Cyfoeth Naturiol Cymru
Natural Resources Wales

Grey Seal Breeding Census Skomer Island 2016

Birgitta Büche and Edward Stubbings
Wildlife Trust of South and West Wales

NRW Evidence Report 194

27/02/2017

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Summary

218 pups were monitored on Skomer Island in 2016, of which 202 were definitely born on Skomer and 16 pups turned up either just before the start of moult, or moulting (wanderers).

The total of 202 pups born on Skomer Island is the third highest total ever recorded with 215 (in 2014) and 220 (in 2015) being the record.

A total of 345 pups were born within the Skomer Marine Conservation Zone, of which 143 were born on the Marloes Peninsula See section 4.2.

The busiest week this year was a fortnight earlier than in 2015 with 33 pups born in week 39 (26/9-2/10). See section 4.2.

The most productive beaches were South Haven (44 pups) and Matthew's Wick (39 pups). North Haven was the third most popular beach followed by Driftwood Bay which was the fourth most popular beach. See section 4.2.

146 pups are known, or assumed, to have survived on Skomer, giving a survival rate of 72% which is lower than last year's rate (76.1%) and the average of the last ten years (76%). See section 4.3.

In 2016 the maximum haul-out (on the main haul-out sites) of 224 animals was recorded on 24 November, eight days later than the maximum haul-out was observed in 2015 and 2014. See section 5.

In 2016 26 animals (22 females, three males, one immature) were photographed with obvious signs of being entangled in nets at some time in their lives. See section 6.

Between 18 August and 11 November 2016 22 incidents of disturbance to seals around Skomer Island were observed. See section 7 and Appendix 3.

In 2016 409 photos were taken which will be entered into the NRW Wales Seal ID database. Furthermore 92 seals were identified by eye, of these 46 were known from previous years. See section 10.

Crynodeb

Cafodd 218 o forloi bach eu monitro ar Ynys Sgomer yn 2016. O blith y rhain, roedd 202 yn sicr wedi'u geni ar Sgomer ac fe ymddangosodd 16 yn union cyn i'r cyfnod bwrw blew gychwyn (crwydriaid).

Y cyfanswm hwn o 202 o forloi bach a anwyd ar Ynys Sgomer yw'r mwyaf ond dau i'w gofnodi erioed – cofnodwyd 215 yn 2014 a 220 yn 2015.

Ganwyd cyfanswm o 345 o forloi bach ym Mharth Cadwraeth Morol Sgomer, gyda 143 o'r rhain wedi'u geni ar Benrhyn Marloes. Gweler adran 4.2.

Digwyddodd yr wythnos brysuraf eleni bythefnos ynghynt nag yn 2015, gyda 33 o forloi bach yn cael eu geni yn ystod wythnos 39 (26/9-2/10). Gweler adran 4.2.

Y traethau mwyaf cynhyrchiol oedd South Haven (44 morlo bach) a Matthew's Wick (39 morlo bach). North Haven oedd y traeth mwyaf poblogaidd ond dau a Bae Driftwood oedd y mwyaf poblogaidd ond tri. Gweler adran 4.2.

Gwyddys neu tybir bod 146 o forloi bach wedi goroesi ar Sgomer, gan roi cyfradd oroesi o 72%, sydd yn is na'r gyfradd ar gyfer y llynedd (76.1%) a'r gyfradd gyfartalog ar gyfer y deg mlynedd diwethaf (76%).

Gweler adran 4.3.

Yn 2016 cofnodwyd y nifer fwyaf o anifeiliaid yn gorffwys (ar y prif safleoedd gorffwys) ar 24 Tachwedd (224 o anifeiliaid), sef wyth diwrnod yn hwyrach nag a welwyd yn 2015 a 2014. Gweler adran 5.

Yn 2016 ffotograffwyd 26 o anifeiliaid (22 morlo benyw, tri morlo gwryw ac un morlo ifanc) a chanddynt arwyddion amlwg eu bod wedi bod yn sownd mewn rhwydi ar ryw adeg yn ystod eu bywydau. Gweler adran 6.

Rhwng 18 Awst ac 11 Tachwedd 2016 gwelwyd 22 achos o aflonyddu ar forloi o amgylch Ynys Sgomer. Gweler adran 7 ac Atodiad 3.

Yn 2016 tynnwyd 409 o luniau a fydd yn cael eu cynnwys yng nghronfa ddata Adnabod Morloi Cymru CNC. Ymhellach, adnabuwyd 92 morlo â'r llygad, ac o blith y rhain roeddem wedi gweld 46 mewn blynyddoedd blaenorol. Gweler adran 10.

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Between 13 August and 27 November 2016 the breeding activities of the Grey seals (*Halichoerus grypus*) on Skomer Island were observed and recorded, using the methods employed in previous years. These methods are detailed in the Skomer MCZ & Skomer Island NNR Grey Seal Management Plan (Alexander, 2015), with revisions made regarding access to some sites (Nathan,L, 2015), and are also mentioned in the individual site sections of this report.

2. Objectives

1. To record the number of Grey seal pups born at all known pupping sites around Skomer Island throughout the pupping season.

2. To determine the survival rate of seal pups up to their first moult and to record the probable cause of death of any fatalities.

4. To monitor the behaviour of all seals during site visits.

5. To maintain a daily record of the number of Grey seals using the main haul-out sites, particularly Castle Bay and North Haven, including details of the age and sex of hauled out animals.

6. To record and document all observed cases of seal disturbance, their cause and outcome, including entanglement with man-made materials (angling line, fishing net, etc.).

7. To record and document individual adult and immature Grey seals with distinctive scars/markings to compare with previous years.

8. To make comparisons of objectives 1 and 2 with previous years' data.

3. Census Methods

Between 13 August and 27 November 2016 all the main Grey seal pupping sites on Skomer Island were checked regularly and individual records were kept of each pup's progress, from birth to completion of moult, as laid out in the Skomer MCZ & Skomer Island NNR Grey Seal Management Plan (Alexander 2015).

The most important beaches; North Haven, Amy's Reach, Matthew's Wick, Castle Bay, Driftwood Bay and South Haven were checked daily from the cliff tops. The main island sites (High Cliff Boulders, The Basin, The Wick, Pig Stone Bay, The Garland Stone and South Stream Cave) were also checked regularly, approximately every 4 days. The Wick and South Stream Cave were checked more often during the peak pupping season.

Caves (e.g. South Haven) and beaches with difficult access (e.g. High Cliff) were only visited after having observed breeding behaviour by females in the vicinity to avoid disturbance.

Due to access difficulties all the main cave sites (The Lantern, Seal Hole and South Castle Beach Cave) were checked whenever conditions allowed. Entry to the caves is dependent on tides, weather and adult seal activity. To avoid causing more disturbance than absolutely necessary no cave was ever entered if a cow remained inside guarding her pup.

Beaches and caves were accessed no more than once a week to minimise disturbance.

Most pups are found within 24 hours of being born on Skomer and therefore their date of birth is known very accurately. When pups were born in the less frequently visited sites their date of birth was approximated based on the date of the previous visit, the pup's size and appearance using SMRU five-stage age classification system (see appendix 1).

Sites were visited when necessary to mark pups in accordance with Skomer MCZ & Skomer Island NNR Grey Seal Management Plan (Alexander, 2015), unless otherwise stated due to recent safety recommendations, (Nathan, L, 2015).

In most instances seal pups were individually marked using coloured aerosol sheep-fleece marker sprays. Pups younger than four days old were not routinely marked because of concerns that marking may interfere with the mother/pup bond. Younger pups were occasionally given a very small mark, usually near the tail, if the beach was being visited anyway. This allowed an individual to be monitored over the following days before being marked properly (when the pup was old enough).

During site visits and inspections disturbance was kept to a minimum.

An assessment was made of the condition of each pup when last seen, classified on a five-point scale:

1. Very small	Assumed not to have survived long after moult
2. Small but healthy	In good condition, would have a reasonable chance of survival
3. Good size	Most should survive
4. Very good size	All should survive
5. Super-moulter	An exceptional sized pup

Seal pups were considered successful if they survived until the beginning of moult, unless they were in poor condition (Hewer, 1974). If a pup disappeared before the beginning of moult an individual assessment was made on its likelihood to have survived based on the above criteria.

4. Census Results

4.1 General

218 pups were monitored on Skomer Island in 2016, of which 202 were definitely born on Skomer and 16 pups turned up either just before the start of moult, or moulting (wanderers).

The total of 202 pups born on Skomer Island is the third highest total ever recorded with 215 (in 2014) and 220 (in 2015) being the record.

The first pup of the season was born on Castle Bay on 12/08 and was found on 13/08.

Sixteen were born in August, 96 in September, 84 in October and six in November. Therefore the busiest month was September contrary to the trend of the last five years in which more pups were born in October than September.

The busiest period this year was two weeks earlier than in 2015 with 33 pups born in week 39 (26/9-2/10).

146 pups are known, or assumed, to have survived on Skomer, giving a survival rate of 72% which is lower than last year's rate (76.1%) and the average of the last ten years (76%).

The seal monitoring sites on Skomer are shown in Plates 1, 2 and 3.

Plate 1 Skomer Island overview

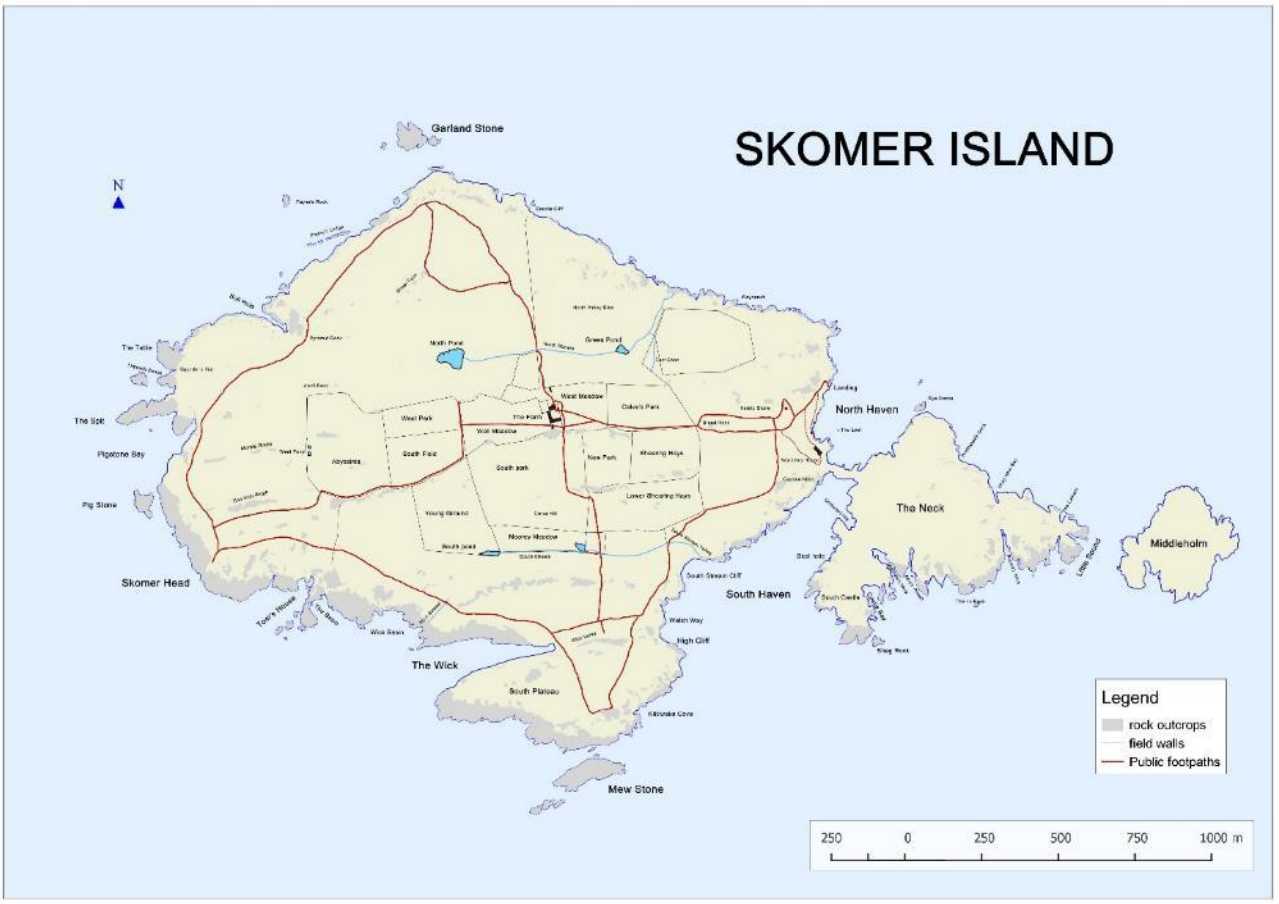


Plate 2 Skomer Island Grey Seal pupping sites East

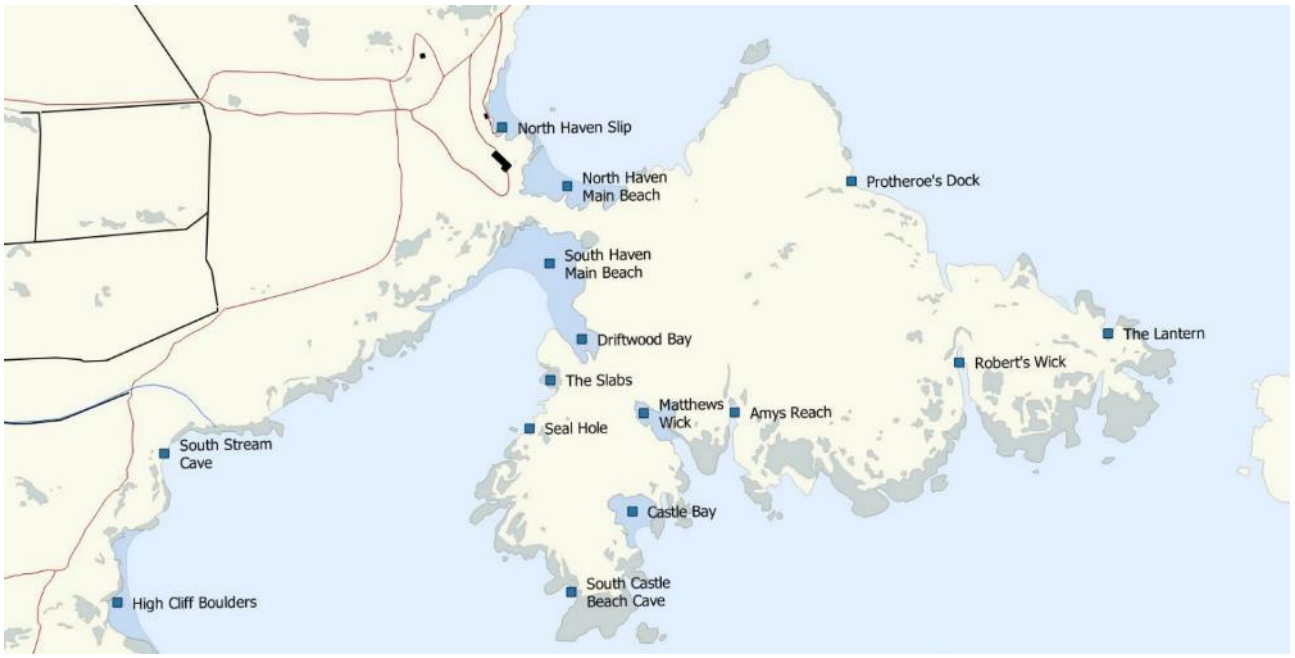
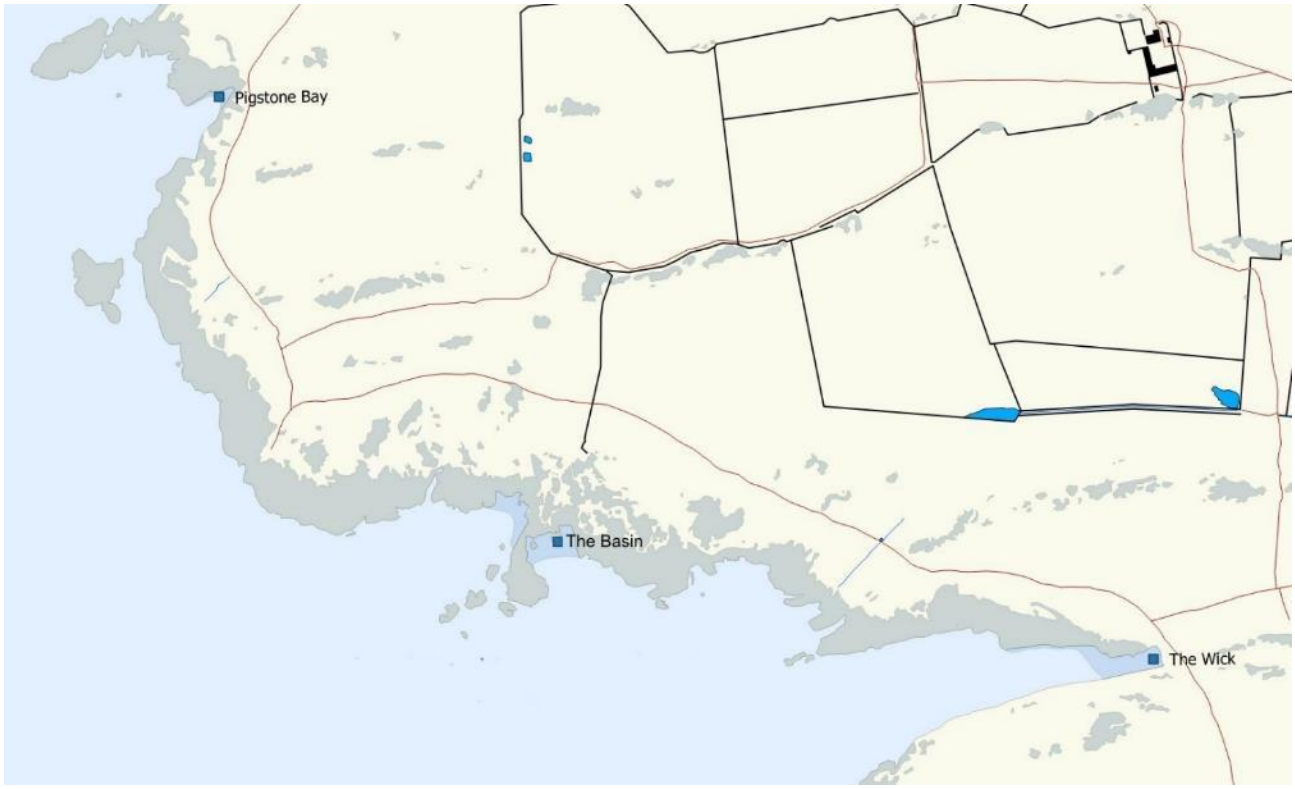


Plate 3 Skomer Island Grey Seal pupping sites West



4.2 Pup Numbers

2016 was a good breeding season for the seals within the Skomer Marine Conservation Zone (MCZ) with a total of 345 pups born, of which 143 were born on the Marloes Peninsula.

