2019.

The number of Puffins seen from the Neck between 30th March and 31st May 2019. The transect again began from a line due north of North Haven and finished at Peter's Bay. The count on 26th April was abandoned due to the weather and counts on the 10th and 28th May were abandoned for other survey work.



The maximum Puffin daycount recorded each spring during the period 1988-2019. Green points represent counts made during March and April, maroon points counts made in May.



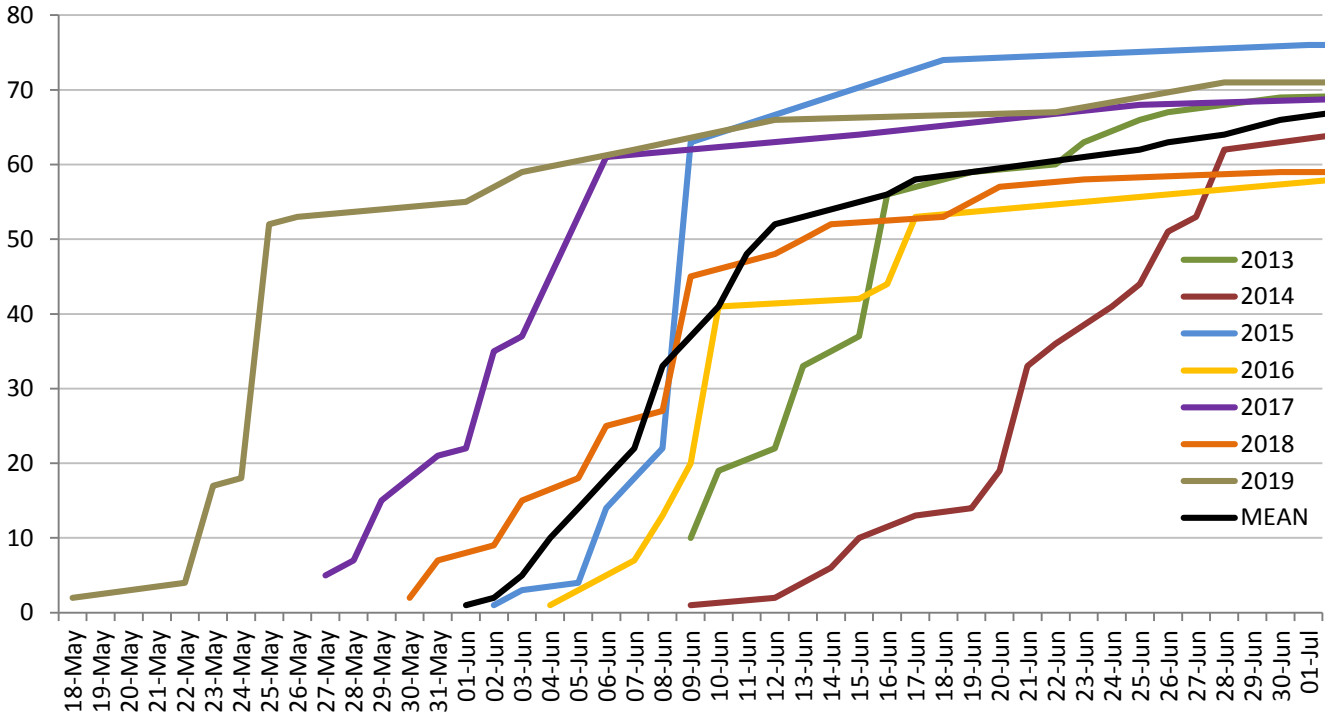
A further whole Island count on 6th April coincided with the third highest April Neck count and produced a total of 7060 birds (to the north there were 1102 on the sea, 14 in the air and 263 on land, to the south 1268 on the sea, 117 in the air and 2026 on land and around the Neck there were

977 on the sea, 438 in the air and 855 on land); although numbers are still down on Lockley's pre-War spring estimates of approximately 40,000, this was the highest April count since 10,000 were logged on the 22nd in 1953 and a tally 6.1% up on the 6656 counted on the 9th last year. Although the whole Island counts provide a relatively consistent long-term method for monitoring the trend in numbers, how the totals reflect the Skokholm breeding population is difficult to ascertain. The Crab Bay total on the evening of the 19th March peak 2019 count was 1851 birds, however more focused monitoring at this site revealed a study population of 75 active burrows in an area which comprises approximately 10% of the colony and where less than half of occupied burrows were study burrows; we might thus predict a very rough minimum of 1500 pairs for Crab Bay (as active burrow distribution is apparently quite even) and expect over 1000 more birds to be using this area of sea than were logged during the peak whole Island count.