On Skomer 218 pups were monitored in 2016. 202 of them were definitely born on Skomer and 16 pups (wanderers) turned up either just before the start of moult, or moulting. These were potentially also born on Skomer but not recorded as they may have been born elsewhere or in locations hidden from view.

After two years of record pup numbers (215 in 2014 and 240 in 2015) the Skomer pup numbers dropped slightly in 2016. However four more pups were born on the Marloes Peninsula than in 2015. The number of seal pups born within the MCZ, however, is still the third highest ever recorded.

Figure 1 Number of seal pups born in Skomer MCZ 1983-2016

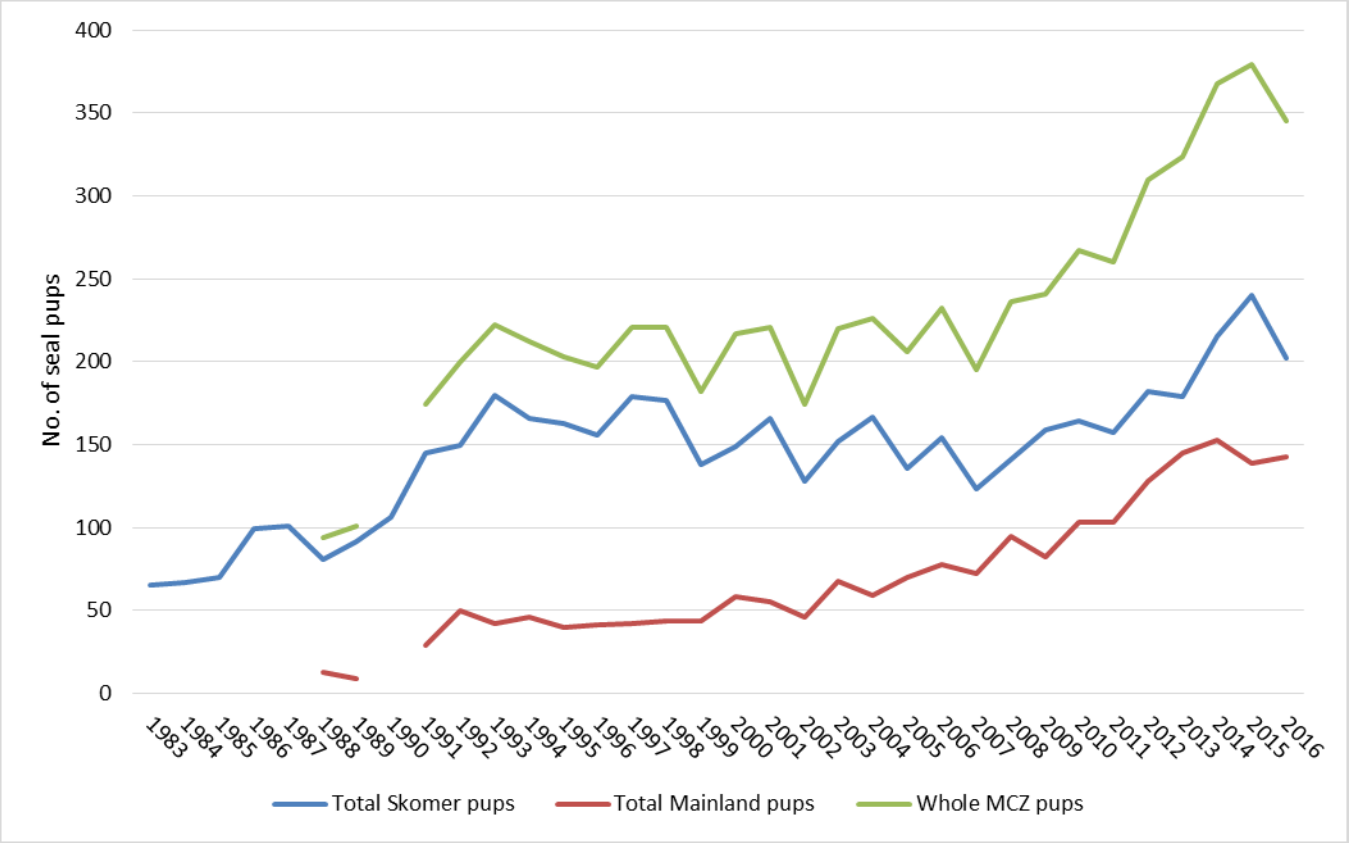


Figure 2 Daily totals of seal pups born on Skomer Island in 2016

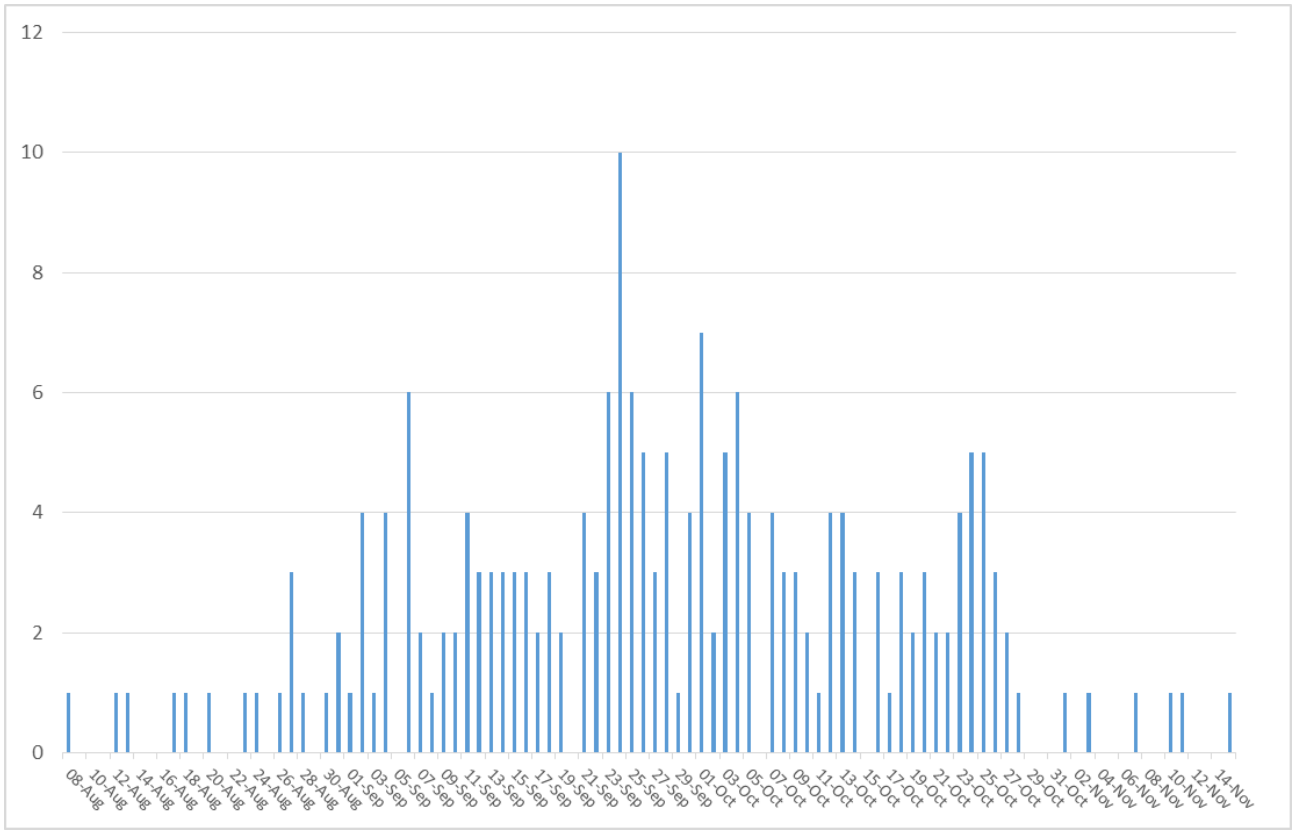


Table 1 Monthly number & percentage of seal pup births on Skomer Island 1983-2016

Year	July	August	September	October	November
2016		16 (7.9%)	96 (47.5%)	84 (41.58%)	6 (3.0%)
2015	0	12 (5%)	91 (37.9%)	114 (47.5%)	23 (9.6%)
2014	0	8 (3.7%)	77 (35.8%)	107 (49.8%)	23 (10.7%)
2013	0	8 (4.5%)	60 (33.5%)	92 (51%)	19 (11%)
2012	0	19 (10%)	65 (36%)	77 (42%)	21 (12%)
2011	0	11 (7%)	55 (35%)	56 (36%)	35 (22%)
2010	0	11 (7%)	75 (46%)	50 (30%)	28 (17%)
2009	0	13 (8%)	62 (39%)	47 (30%)	36 (23%)
2008	0	11 (8%)	79 (57%)	37 (27%)	11 (8%)
2007	0	10 (8.5%)	63 (53%)	35 (30%)	10 (8.5%)
2006	0	11 (7%)	78 (52%)	47 (31%)	15 (10%)
2005	0	12 (9%)	79 (58.5%)	35 (26%)	9 (6.5%)
2004	0	24 (14%)	98 (59%)	37 (22%)	8 (5%)
2003	1 (1%)	17 (11%)	92 (60%)	38 (25%)	6 (4%)
2002	0	21 (16.5%)	62 (48.5%)	42 (33%)	3 (2%)
2001	0	17 (10%)	90 (54.5%)	57 (34.5%)	1 (1%)
2000	2 (1%)	14 (9%)	102 (65%)	40 (25%)	No survey
1999	0	6 (4%)	91 (65%)	44 (31%)	No survey
1998	0	7 (4%)	96 (54%)	70 (39%)	5 (3%)
1997	0	3 (2%)	75 (43%)	85 (49%)	10 (6%)
1996	0	0	61 (39%)	75 (48%)	20 (13%)
1995	0	2 (1%)	49 (30%)	99 (61%)	13 (8%)
1994	0	2 (1%)	51 (31%)	96 (58%)	16 (10%)
1993	0	6 (3%)	67 (38%)	87 (49%)	18 (10%)
1992	1 (0.5%)	4 (3%)	40 (28%)	73 (50%)	27 (18.5%)
1991	1 (1%)	0	20 (14%)	75 (54%)	43 (31%)
1990	0	3 (3%)	17 (16%)	69 (64%)	18 (17%)
1989	0	2 (2%)	18 (19%)	45 (46%)	32 (33%)
1987*	0	0	11 (11%)	41 (41%)	32 (32%)
1986*	0	4 (4%)	22 (25%)	32 (36%)	34 (39%)
1985*	0	0	18 (24%)	20 (27%)	20 (27%)
1984*	0	0	9 (13%)	28 (41%)	18 (26%)
1983*	0	0	24 (33%)	31 (42%)	15 (20%)

Seal observations continued to mid-December in 1983, 1985 and 1986 and to the end of January in 1984 and 1987. The following data was recorded in these survey years:
1983 Dec: 3(4%), 1984 Dec: 6(9%), Jan: 6(9%). 1985 Dec: 14(19%), 1986 Dec: 5(5%),

1987 Dec: 15(15%), Jan: 5(5%). From 1989 onwards the survey only continued to the end of November when the island was vacated of all staff. This table also excludes 1988 as it was not possible to extract the data.

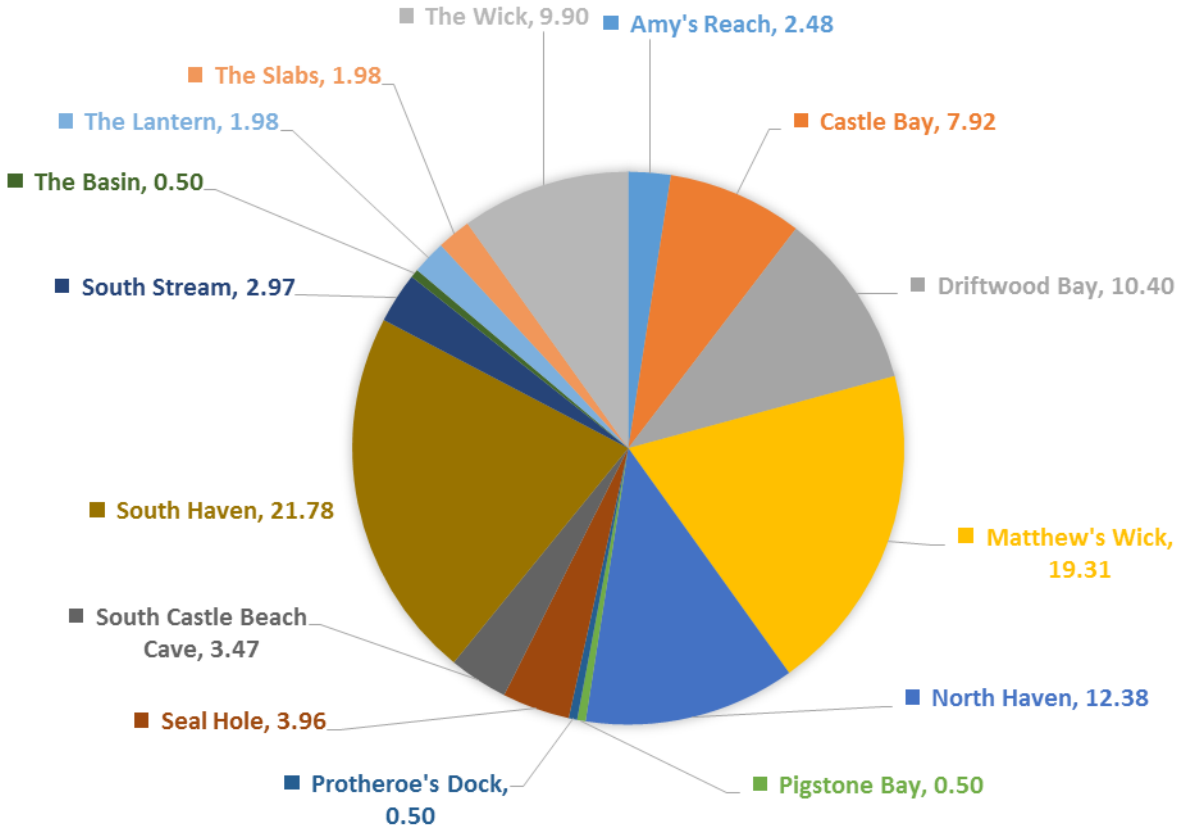
There are occasional records of seal pups in July by island staff and these are included in the table, however the full survey with routine site visits does not commence till August.

The busiest period this year was two weeks earlier than in 2015, with 33 pups born in week 39 (26/9-2/10).

Like in the previous three years the most productive beaches were South Haven (44 pups) and Matthew's Wick (39 pups). In 2015 and 2016 (in contrast to 2014) North Haven was the third most popular beach followed by Driftwood Bay which was the fourth most popular beach in 2015 and 2016.

The fact that there were no strong northerly winds during the main pupping period (October) may have contributed to North Haven beach being an attractive pupping site.

Figure 3 Percentage of seal pups born at each site on Skomer Island in 2016



4.3 Survival Rate

The fate of all 202 pups is known with relative certainty so no pups were excluded from the survival rate calculation.

136 pups are known, or assumed to have survived on Skomer, giving a survival rate of 72%, which is lower than in 2015 but still higher than in 2014 (68%) and lower than the average of the last 10 years (76%).
On the mainland 108 pups are known, or assumed to have survived, giving a survival rate of 76% which is also lower than in 2015 (81%). The overall survival rate for the Skomer MCZ was 75% (same as in 2015).

Figure 4 Percentage of seal pups surviving in Skomer/MCZ 1983-2016

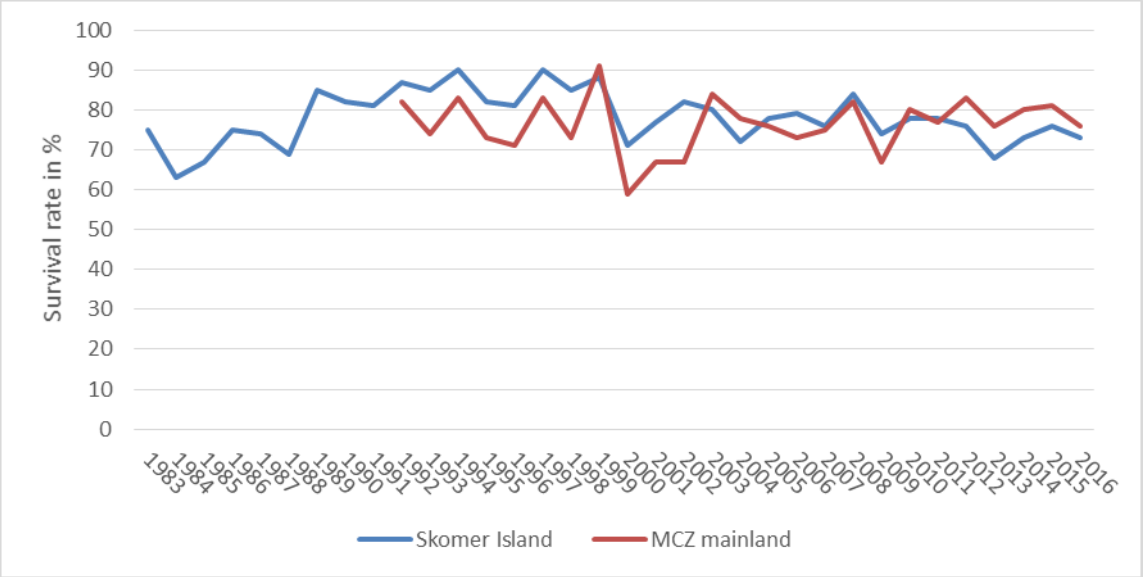


Figure 5 Weekly seal pup births and deaths on Skomer Island in 2015 and 2016

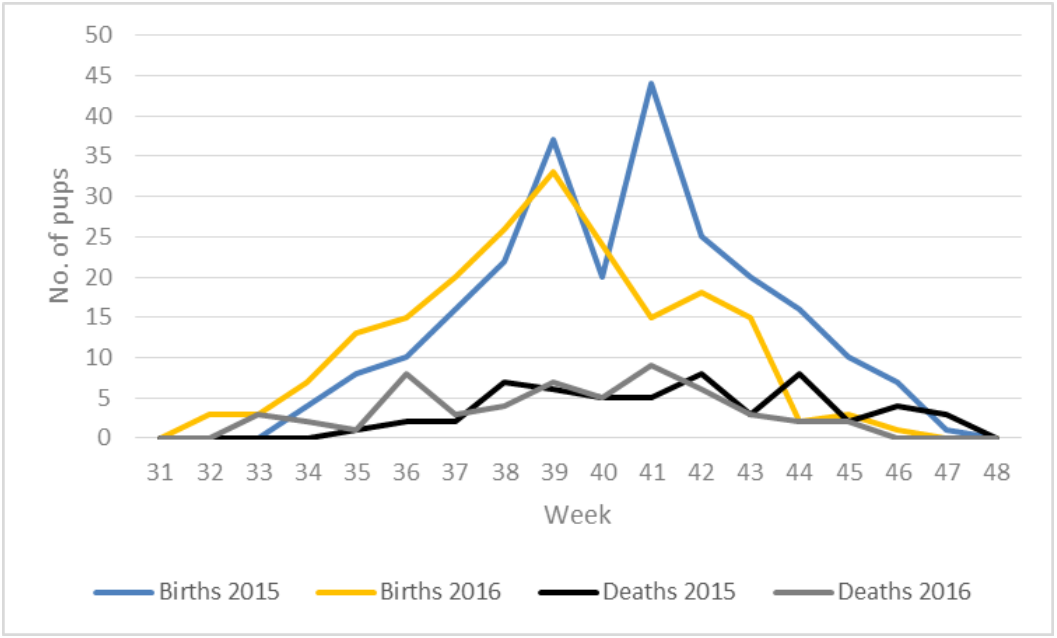


Table 2 Survival rates per site on Skomer Island in 2016

Site	**Total Number of pups raised per beach** (excl. pups whose fate is unknown)				**No of pups survived**				**Survival Rate %**			
	2013	**2014**	**2015**	**2016**	**2013**	**2014**	**2015**	**2016**	**2013**	**2014**	**2015**	**2016**
Amy's Reach	5	3	8	5	2	3	6	3	40	100	75	60
Castle Bay	21	30	23	16	14	17	15	9	67	57	65	56
Driftwood Bay	21	26	25	21	18	21	21	15	72	81	84	71
Garland Stone	0	0	2	0	0	0	1	0	0	0	50	n/a
High Cliff Boulders	4	0	0	0	4	0	0	0	100	0	0	n/a
Matthew's Wick	35	41	42	39	25	32	31	27	71	78	74	69
Mew Stone	0	0	1	0	0	0	0	0	0	0	0	n/a
North Haven	18	24	36	25	8	19	28	19	44	79	78	76
Pigstone Bay	0	0	1	1	0	0	0	1			0	100
Protheroe's Dock	2	1	1	1	2	1	1	0	100	100	100	0
Seal Hole	6	9	9	8	5	5	5	7	83	56	56	88
South Castle Beach Cave	9	4	5	7	7	4	3	4	78	100	60	57
South Haven	34	33	40	44	21	23	34	27	72	70	85	61
South Stream	2	7	9	6	2	6	7	5	100	86	78	83
The Basin	1	4	2	1	0	4	1	0		100	50	0
The Lantern	4	1	1	4	3	1	1	3	75	100	100	75
The Slabs	4	6	8	4	1	2	5	2	25	33	63	50
The Wick	13	22	21	20	7	17	19	14	54	77	90	70

Note: Pups that moved from their natal beach to a new location and spent the majority of their time there were added to that beach's total to establish the survival rate for this location. Pups which fates were unknown were not taken into account when calculating the survival rate.

Table 3 Causes of seal pup deaths on Skomer Island in 2016

Cause of death	No. of pups	% of deaths	% of total pups born
Abandoned/ diseased	4	7	2
Abandoned/separated/starved	16	29	8
Accident/killed	0	0	0
Disappeared ≤ stage 3	14	25	7
Diseased	1	2	0
Drowned	3	5	1
Drowned/diseased	0	0	0
Stillborn	11	20	5
Stillborn/drowned	0	0	0
Unknown	6	11	3
Other*	1	2	0
Total	**56**		

* One female on South Haven beach was looking after her own and one adopted pup but she seemed not to be able to feed them. The pups were observed trying to suckle and the female was very attentive and aggressive against other females but the pups didn't put on weight and both died at seven and 19 days of age respectively. The female had a large scar on her underside which possibly hindered the pups from suckling.

Plate 4 Mother of pup 115 and 117 trying to suckle the pups

4.4 Site Summaries

4.4.1 North Haven

Pups on the main North Haven beach can be very difficult to monitor as there are several caves and overhangs at the back of the beach where pups often disappear, especially during rough weather. The beach is a popular haul-out site and it can become impossible to try and see hidden pups without disturbing the haul out.

A total of 25 pups were born in North Haven in 2016. 19 pups are assumed to have survived to the beginning of moult or were weaned, giving a survival rate of 76% which is two percent lower than last year's (78%). In the last three years the seal pups on North Haven beach profited from the lack of strong northerly winds.

Figure 6 Number of seal pups born in North Haven 1983–2016

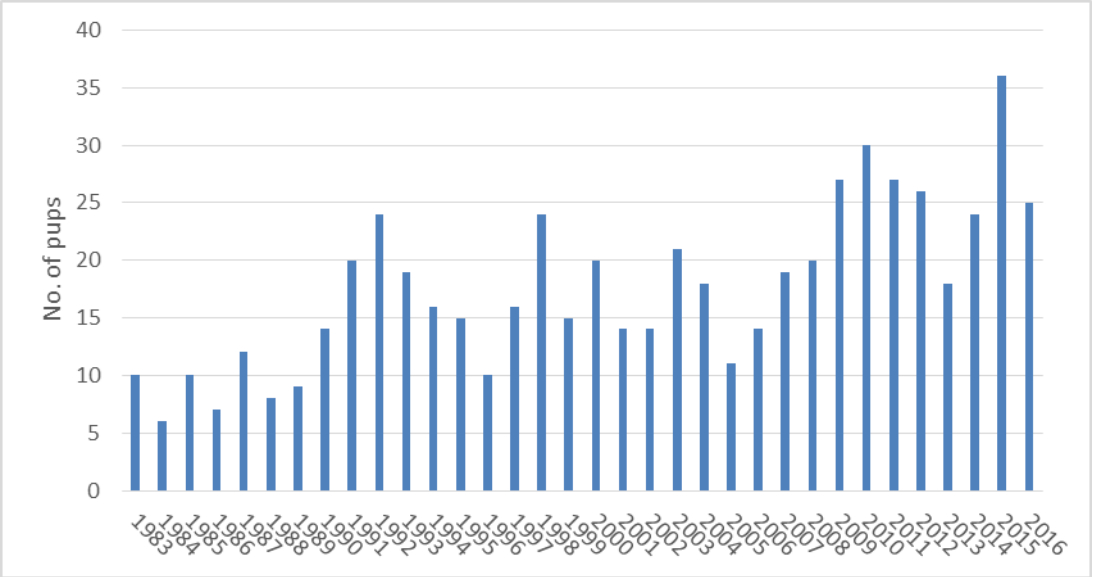


Figure 7 Weekly seal pup births in North Haven in 2016

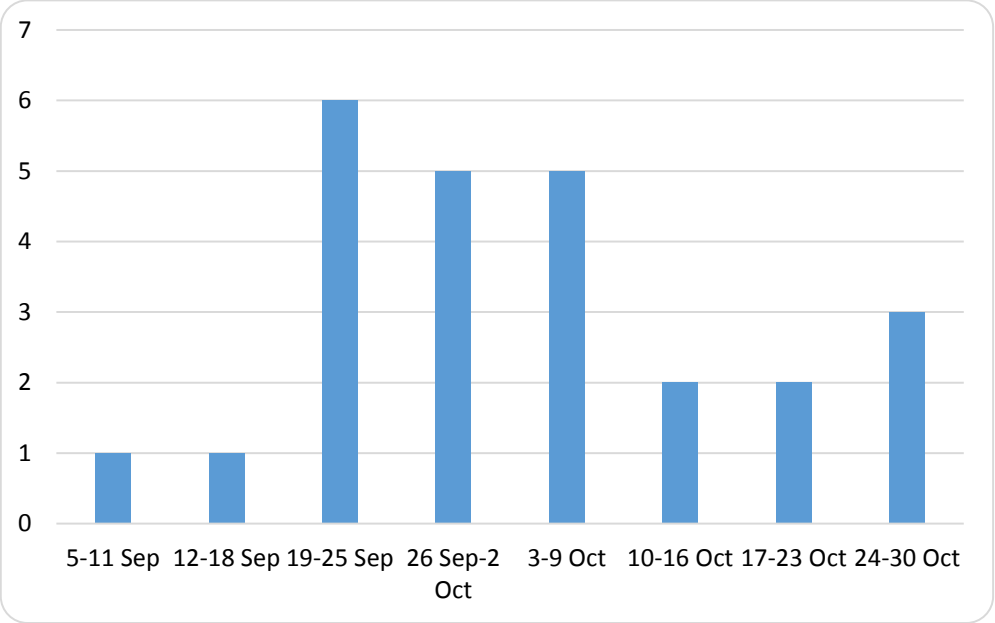


Table 4 Fate of pups in North Haven in 2016

Fate	No of pups
Assumed dead	2
Assumed survived	4
Dead	4
Survived to beginning of moult	4
Survived to weaning	11
Total	**25**

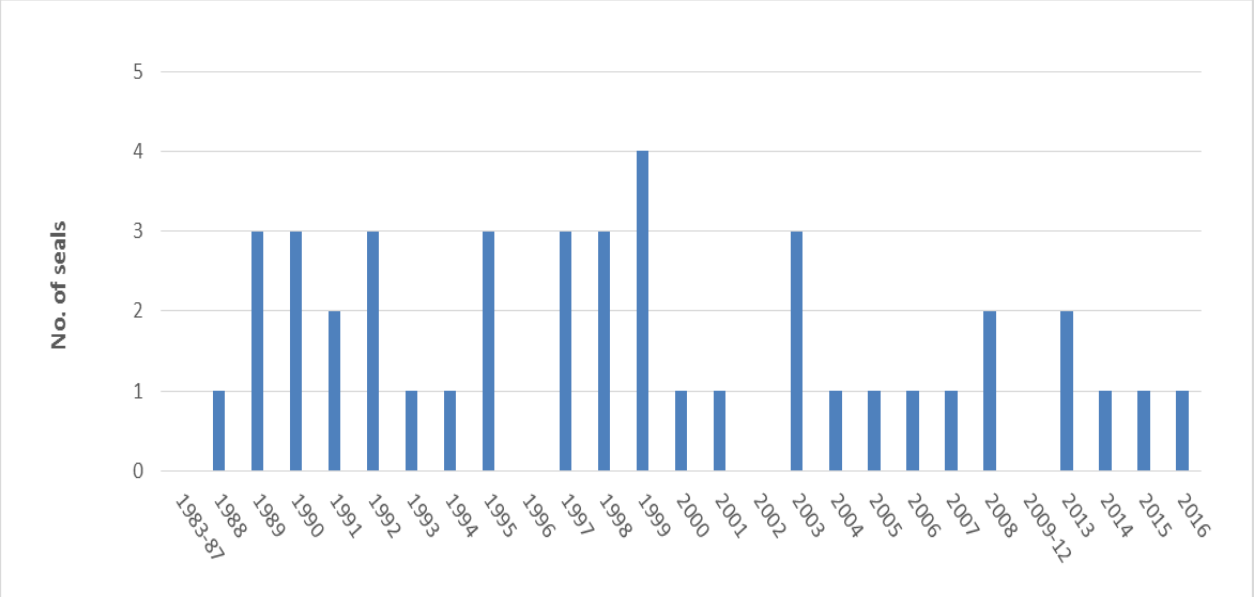
Table 5 Causes of seal pup deaths on North Haven beach in 2016

Cause of death	No. of pups
Abandoned/separated/starved	1
Disappeared ≤ stage 2	3
Stillborn/drowned	1
Unknown	1
Total	**6**

4.4.2 Protheroe's Dock

In 2016 one pup was found dead, size 1 on Protheroe's Dock in week 43.

Figure 8 Number of seal pups born in Protheroe's Dock 1983-2016



Six site visits were conducted to Protheroe's Dock during the monitoring period.

4.4.3 The Lantern

Access to the Lantern is only possible at low tide. All access routes into the Lantern are hazardous in wet weather or when there is a big swell. Even if access is possible cows often remain deep inside the cave making marking pups impossible and accurately assessing their progress very difficult.

Since 2014 access has been gained by abseiling from a rocky outcrop into the eastern entrance which enables access even on smaller tides (>2.5). In 2015 this route was risk assessed by Leo Nathan and was deemed to be the best and safest way of entering the Lantern. A semi-permanent rope (which is removed in winter) was installed around a rocky outcrop. When conducting a site visit the abseil rope is clipped on to this one via a karabiner; this setup reduces the risk of making mistakes and speeds up the site visit.

In 2016 the Lantern was checked nine times and four pups were found of which three are assumed to have survived giving a survival rate of 75%.