A productivity plot established at Crab Bay in 2013 was used for a seventh season. The majority of the 100 burrows individually numbered in 2013 were again used this year, although a small number of posts were repositioned due to either winter losses or subsequent excavations making it difficult to tell which hole was marked. Of these, 75 were seen to be occupied and were visible throughout the season (61 in 2018); productivity estimates are based on observations of these burrows. Five active burrows (6.67%) were not seen to be provisioned with fish and it is assumed that these failed at egg stage (3.28% in 2018, 5.80% in 2017 and 7.58% in 2016). There were four fish deliveries on an exceptionally early 14th May (21st May in 2018, 24th May in 2017, 29th May in 2016, 31st May in 2015, 3rd June in a post-wreck 2014 and 30th May in 2013); these were seemingly the earliest deliveries ever witnessed on Skokholm. It was not until 18th May that fish were seen to be brought to the study plot, this 12 days before the first of last year and 14 days before the seven year mean (see below graph for the first plot delivery dates logged in previous years). The cumulative total of provisioned burrows increased rapidly; nearly 70% of burrows had been provisioned within a week of the first fish arriving, all of these with chicks prior to the earliest first delivery date of the previous six years. The 2019 chick feeding period was over three weeks earlier than in 2014 (the breeding season which followed the most severe winter storms recorded during this study).

Although the study plot was visited for a minimum of one hour most days, it certainly cannot be assumed that the first and last fish provisioning was seen for each burrow. Indeed the daylight hours Puffin watches highlight how some burrows are provisioned infrequently (see table below). Additionally it proves difficult to standardise ad hoc recording effort between years. It was thus decided in 2016 that a three visit method would be used to calculate productivity on Skokholm, but that five visits and ad hoc records would still be collected to allow further comparisons to be made in the future (see second table below and the 2016 Seabird Report for more details). This is more in line with the Seabird Monitoring Handbook (Walsh *et al*., 1995) which states that, when monitoring Puffin productivity in colonies where the nest is inaccessible and the colony is shared with Manx Shearwaters, the most appropriate technique is 'When birds are feeding large chicks, make a few watches to determine which burrows/crevices have fish taken down them'. Establishing which burrows contain large chicks is inevitably the main issue with this technique, necessitating earlier watches to detect chick hatching dates (which since 2013 have varied by as much as a month).

The number of study burrows which had been provisioned with fish by a particular date.



The number of fish deliveries to known active burrows during five daylight watches.

No. of deliveries	0	1	2	3	4	5	6	7	8	9	10	11	12	13
No. of burrows 25 May		10	7	6	10	4	5	2	4	2	1	1		
No. of burrows 12 June	3	8		5	7	14	8	9	2	4	1			
No. of burrows 22 June	1	19	10	15	5	6	4							
No. of burrows 28 June	5	20	9	3	4	1	1	1	1			1		
No. of burrows 7 July		10	5	2	1	3	1							1

Puffins can fledge having spent a minimum of 34 days as a burrow-bound chick, although this is more typically 38 days and can be anything up to 60 days (Ferguson-Lees *et al*., 2011). A flaw with the three visit technique is that some chicks could potentially be counted as fledged when they had reached as little as 17 days old. However it would be incorrect to assume that only those provisioned on all three watches went on to fledge; early hatchers could potentially have departed by the third watch whilst others may have hatched after the first watch. Although this three visit technique is more standardised than the ad hoc recording, the 2013 to 2019 productivity estimates of between 0.73 and 0.80 fledglings per pair certainly include birds which did not fledge. For example a bird

counted as fledged in 2017 was known to die of an apparent eye injury at approximately 25 days old, whilst this year at least some of the 15 large chicks seen to be taken from the plot by Great Black-backed Gulls between 19th June and 7th July were already counted as having fledged. Nevertheless this more standardised monitoring method suggests that 2019 productivity of 0.76 was in line with recent years, indeed it almost matched the seven year mean (0.75 ±se 0.01). If the ad hoc records are included and it is assumed that a chick seen to be provisioned for 31 days or more was of fledging size, then the 2019 data suggests that, of the 75 monitored breeding attempts, perhaps as few as 41 (54.7%) were potentially successful (55.7% in 2018, 56.5% in 2017, 63.6% in 2016, 55.0% in 2015, 50.0% in 2014 and 49.4% in 2013), although at least 54 attempts saw a chick reach a minimum of 26 days (72.0%, see second table below).