Figure 9 Number of seal pups born in The Lantern 1983-2016

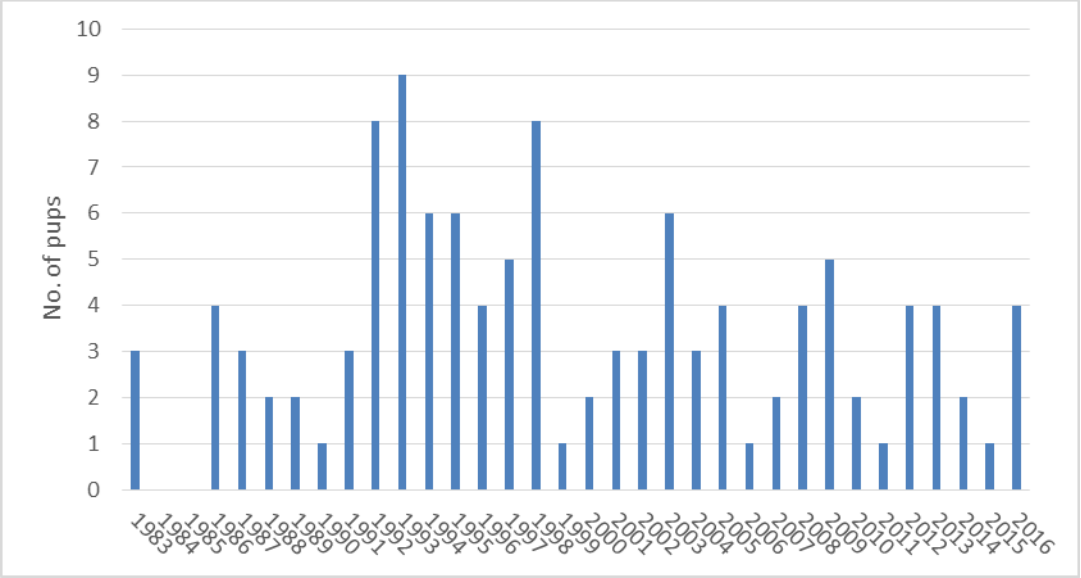


Figure 10 Weekly seal pup births in the Lantern in 2016

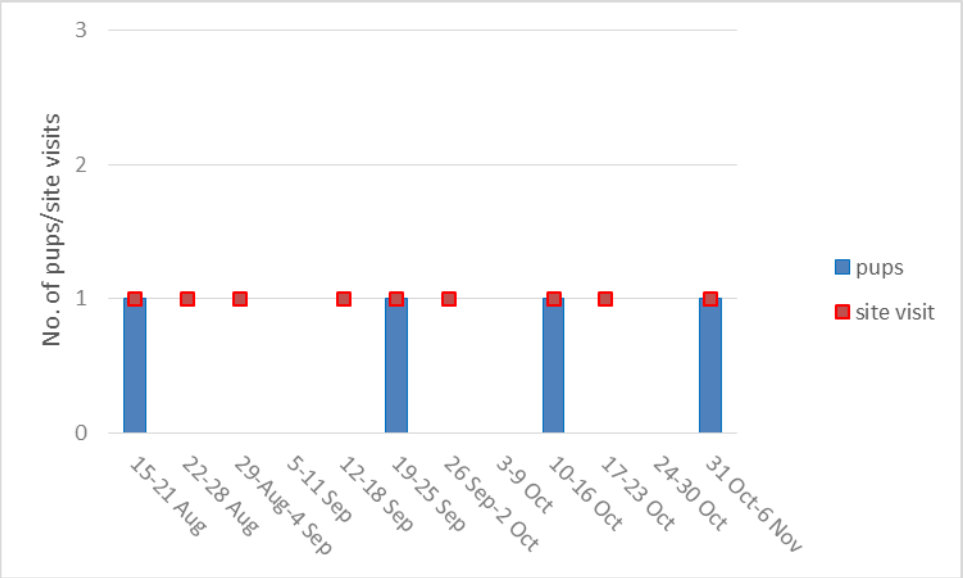


Table 6 Fate of pups in the Lantern in 2016

Fate	No of pups
Assumed dead	1
Total	**1**

Table 7 Causes of seal pup deaths in the Lantern in 2016

Cause of death	No. of pups
Disappeared ≤ stage 2	1
Total	**1**

4.4.4 Amy's Reach

Five pups were born in Amy's Reach in 2016.

Figure 11 Number of seal pups born in Amy's Reach 1983–2016

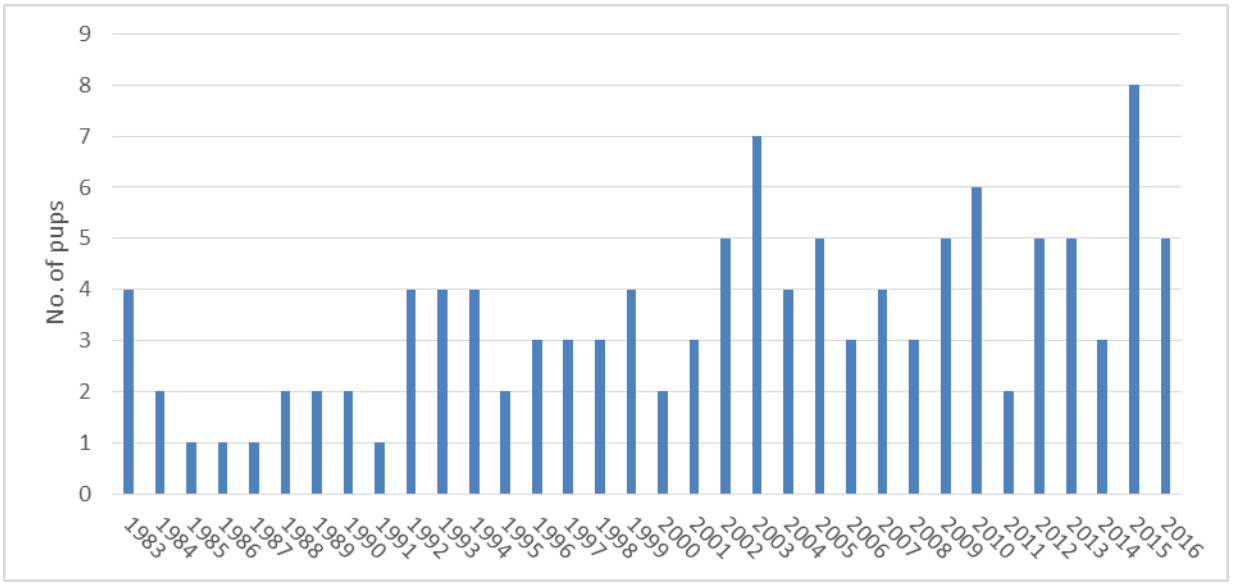
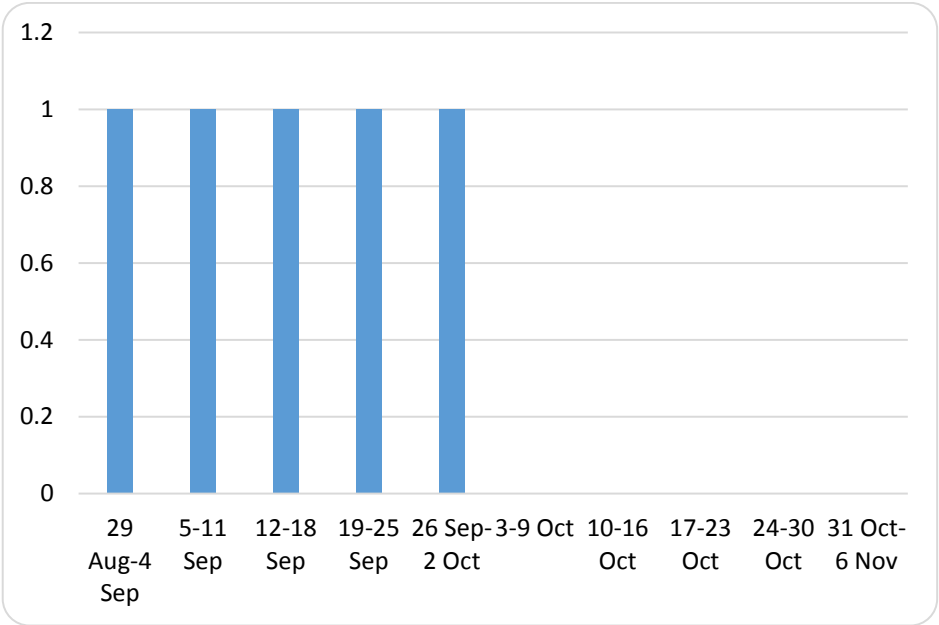


Figure 12 Weekly seal pup births in Amy's Reach 2016



Three of the five pups born survived and weaned, giving a survival rate of 60%.

Table 8 Fate of pups in Amy's Reach in 2016

Fate	No of pups
Dead	2
Survived to weaning	3
Total	**5**

Table 9 Causes of seal pup deaths in Amy's Reach 2016

Cause of death	No. of pups
Still born	1
Unknown	1
Total	**2**

4.4.5 Matthew's Wick

39 pups were born on Matthew's Wick in 2016.

Figure 13 Number of seal pups born in Matthew's Wick 1983–2016

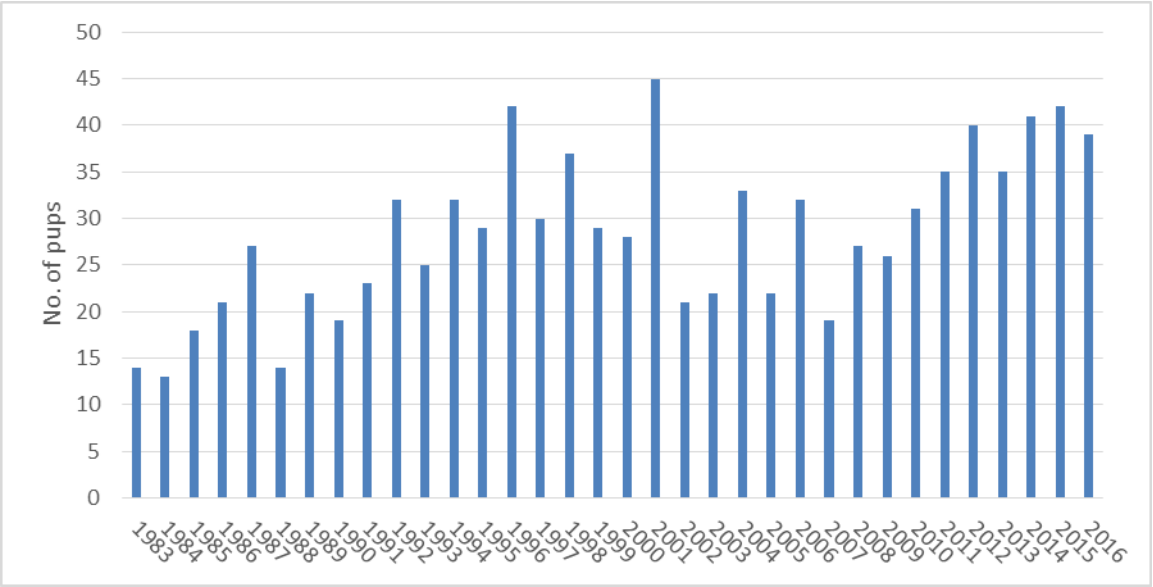
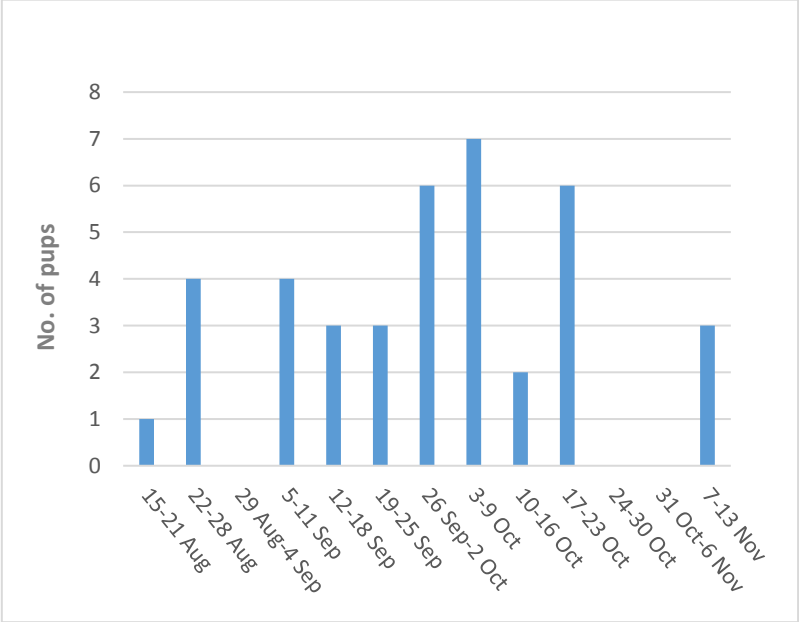


Figure 14 Weekly seal pup births in Matthew's Wick in 2016



27 pups are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 69%.

Table 10 Fate of pups on Mathew's Wick in 2016

Fate	**No of pups**
Assumed dead	4
Assumed survived	3
Dead	8
Survived to beginning of moult	3
Survived to weaning	21
Total	**39**

Table 11 Causes of seal pup deaths on Mathew's Wick in 2016

Cause of death	**No. of pups**
Abandoned/separated/starved	5
Disappeared <size 3	4
Diseased/abandoned	1
Stillborn/drowned	2
Total	**12**

4.4.6 Castle Bay

Only 16 pups were born in Castle Bay in 2016, seven less than the previous year.

Figure 15 Number of seal pups born in Castle Bay 1983-2016

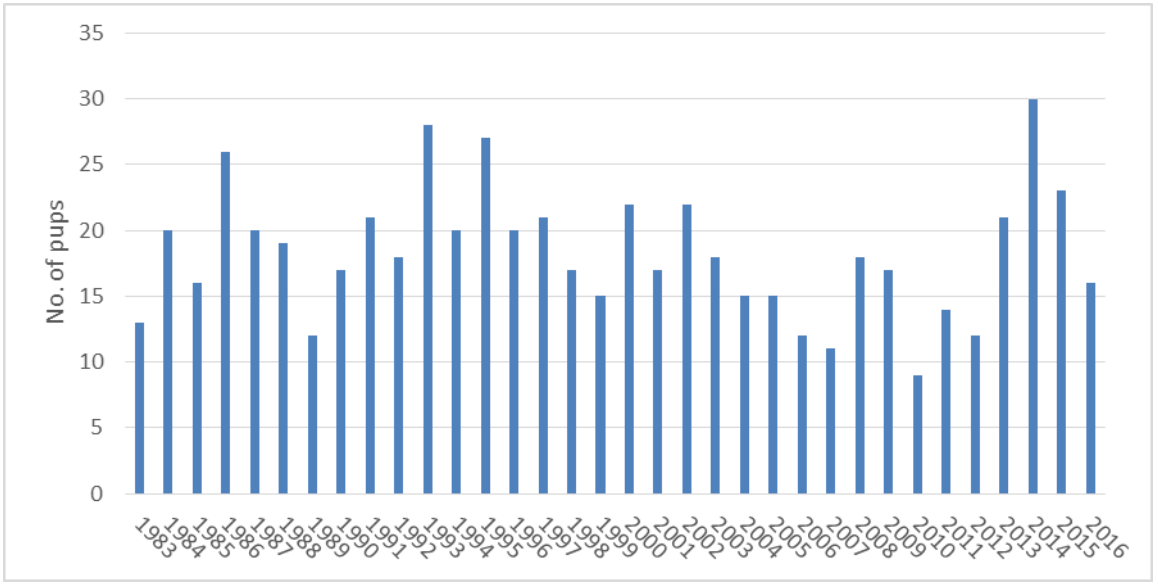
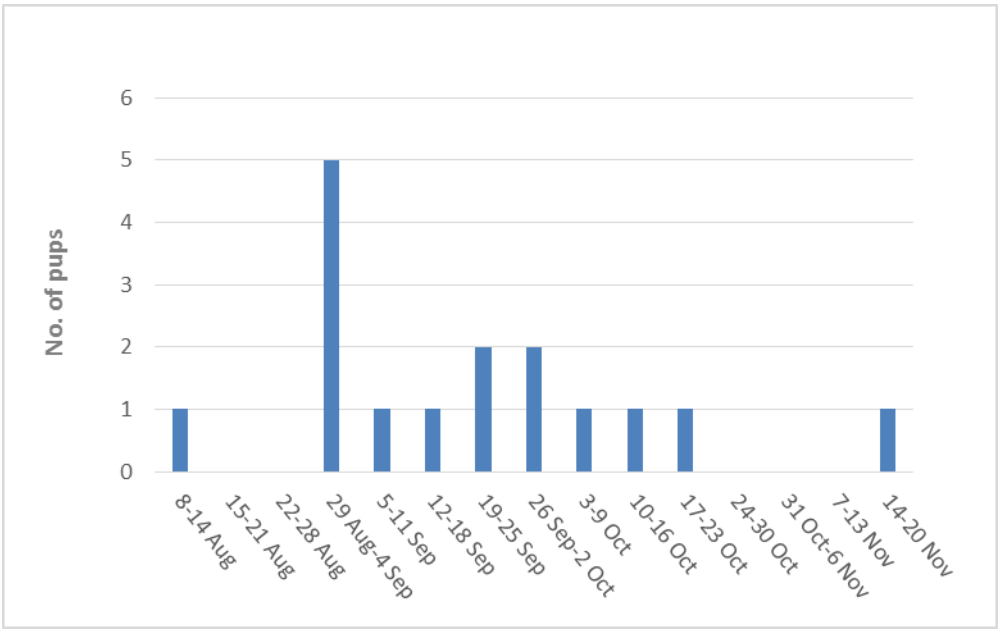


Figure 16 Weekly seal pup births in Castle Bay in 2016



Access to Castle Bay is impossible and pups born there do not get marked. In Castle Bay nine pups are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 56%.

Castle Bay seems to be a less suitable beach for raising seal pups. The survival rate in the years 2013-2016 was lower than the year's average and the 2016 survival rate was lower than the average survival rate since recording began. Castle Bay is facing into the prevailing wind direction hence it gets fully flooded during storms. However, the beach is rather wide which will protect the pups on all but the bigger tides. Castle Bay is also the beach with the largest and most permanent haul-out. Maybe the presence of other seals unsettles the mothers and pups and leads to abandonment of the pup, or the site. As these pups are not marked it is difficult to say whether pups that disappear turn up somewhere else and wean successfully.

Table 12 Fate of pups on Castle Bay in 2016

Fate	**No of pups**
Assumed dead	1
Assumed survived	4
Dead	6
Survived to beginning of moult	1
Survived to weaning	4
Total	**16**

Table 13 Causes of seal pup deaths on Castel Bay in 2016

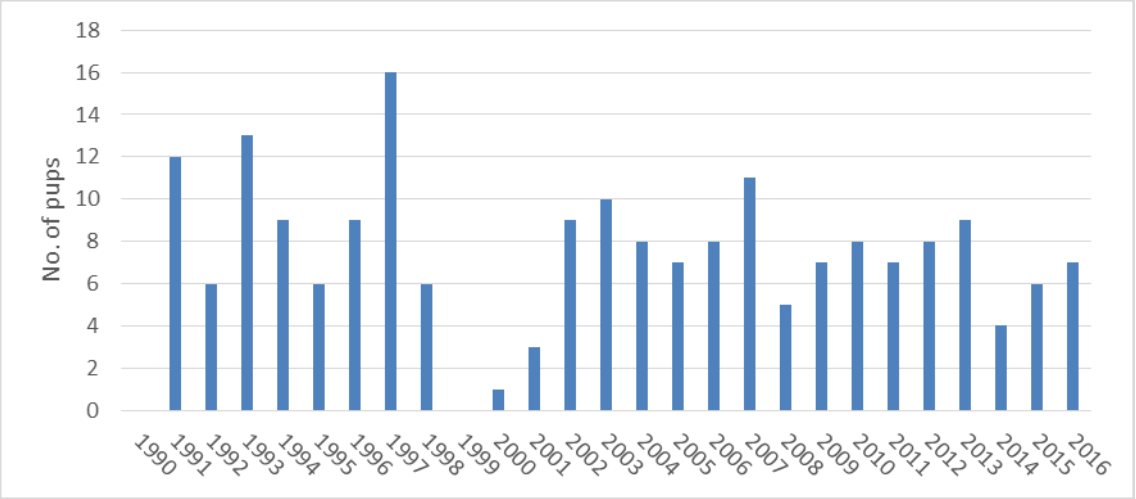
Cause of death	**No. of pups**
Abandoned/separated/starved	3
Disappeared ≤ stage 2	1
Diseased	1
Stillborn	2
Total	**7**

4.4.7 South Castle Beach Cave

South Castle Beach Cave was overlooked as a pupping site prior to 1990, and between 1999-2001 access was severely limited as the unstable nature of the rock above was deemed unsafe for the rope access recommended in the Handbook (Poole, J, 1996a), and boat access is virtually impossible due to the almost constant swell. Following a re-assessment in 2002 it was considered that a scramble route without rope was a reasonable option in dry conditions (Hughes, 2002). In 2015 the route was reassessed again by Leo Nathan and an abseil route was installed making access easier and safer. The cave is only accessible from land at low tide and because of the long and rocky route from the cave to the water it was decided not to enter the cave when cows were present to avoid excessive disturbance.

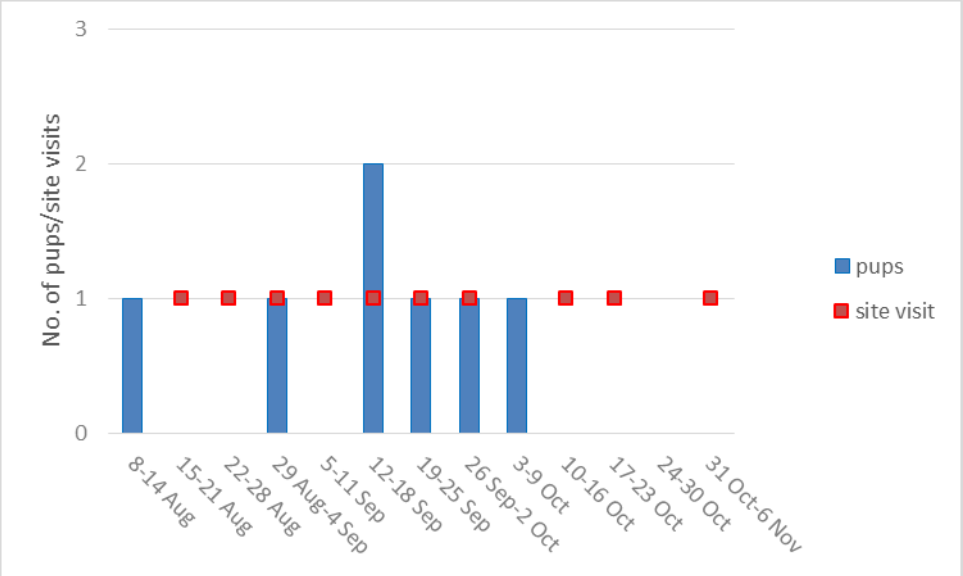
Seven pups were born in South Castle Beach Cave in 2016. Four pups are assumed to have survived, survived to beginning of moult or survived and were weaned. One pup was found dead in size 2, one pup disappeared size 1 and a third pup was abandoned giving a survival rate of 50%.

Figure 17 Number of seal pups born in South Castle Beach Cave 1983-2016



Ten visits were made to South Castle Beach Cave during the observation period.

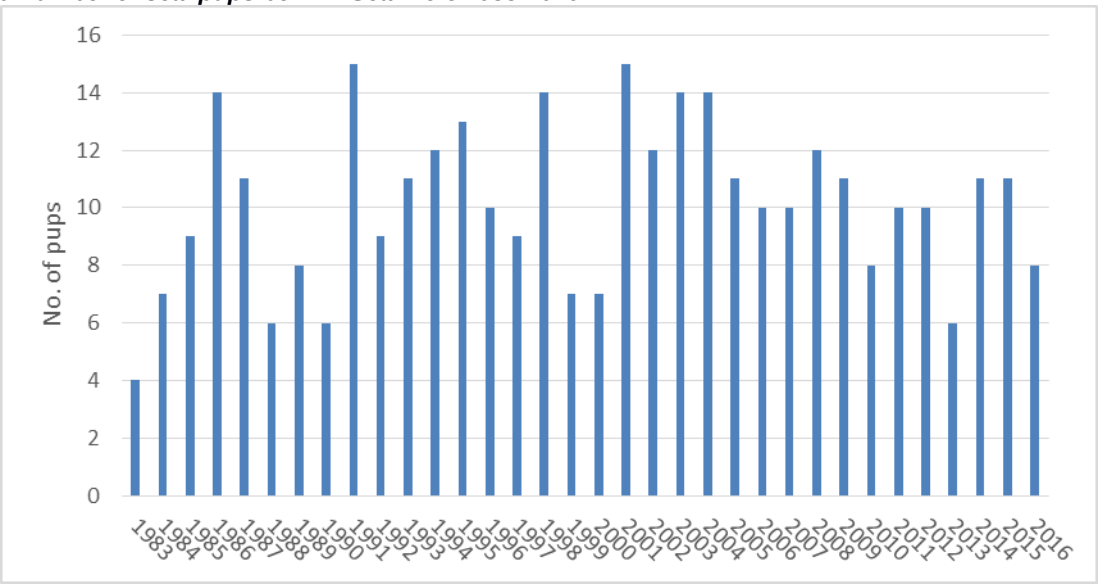
Figure 18 Weekly seal pup births in South Castle Beach Cave in 2016



4.4.8 Seal Hole

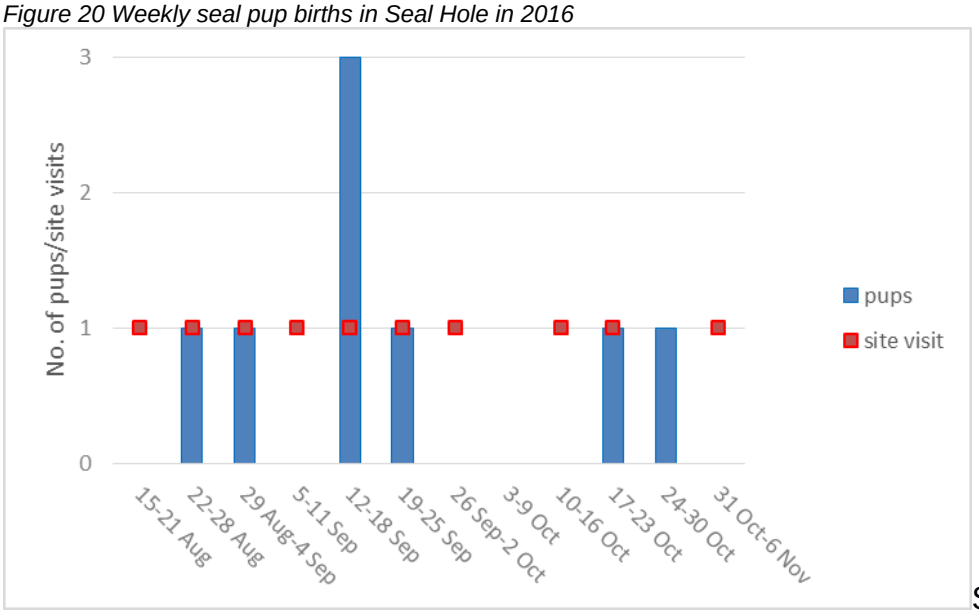
Eight pups were born in Seal Hole in 2016.

Figure 19 Number of seal pups born in Seal Hole 1983-2016



In 2016 ten site visits were made to Seal Hole.

Figure 20 Weekly seal pup births in Seal Hole in 2016



Seven pups born in Seal Hole are assumed to have survived, survived to beginning of moult or survived and were weaned. One pup drowned giving a survival rate of 86%.

4.4.9 The Slabs

Three pups were born on The Slabs in 2016.

One pup was weaned successfully, one pup died (reasons unknown) and one pup was abandoned giving a survival rate of 33%

Figure 21 Number of seal pups born on The Slabs 1983-2016

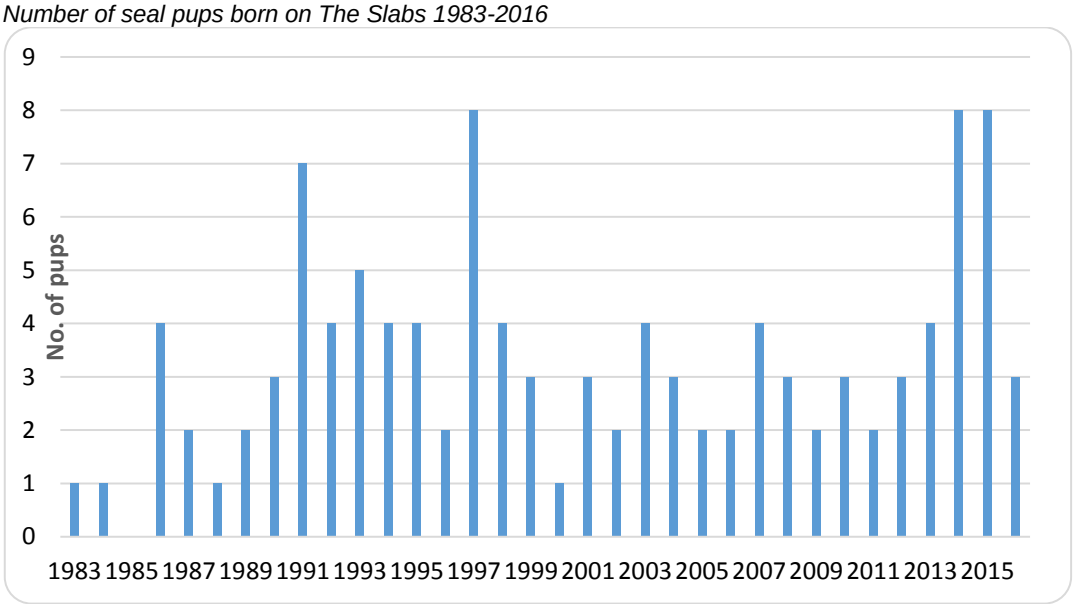
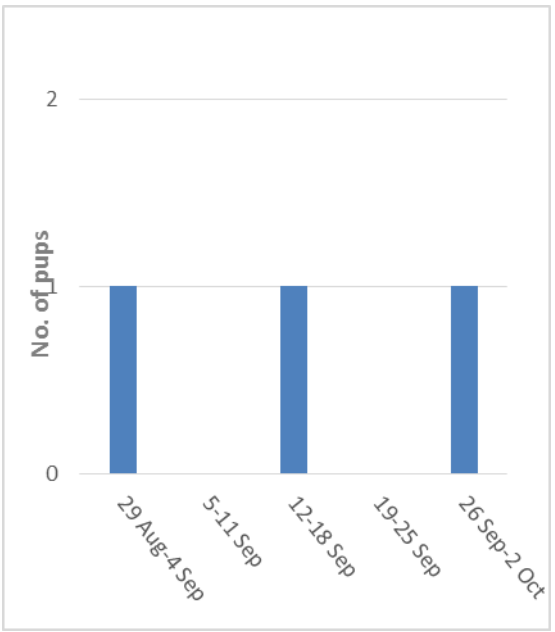


Figure 22 Weekly seal pup births on The Slabs in 2016



4.4.10 Driftwood Bay

23 pups were born in Driftwood Bay in 2016.

Figure 23 Number of seal pups born in Driftwood Bay 1983-2016

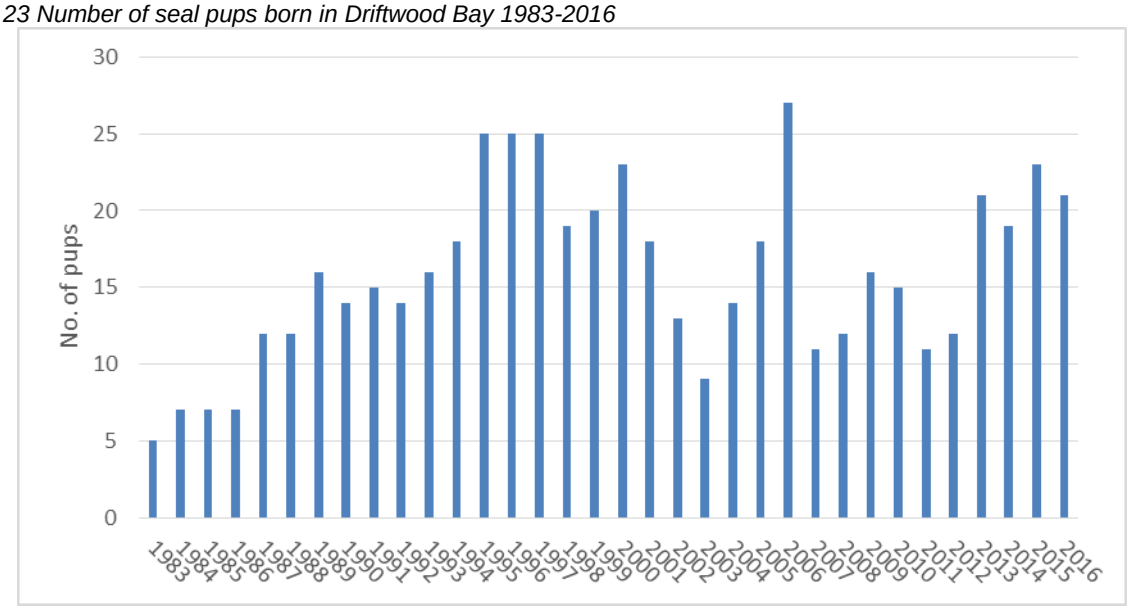
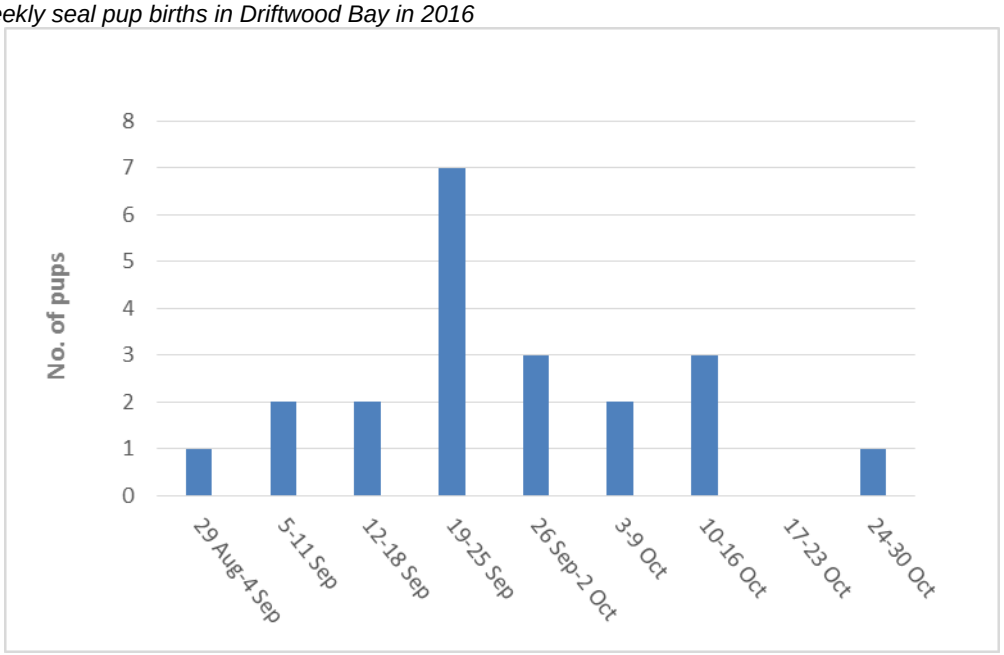


Figure 24 Weekly seal pup births in Driftwood Bay in 2016



One pup was born on South Haven beach but spent most of its time before weaning on Driftwood Bay, hence it was included in the figures for Driftwood Bay. Another pup was born on Driftwood Bay but spent most of its time before weaning on South Haven beach, hence it wasn't included in the Driftwood Bay figures.

Therefore a total of 21 pups was used to calculate the survival rate for this site. Of these, 15 pups are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 71%.

Table 14 Fate of pups on Driftwood Bay in 2016

Fate	**No of pups**
Assumed dead	2
Dead	4
Survived to beginning of moult	3
Survived to weaning	12
Total	**21**

Table 15 Causes of seal pup deaths on Driftwood Bay in 2016

Cause of death	**No. of pups**
Abandoned/separated/starved	2
Disappeared ≤ stage 2	2
Ill/abandoned	1
Stillborn	1
Total	**6**

4.4.11 South Haven

This site is made up of South Haven main beach and the two caves between the beach and Driftwood Bay. The caves were only visited when pups were marked on the main beach as accessing the caves inevitably disturbs all seals on the beach. The entrances to the caves can be monitored from across the bay and pups tend to move out of the caves within their first week and can be observed from above thereafter.