Calculating productivity using only three daylight watches. The first watch was between 25th May and 28th June (dependent on the date of first fish delivery that year), the second between 12th June and 8th July and the third between 28th June and 24th July. Chicks are assumed to have fledged if fed on a minimum of two watches. Ad hoc productivity is based on a chick reaching 31 days.

	First fish in plot	Last fish in plot	Fed watch 1 & 2	Min. chick age	Fed watch 2 & 3	Min. chick age	Fed all 3 watches	Min. chick age	Prod. based on 3 watches	Ad hoc prod.
2019	18-May	24-Jul	19	19 (25/5 - 12/6)	9	17 (12/6 - 28/6)	29	35 (25/5 - 28/6)	**0.76** (57 of 75)	0.55
2018	30-May	30-Jul	20	22 (9/6 - 30/6)	11	18 (30/6 - 17/7)	15	39 (9/6 - 17/7)	**0.75** (46 of 61)	0.56
2017	27-May	30-Jul	33	20 (6/6 - 25/6)	6	18 (25/6 - 12/7)	16	37 (6/6 - 12/7)	**0.80** (55 of 69)	0.57
2016	04-Jun	13-Aug	7	16 (17/6 - 2/7)	3	13 (2/7 - 14/7)	38	28 (17/6 -14/7)	**0.73** (48 of 66)	0.64
2015	02-Jun	05-Aug	16	14 (18/6 - 1/7)	2	12 (1/7 - 12/7)	42	25 (18/6 -12/7)	**0.75** (60 of 80)	0.55
2014	09-Jun	06-Aug	14	11 (28/6 - 8/7)	4	17 (8/7 - 24/7)	38	27 (28/6 -24/7)	**0.74** (56 of 76)	0.50
2013	09-Jun	14-Aug	11	15 (16/6 - 30/6)	6	14 (30/6 - 13/7)	39	28 (16/6 -13/7)	**0.73** (56 of 77)	0.49

The number of days between first and last observed chick feeding based on ad hoc recording and five daylight hours watches.

Days	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-51
No. of burrows	5	3		5	3	13	21	6	8	6