In 2016 44 were born on South Haven.

Figure 25 Number of seal pups born in South Haven 1983-2016

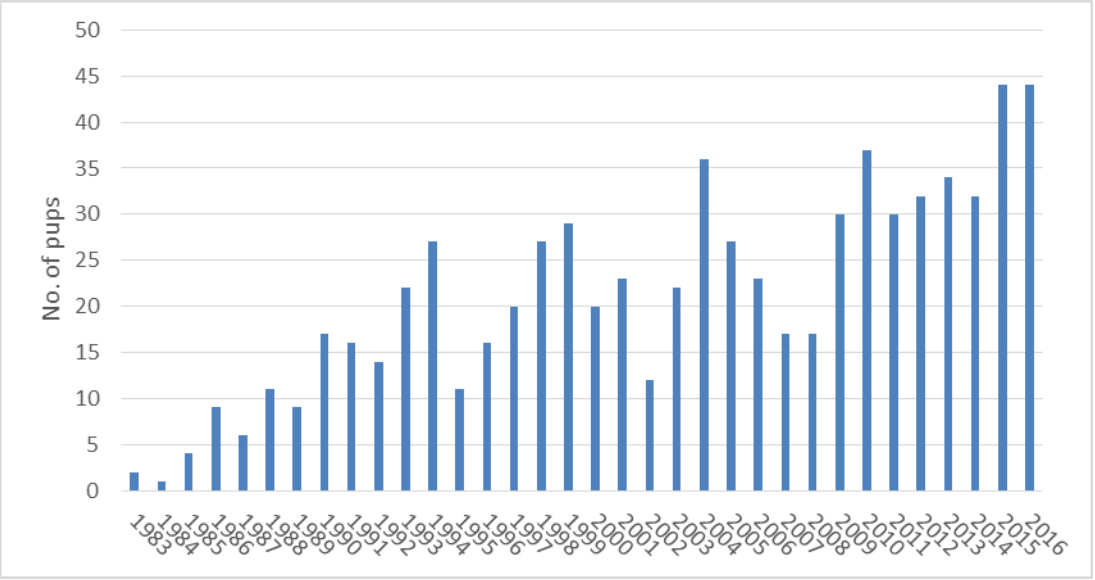
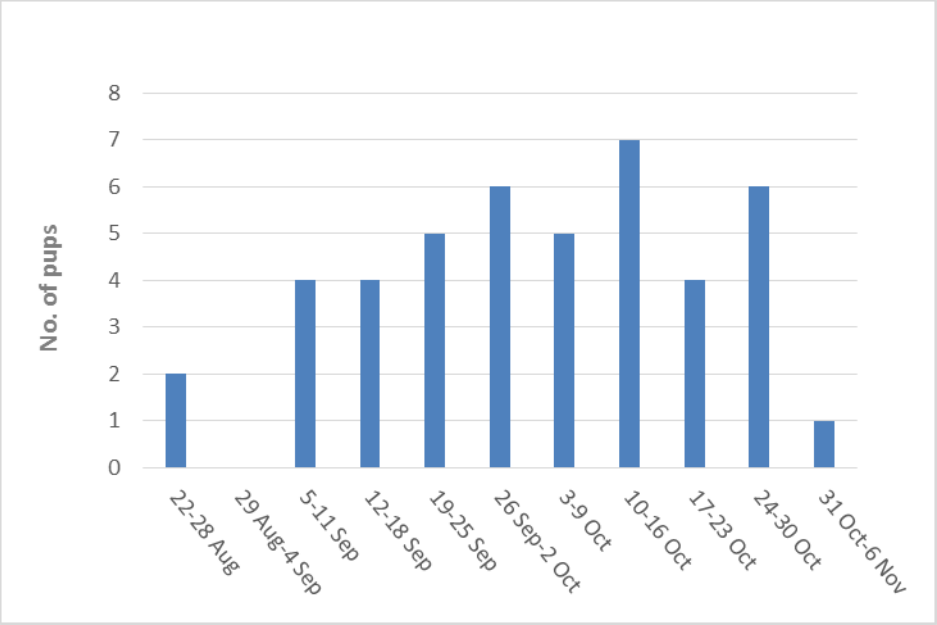


Figure 26 Weekly seal pup births in South Haven in 2016



One pup moved to Driftwood Bay and spent most of its time before weaning there. One pup moved from South Haven to Driftwood Bay and spent most of its time before weaning on

this beach. The survival for all pups raised on South Haven is 84% which makes it the most successful beach.

Table 16 Fate of pups in South Haven in 2016

Fate	**No of pups**
Assumed dead	2
Assumed survived	6
Dead	5
Survived to beginning of moult	9
Survived to weaning	22
Total	**44**

Table 17 Causes of seal pup deaths in South Haven in 2016

Cause of death	**No. of pups**
Abandoned/separated/starved	2
Abandoned/ill	1
Disappeared <3	2
Still born	1
Other*	1
Total	**7**

*see section 4.3

4.4.12 South Stream Cave and Boulders

South Stream Cave and Boulders is a hard site to monitor well. Access to the cave is only possible at low tide and is very treacherous in wet weather, pups are usually hidden in the cave or behind boulders and the only sign that they are present is when cows are seen swimming offshore. Before 2014 it was customary to check the site daily from The Neck and then follow up any activity with a visit to the cave. However in August 2014 we discovered that pups can easily be missed when inspecting from such a distance. In 2016 we checked the site from South Stream outfall every two to three days and as activity was low no full site visits was necessary.

Six pups were born at South Stream Cave in 2016, five are assumed to have survived, survived to beginning of moult or survived and were weaned. One pup is assumed dead as it disappeared size <3 giving a survival rate of 83%.

Figure 27 Number of seal pups born in South Stream Cave 1983-2016

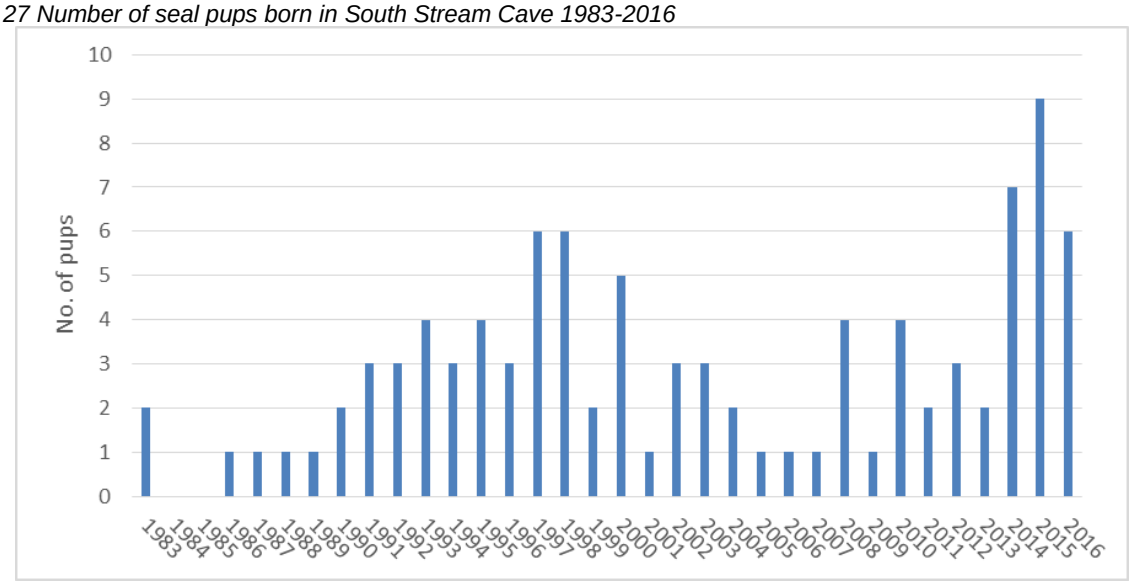
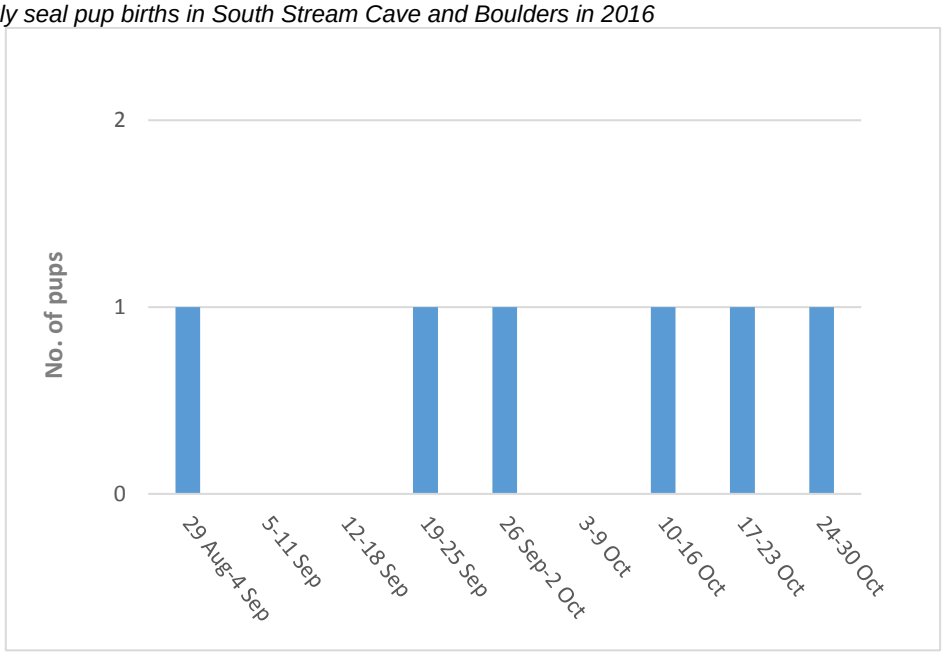


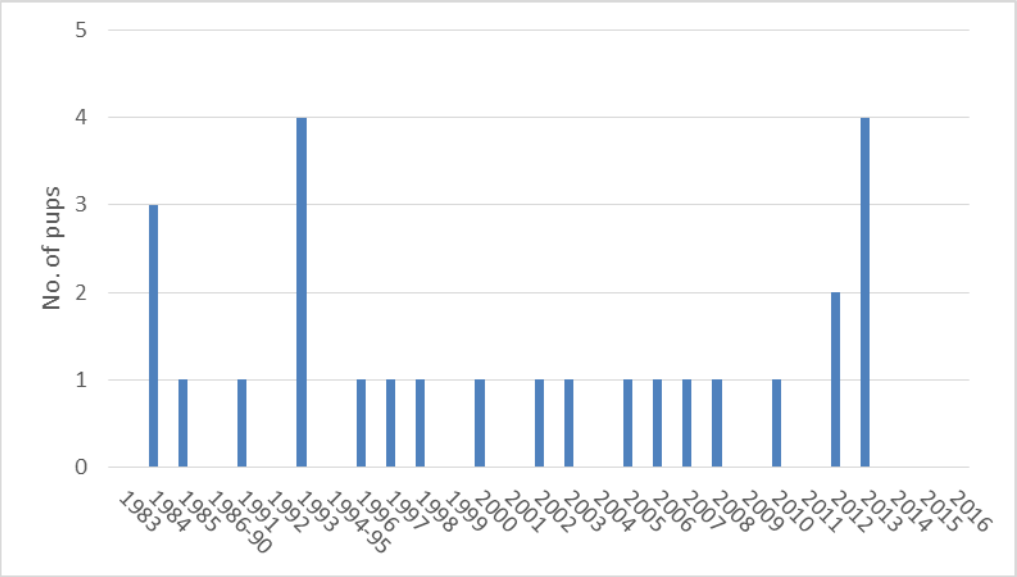
Figure 28 Weekly seal pup births in South Stream Cave and Boulders in 2016



4.4.13 High Cliff Boulders

High Cliff Boulders is another site which is difficult to monitor as the boulders shield the pups from view. The only way to check the beach fully is to scramble to the bottom and search within the rocks. High Cliff Boulders was checked approximately every four days from Welsh Way and one full site visit was conducted on 26 October after a seal pup was observed from the top. This turned out to be a wanderer. No pups were recorded born on this site in 2016.

Figure 29 Number of seal pups born at High Cliff Boulders 1983-2016



4.4.14 The Wick

20 seal pups were born on The Wick in 2016.

Figure 30 Number of seal pups born in The Wick 1983-2016

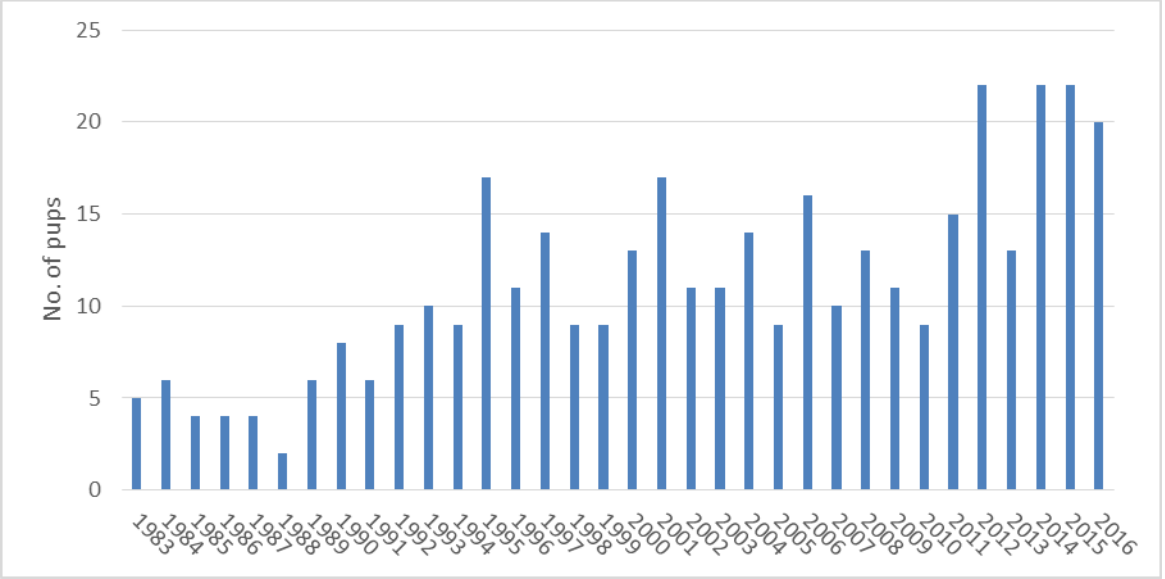
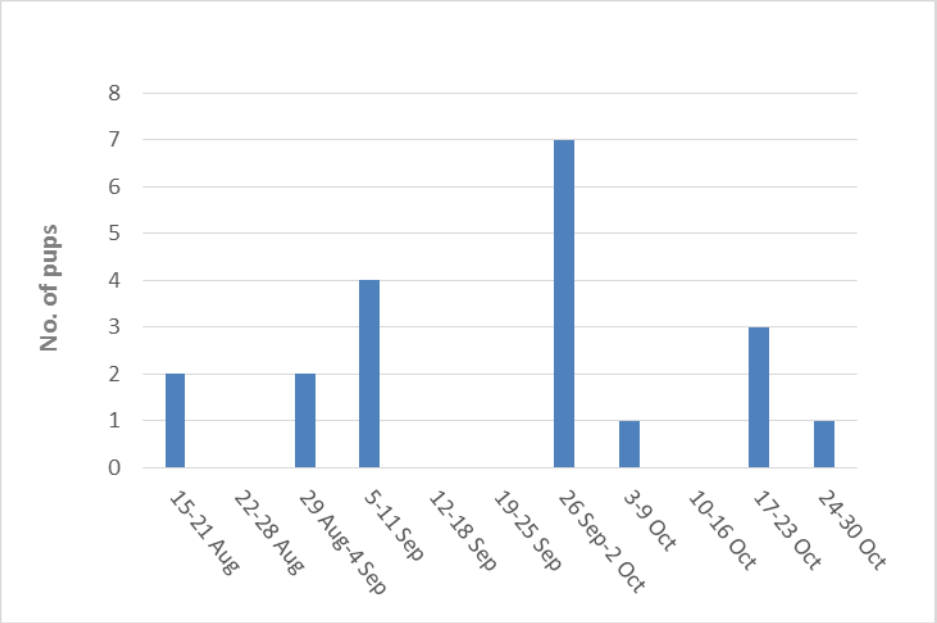


Figure 31 Weekly seal pup births in The Wick in 2016



14 pups are assumed to have survived, survived to beginning of moult or survived and were weaned and one pup's fate is unknown, giving a survival rate of 70%.