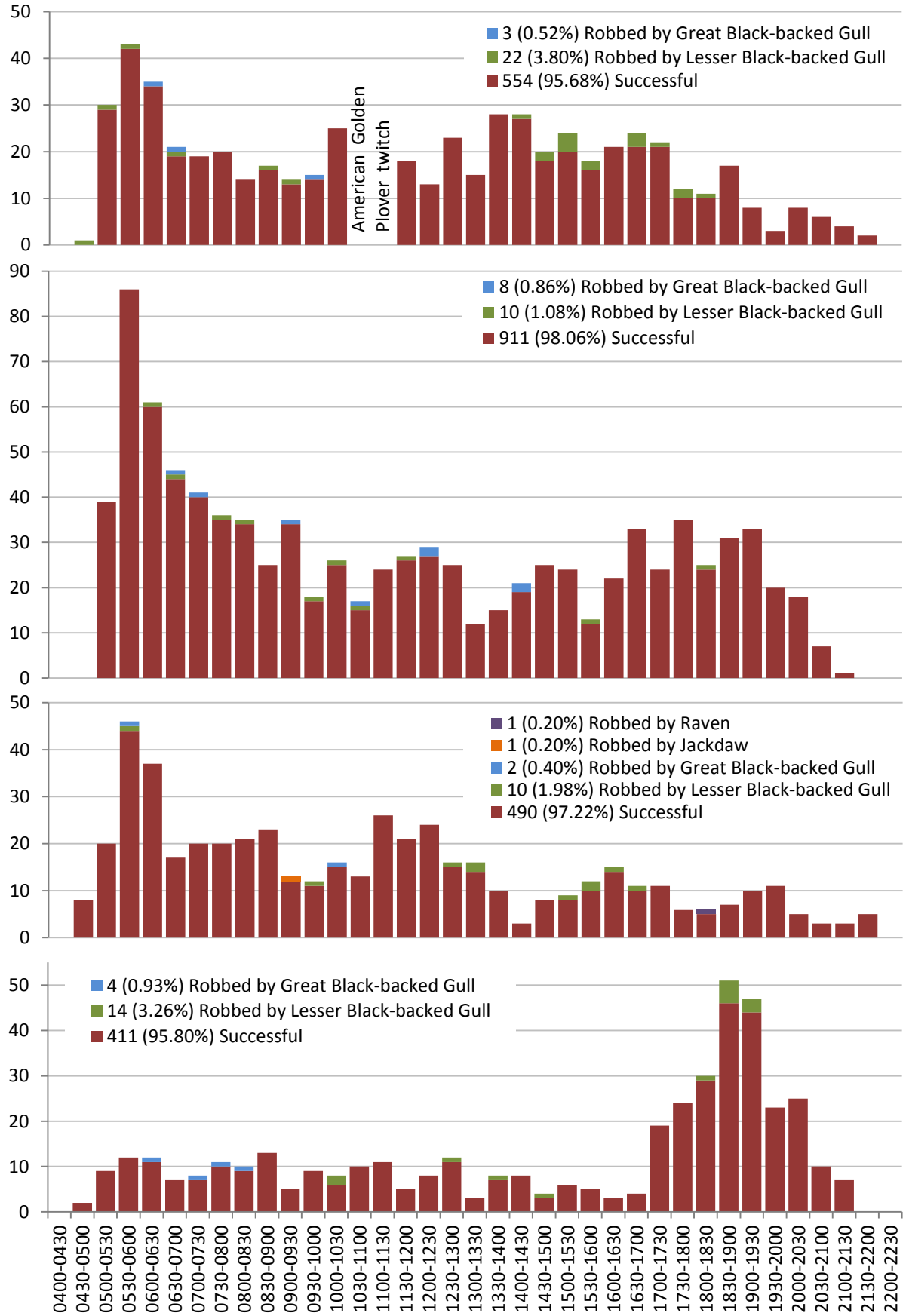
The five daylight hours watches (made on 25th May, the 12th, 22nd and 28th June and on 7th July), were also used to monitor kleptoparasitism by gulls. The study plot was again confined to the area of the 100 numbered burrow stakes at Crab Bay. On 25th May 579 Puffins arrived to the study area with fish and of these 25 (4.32%) were successfully robbed. On 12th June 929 birds arrived and 18 (1.94%) were robbed. On 22nd June 504 birds arrived and 14 (2.78%) were robbed. On 28th June 429 birds arrived and 18 (4.20%) were robbed. On 7th July 228 birds arrived and five (2.19%) were robbed. It should be noted that these figures do not take into account the number of fish lost to gulls at sea or on the approach to the colony. In terms of the proportion of deliveries lost over the study plot, a five visit mean of 3.00% was the third lowest of the last seven years, with the last three years having been the lowest. The actual number of deliveries stolen matched last year as the second lowest to date. The highest levels of kleptoparasitism to be logged so far occurred in 2013. This general decline in kleptoparasitism is perhaps in part due to a reduced Lesser Black-backed Gull population (which has declined by 30.4% in the same seven years), although an increase in Great Black-backed Gull numbers may at the same time be having an effect, with the more aggressive large gulls keeping the

Herring and Lesser Black-backed Gulls from the study area. There has been an increase in corvids kleptoparasitising Puffins; there were no records between 2013 and 2016, a Crow stole one delivery in 2017, Jackdaws stole single deliveries in 2018 and this year and a Raven stole a delivery this year.

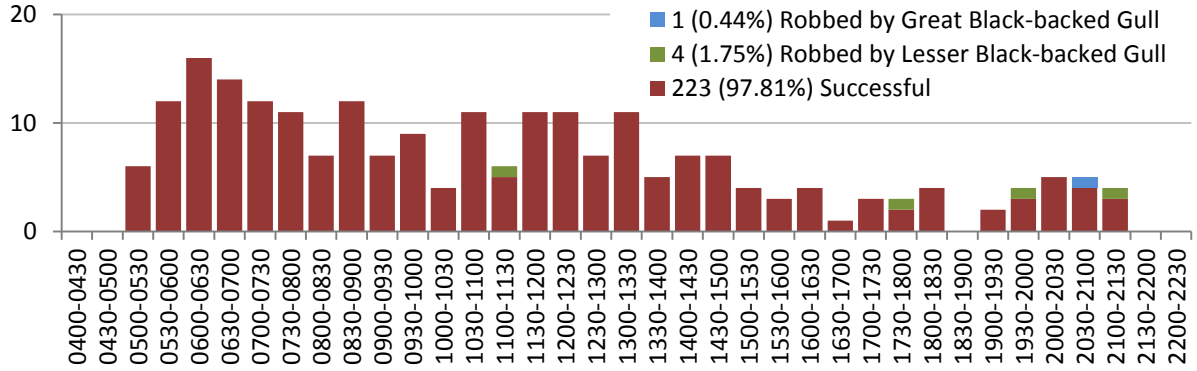
The number of fish deliveries made to the study plot during each daylight hours watch, the number of Puffins which lost fish over the plot and the percentage which lost fish.

		Watch 1	Watch 2	Watch 3	Watch 4	Watch 5	Total
2019	Number of deliveries	579	929	504	429	228	**2669**
	Number parasitised	25	18	14	18	5	**80**
	Percentage parasitised	4.32	1.94	2.78	4.20	2.19	**3.00**
2018	Number of deliveries	701	852	527	511	359	**2950**
	Number parasitised	19	12	8	8	33	**80**
	Percentage parasitised	2.71	1.41	1.52	1.57	9.19	**2.71**
2017	Number of deliveries	844	991	1100	527	177	**3639**
	Number parasitised	30	11	3	7	5	**56**
	Percentage parasitised	3.55	1.11	0.27	1.33	2.82	**1.54**
2016	Number of deliveries	421	733	889	489	525	**3057**
	Number parasitised	20	45	35	10	28	**138**
	Percentage parasitised	4.75	6.14	3.94	2.04	5.33	**4.51**
2015	Number of deliveries	699	927	916	521	123	**3186**
	Number parasitised	43	34	23	10	4	**114**
	Percentage parasitised	6.15	3.67	2.51	1.92	3.25	**3.58**
2014	Number of deliveries	262	513	643	670	179	**2267**
	Number parasitised	28	37	29	3	1	**98**
	Percentage parasitised	10.69	7.21	4.51	0.45	0.56	**4.32**
2013	Number of deliveries	413	684	610	107		**1814**
	Number parasitised	76	40	32	11		**159**
	Percentage parasitised	18.40	5.85	5.25	10.28		**8.77**

The number of chick provisioning attempts during daylight on 25th May and the 12th, 22nd and 28th June 2019, along with the number of times that gulls and corvids successfully robbed the fish. The unusual pattern of deliveries on 28th June was attributed to an ameliorating morning gale.



The number of chick provisioning attempts during daylight on 7th July 2019, along with the number of times that gulls successfully robbed the fish.



Survival in adult Puffins. An average survival figure for each year is based on the number of birds ringed in the preceding year plus the number of previously ringed birds known to be still alive, for example 215 birds (93.48%) are now known to have been alive in 2015, of a 2014 total of 230 (57 ringed in 2014 plus 173 (93+40+40) ringed previously and known to be alive). Survival after a one year establishment period means that birds have been seen within the study area before (and are therefore assumed to be located in visible positions); birds ringed in the preceding year are therefore excluded from the calculations as they may be occupying hidden areas of the colony.

	2011	2012	2013	2014	2016	2017	2018	Total	Survival after one year
Total Ringed	128	58	51	57	23	24	31	372	
Seen in 2012	72							72	
Alive in 2012	114							114	
% survival	89.06							89.06	**No data**
Seen in 2013	103	52						155	
Alive in 2013	111	55						166	
% survival	97.37	94.83						96.51	**97.37**
Seen in 2014	86	36	37					159	
Alive in 2014	93	40	40					173	
% survival	83.78	72.73	78.43					79.72	**80.12**
Seen in 2015	79	37	35	50				201	
Alive in 2015	86	39	37	53				215	
% survival	92.47	97.50	92.50	92.98				93.48	**93.64**
Seen in 2016	68	34	32	43				177	
Alive in 2016	78	37	35	47				197	
% survival	90.70	94.87	94.59	88.68				91.63	**91.63**
Seen in 2017	72	35	31	44	19			201	
Alive in 2017	77	36	32	44	19			208	
% survival	98.72	97.30	91.43	93.62	82.61			94.55	**95.94**
Seen in 2018	70	34	28	40	19	20		211	
Alive in 2018	73	35	30	40	19	22		211	
% survival	94.81	97.22	93.75	90.91	100.00	91.67		94.40	**94.71**
Seen in 2019	66	33	27	36	17	20	21	220	
Alive in 2019	66	33	27	36	17	20	21	220	
% survival	90.41	94.29	90.00	90.00	89.47	90.91	67.74	88.00	**90.87**