Table 18 Fate of pups on The Wick 2016

Fate	**No of pups**
Assumed survived	2
Dead	6
Survived to beginning of moult	5
Survived to weaning	7
Total	**20**

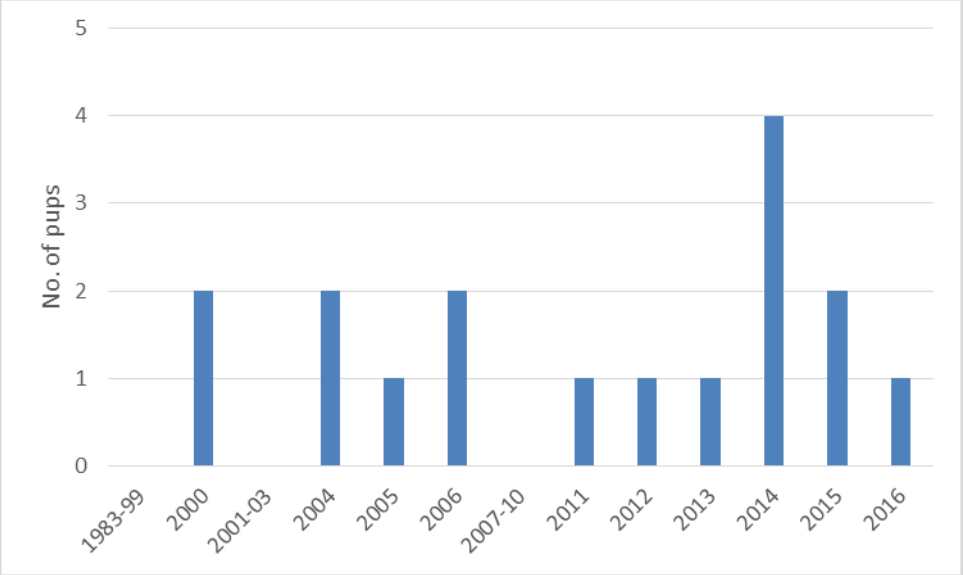
Table 19 Causes of seal pup deaths on The Wick in 2016

Cause of death	**No. of pups**
Abandoned	1
Abandoned/ill	1
Drowned	1
Still born	3
Total	**6**

4.4.15 The Basin

In 2016 one pup was found dead in The Basin in in week 39. It appeared to have drowned. The Basin was monitored approximately every four days and two full site visits were conducted.

Figure 32 Number of seal pups born in The Basin 1983-2016



4.4.16 Robert's Wick

As far as we are aware no pups were born in Robert's Wick in 2016. This site was possibly used once, in 2001.

4.4.17 Tom's House

No pups were born at Tom's House in 2016. The site has only been used once, in 1997, when a single pup was born.

4.4.18 Pigstone Bay

Pigstone Bay is a difficult site to monitor as there is a sea cave, which is impossible to access from land. The cave was entered by boat in 1985 and found to end in a shingle beach which held about a dozen hauled out seals and it was considered the cave could be an important pupping site (ALEXANDER & ALEXANDER, 1987). Any pups that are found at Pigstone Bay are rarely seen again and are usually assumed to have died, although it is equally possible they could have just swum back to the cave or to some other spot around the island.

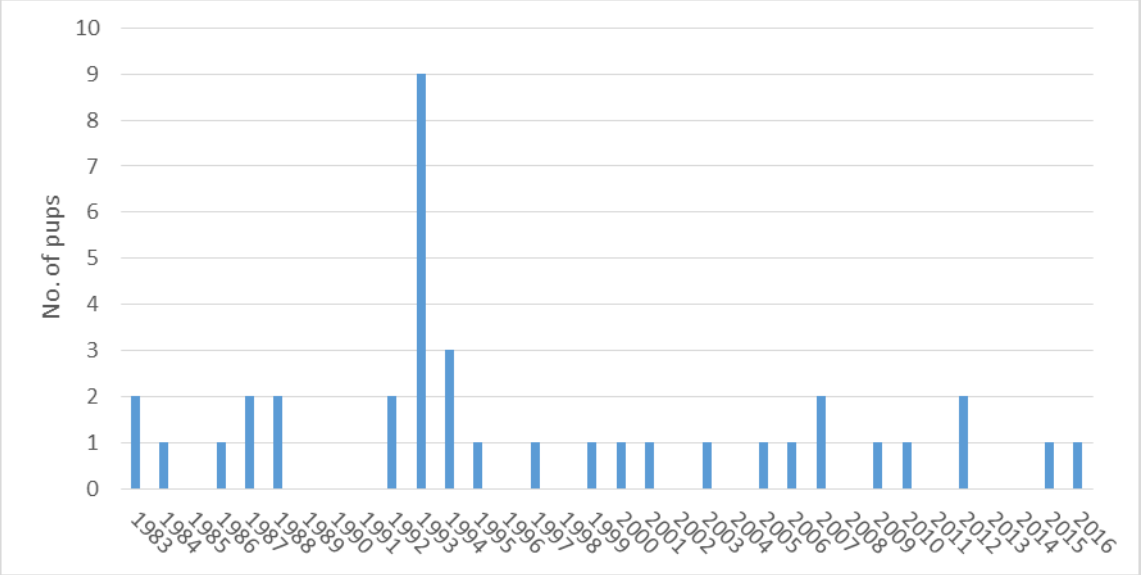
The Pigstone Bay site comprises not only a cave but also a beach where it has been thought that pups were occasionally born on or washed onto when getting displaced from the cave. Up to 2016 Pigstone Bay was solely monitored from the cliff top but as only half the beach is visible from above a route down to the beach was sought.

It is possible to walk down to the beach without having to scramble by following the edge of the bay and making one's way along a grassy slope until one comes to the start of the rocky slabs.

*Plate **5** Way down to Pigstone Bay beach*

In 2016 we managed to monitor this site approximately every four days during the main pupping time. Four full site visits to the beach were undertaken in 2016. One pup was born at Pigstone Bay in week 40 and weaned successfully.

Figure 33 Number of seal pups born in Pigstone Bay 1983-2016



4.4.19 The Garland Stone

No pups were born at the Garland Stone in 2016.

One pup was born at this site in 2015, 2007 and in 2001.

4.4.20 The Mew Stone

No pups were born at the Mew Stone in 2016. This site was only used once in 2015 when a freshly dead pup was found floating at the base of the Mew Stone.

4.5 Movements

During 2016, 17 pups were recorded making movements between beaches on Skomer.

According to Boyle, D (2012) movements of pups between beaches usually occur during periods of strong winds and spring tides and are presumably a result of pups running out of dry land on their natal beach and then swimming to the nearest available dry site. However pups seem to move frequently between Seal Hole, Driftwood Bay and South Haven and also between North Haven main beach and North Haven slip irrespective of tides.

Table 20 Movements of marked pups on Skomer Island in 2016

Natal Site	**Pup No.**	**Destination ***	**Age** (on arrival at destination)	**Pup condition *** (when last seen)	**Comments**
SCBC	2	SBS	15	SBM	Not confirmed that this is the same pup
SHV	9	DWB	9	SW	
SHO	53	SBS	16	SBM	
SHV	56	SBS	6	SW	
DWB	63	SHV	1	SW	
NHV	92	NHV(S)	6	D	Moved between beaches as was abandoned
NHV(S)	118	NHV	11	SW	
SHV	134	DWB-SHV	8-10	SW	
SHV	140	DWB	10	SW	
MWK	144	AMR-MWK	4-9	SW	
SHV	147	DWB-SHV	7-22	SW	
SHV	148	DWB	5	SBM	
SHV	163	SSC	7	AS	
SHV	194	SSC	20	SBM	
SHV	203	DWB	18	SW	
SHO	209	SHV	13	SW	

* see Appendix 2 for key

4.6 Wanderers

16 pups were recorded as wanderers. These are pups which turn up unaccompanied by their mothers, either moulting or just before the start of moult, and where their natal beach is unknown. Large wandering pups usually finish moult once they have established themselves on a beach whereas the smaller ones (presumably abandoned or separated) usually disappear within days.

The appearance of wandering (unknown) pups is most likely linked with storm and spring tide events. However in 2016 wanderers were recorded throughout the season, from 11 September until 27 November, and it seems that pups, once they have been abandoned, quite regularly migrate to different beaches independently of storms or large tides.

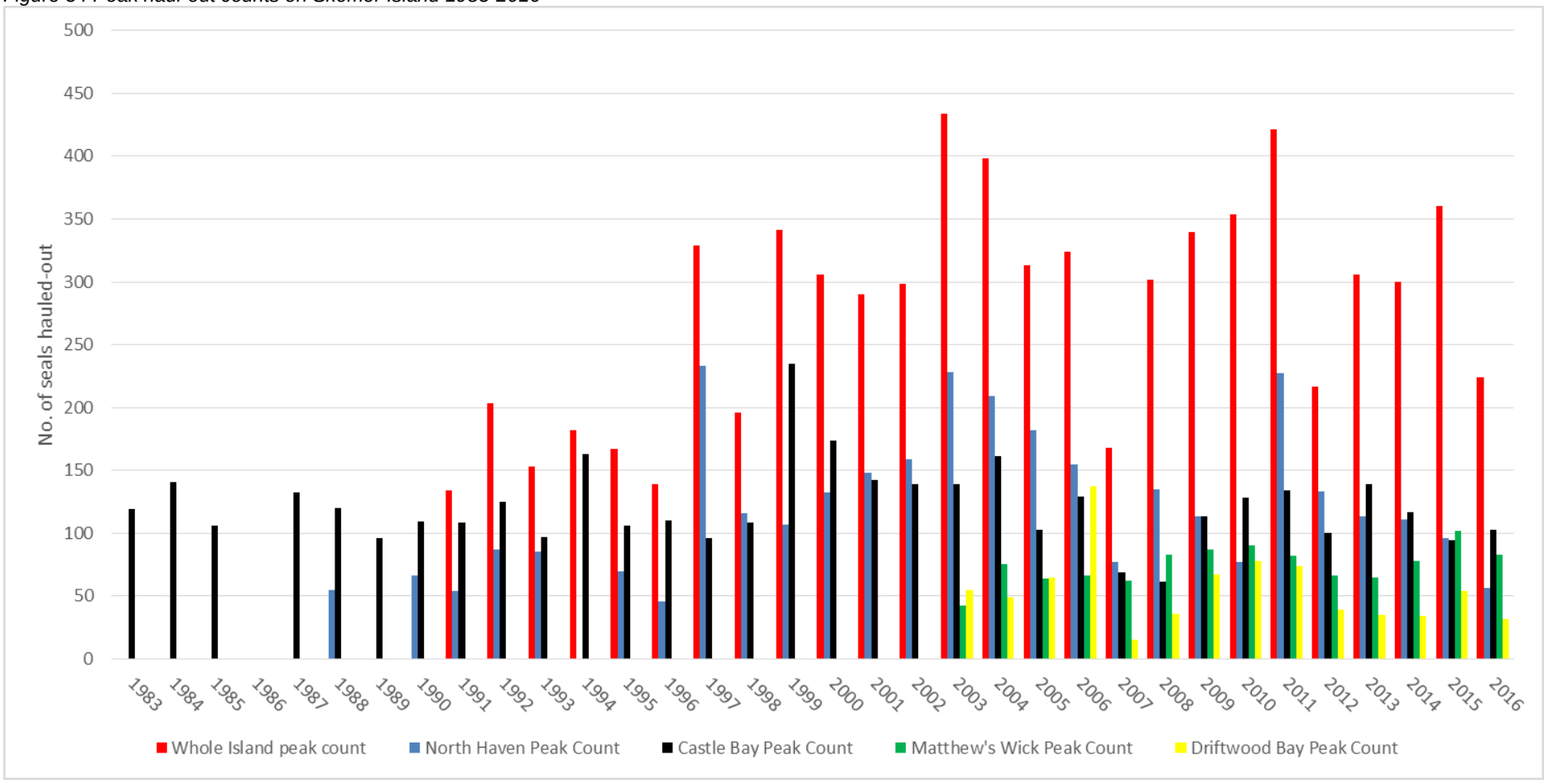
5. Haul-outs in 2016

In 2016 the maximum haul-out (on the main haul-out sites) of 224 animals was recorded on 24 November, eight days later than the maximum haul-out was observed in 2015 and 2014. The maximum haul-out count in 2016 was lower than in previous years with 360 animals recorded in 2015 and 300 in 2014.

The average maximum haul-out on the main haul-out sites for the last ten years is 309, hence the number of seals using Skomer to haul-out in 2016 was lower than the ten year average. It seems that fewer Grey Seals were using Skomer in 2016, not only as a pupping but also as a haul-out site.

In 2015 all main haul-out beaches (Matthew's Wick, North Haven, Castle Bay and Driftwood Bay) had their peak haul-out count on 16/11. In 2016 however, North Haven experienced its largest haul-out on 27/09, Castle Bay on 18/10 and 10/11 and Driftwood Bay and Matthew's Wick on 19/11

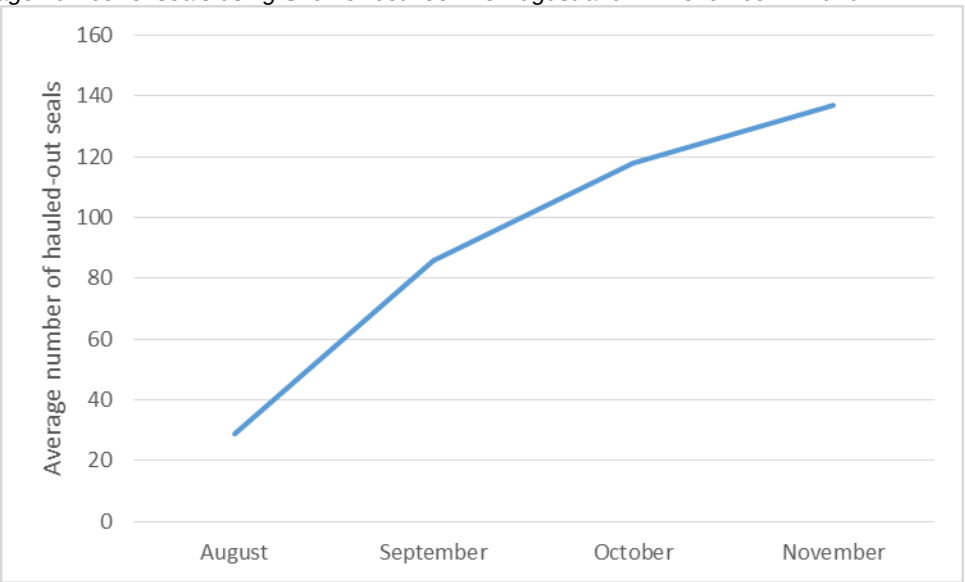
Figure 34 Peak haul-out counts on Skomer Island 1983-2016



For haul-out details see 2016 Haul-out Raw Data file.

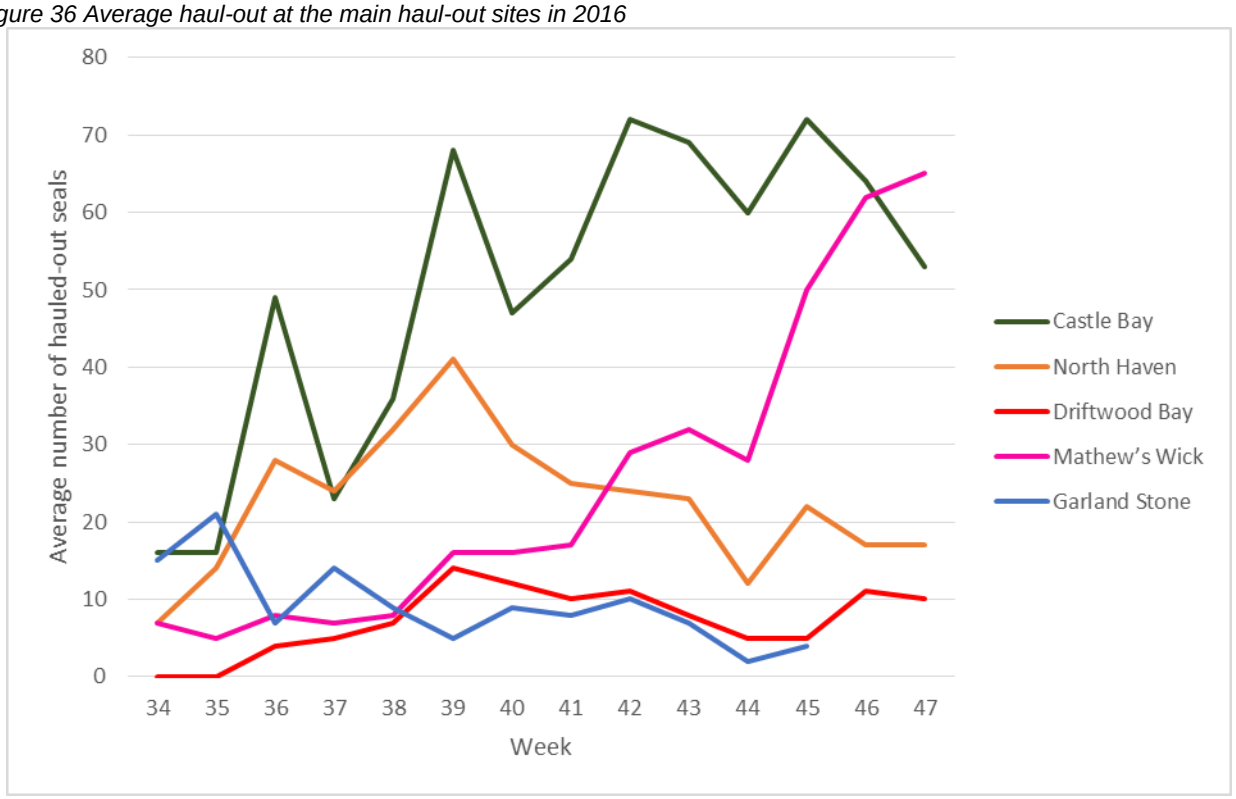
As in previous years an attempt was made to cover all beaches suitable for hauling-out simultaneously during low tide in order to establish how many seals are actually using Skomer on a daily basis.