A colour ringing project was begun at Crab Bay in 2011 to allow an estimate of adult survival to be made each year. There were 128 birds ringed in the first year, 166 between 2012 and 2014, 78 between 2016 and 2018 and a further 28 were added to the scheme this year. The table above

summarises the resighting data collected so far. What is apparent is that some birds are not seen every year, perhaps because they have not returned to the study plot or perhaps because their colour rings have not been seen, indeed 13 birds were not seen for two years (including two which have gone missing for two years twice) and seven birds were not seen for three years. We now know, for example, that the 155 birds seen in 2013 was only 93.37% of the number actually alive. The survival estimates for more recent years are thus likely to be modified in the future, to take into account birds which have not yet been seen. Nevertheless, with eight years of resighting data now available, we can start to look at fluctuations in survival over time. The proportion of birds surviving the winter during the period 2011 to 2019 has varied between 79.72% (in 2014) and 96.51% (in 2013), with only the 2014 return rate being below 88%. A flaw with this survivorship estimate is that colour marks were added to Puffins caught in flight, individuals potentially resident in areas not visible to researchers; a better estimation of survival may therefore come from looking for birds previously seen in the field (thus discounting individuals in the year after ringing). The resulting survival estimates range from 80.12% (in 2014) to 97.37% (in 2013), with only the 2014 return rate being below 90%. Clearly the most striking feature of these estimates is the substantial drop in survival noted after the severe 2013 to 2014 winter wrecks; it remains to be seen how often such drops in survival can occur before the spring raft counts show a decline in overall numbers.

Puffin EX83523 (Black and White stripe over BTO, Yellow over Black), ringed as an adult in 2011 and seen in subsequent years to be a typically plumaged bird, arrived in 2017 with predominantly white feathers in the throat, nape and mantle. The extent of the white plumage has however not seemingly changed between the 2017 and 2019 breeding seasons. This 'progressive greying', which could be mistaken as leucism were it not for a knowledge that the bird previously appeared normal, is caused by a loss or failure of pigment cells with age.

Ad hoc records mirrored the whole Island count in suggesting that the number of birds on Skokholm is increasing; a bird walking along the Lighthouse Track below Tattenham Hill on 30th May and singles south over the Top Tank and east over Gull Field on 23rd June were all novel observations for the last seven years. Although there were no complete Island counts, several daycounts in excess of 5500 were logged in July when large numbers of young adults arrived. It was perhaps one of these less

experienced birds which was eaten by a Great Black-backed Gull at Rat Bay on the 16th; although Puffins are regularly taken during the spring, we rarely record adults being eaten during the chick fledging period (there was only one record last year). There was a distinct change in behaviour from 8th July, with lots more head waving within the plot and mass wheeling displays, although it was not until the 23rd that the majority of birds stopped returning to land (raft counts remained in the hundreds until 2nd August). There were 12 Crab Bay fish deliveries in two hours of observations on 27th July and the last fish deliveries to this area were logged on the 30th (when four burrows were still active). Although an adult was seen departing the slope near the replica Alice Williams on 7th August, the last observed fish delivery to this site, and indeed to anywhere on the Island, was logged on the 4th; this was six days earlier than the last 2018 deliveries (which were also to the slope near Alice), six days earlier than the last of 2017, nine days earlier than the last of 2016, 12 days earlier than in 2015 and 18 days earlier than in 2014 (the latest breeding season in recent years). Two were off the Bluffs on the 9th, four off the Lighthouse on the 10th and one there the following day was the last record of the breeding season. Three flying at sea on 26th September was a typical autumn sighting; there have been September records in 38 previous years including five of the last eight.

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Storm Petrel chick in the Gantry (cover) and two moulting Storm Petrel, both captured using infrared photography © Bart Vercruysse & Pol Dewulf, aberrant Storm Petrel © Chris Payne, Storm Petrel above the Knoll and Manx Shearwater near the Lighthouse, both captured using infrared photography © Bart Vercruysse & Pol Dewulf, Herring Gull and Puffin © Rhodri Llewellyn, Puffin with fish © Richard Coles and Puffin with twig © Keith Rowley
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