Figure 35 Average number of seals using Skomer between 13 August and 27 November in 2016



When looking at the average number of seals hauled-out per site (during the monitoring period of 20/8-27/11), Castle Bay (including Shag Rock) and Matthew's Wick were the most popular haul-out sites, same as in 2015, followed by North Haven and Garland Stone The number of seals hauled-out per site varies significantly from day to day and is most likely determined by weather conditions; for example on 6 November (week 44) and 21 November (week 47) northerly gales turned North Haven into an unsuitable haul-out location and the whole island haul-out counts correspondingly plummeted to 22 and 18 respectively.

Figure 36 Average haul-out at the main haul-out sites in 2016



Note: The Garland Stone was not regularly counted in November.

Figure 37 North Haven haul-out in 2016

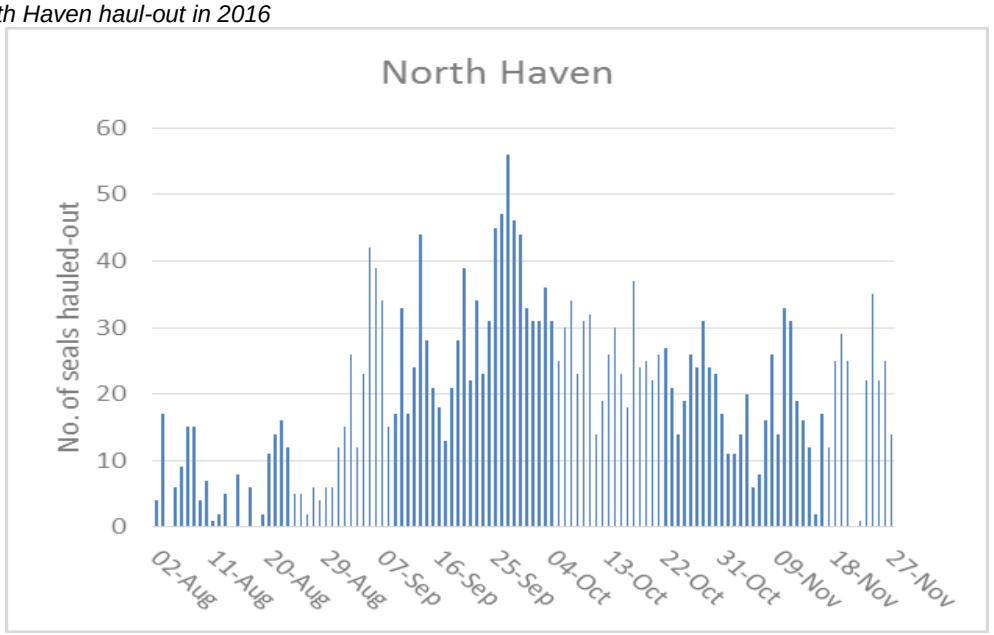


Figure 38 Castle Bay haul-out in 2016

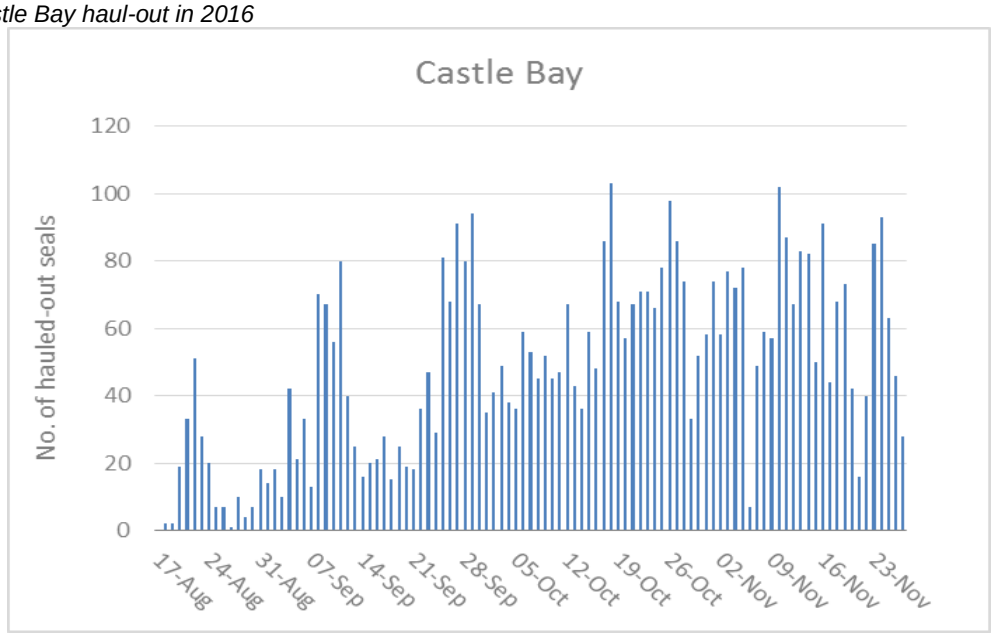


Figure 39 Driftwood Bay haul-out in 2016

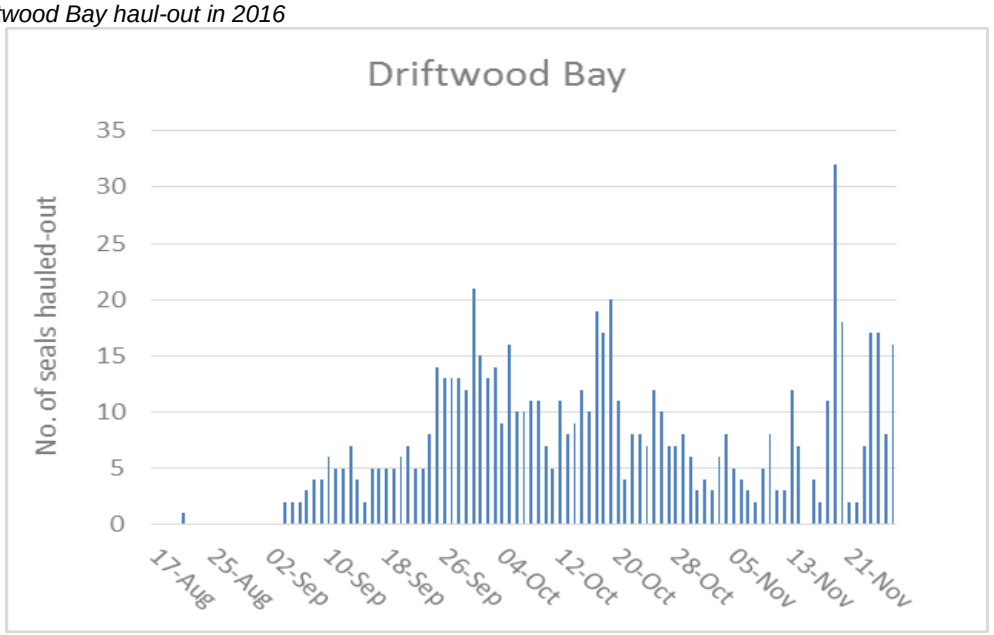


Figure 40 Matthew's Wick haul-out in 2016

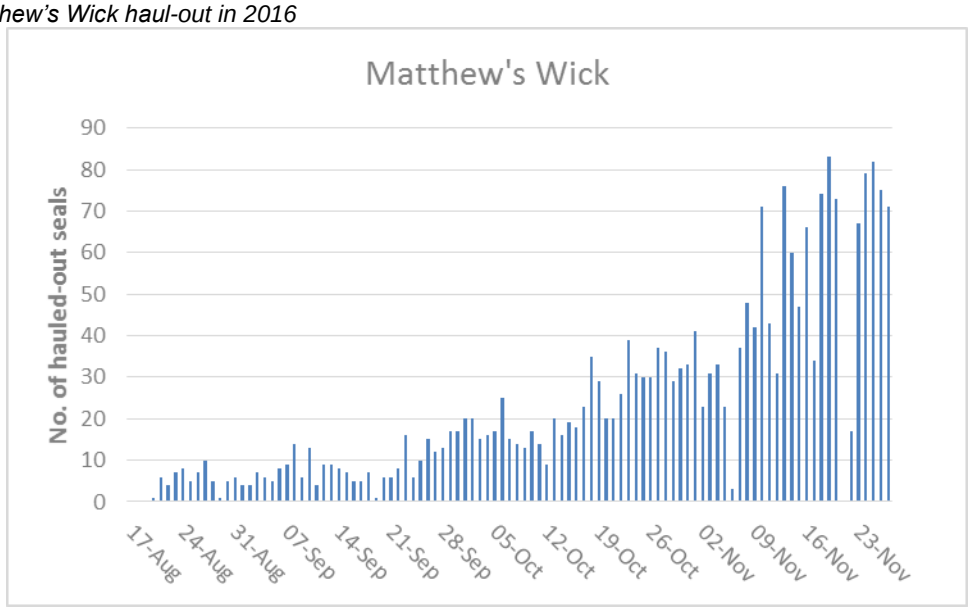


Figure 41 Garland Stone haul-out 2016

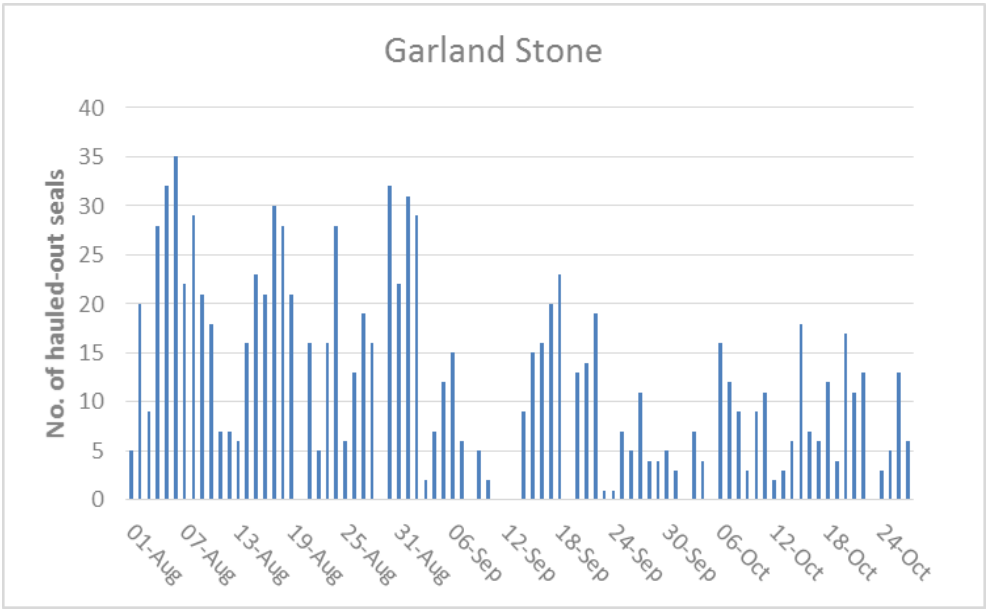
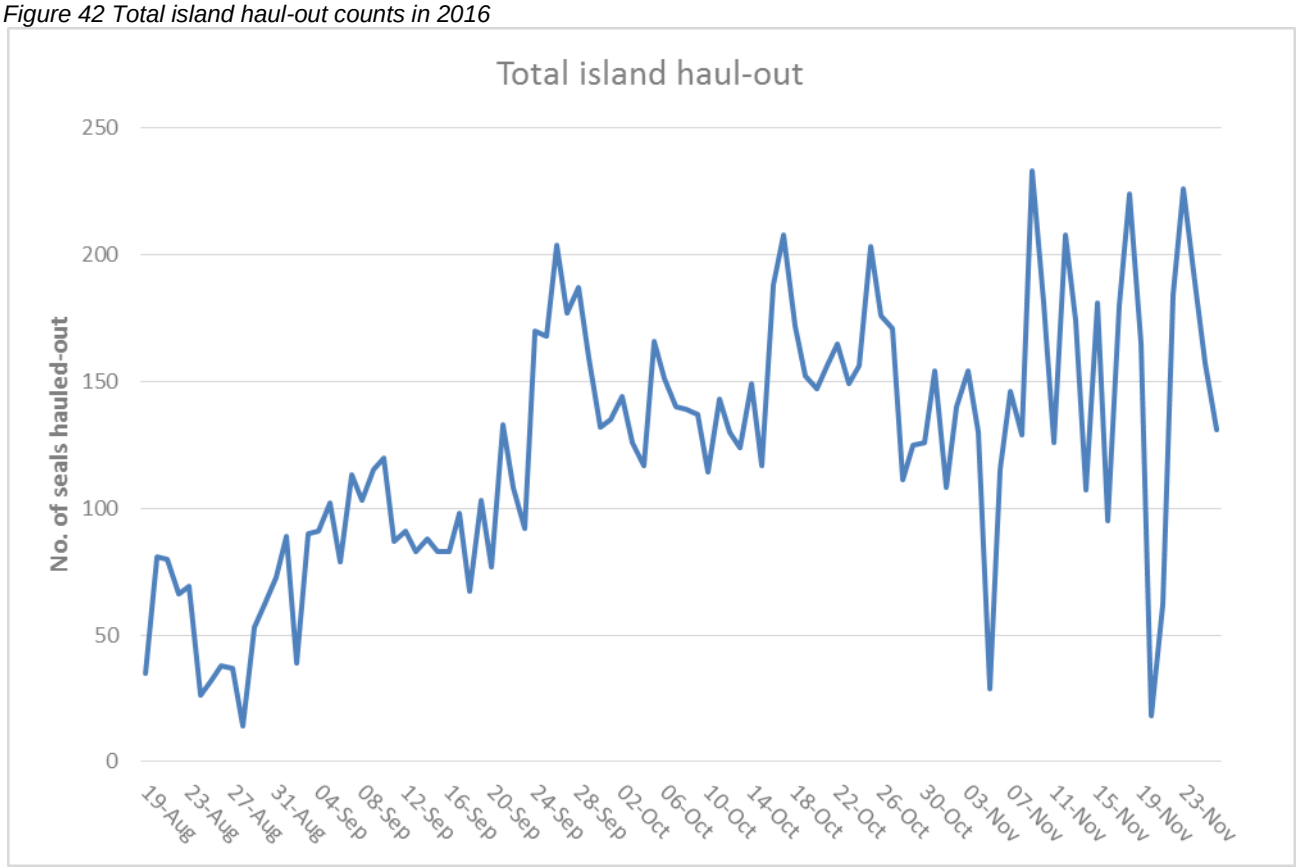


Figure 42 Total island haul-out counts in 2016



6. Pollution

6.1 Netting

Monofilament line and netting were the most obvious pollutants affecting seals. In 2016 26 animals (22 females, three males, one immature) were photographed with obvious signs of being entangled in nets at some time in their lives, most commonly a deep scar around their necks, often with netting still embedded.

In 2016 10 animals with scars caused by netting were known from previous years.

13.SC-NK-073.CBY
14.SB-NK-015.NHV
14.SC-NK-303.NHV
NK-020
NK-048
NK-055

For more detailed information on these animals see the raw data file “1994-2016 distinctive seals”.

6.2 Oil/Tar

Skomer’s beaches remain very clean, no pollution by oil or tar was observed in 2016.

7 Disturbance

Between 18 August and 11 November 2016 22 incidents of disturbance to seals around Skomer Island were observed. All such events were noted in a disturbance log and rated the severity of the disruption to seals: 1= little disturbance (e.g. lifting of heads but not leaving beach) 2= Seals enter water in response to perceived threat; 3= major disturbance involving abandonment of pup or similar. Eight incidents of category 2 (incl. three which were rated 2-3) and 12 of category 1 were observed.

Similarly to previous years boats were frequently recorded in the voluntary no access zones especially in South Haven. Some boats come far into South Haven particularly to seal watch. Boats anchored in South Haven risk disturbing seals either by their presence alone or by noise caused by lifting the anchor etc. Another area of concern are the hauled- out seals on Rye Rocks which regularly get frightened into the water by kayakers, dive boats etc. throughout the entire season. Furthermore lobster potters take no notice of the voluntary no access zones and place their pots extremely close to pupping and haul-out sites.

For details see Appendix 3 and 4.

Plate 6 Boaters swimming just off Driftwood Bay on 28/08/16

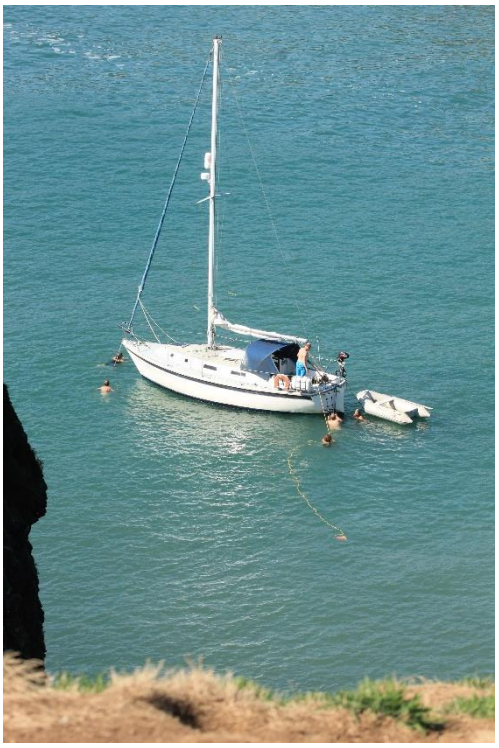


Plate 7 Divers disturbing seals on North Haven beach on 8/10/16

Plate 8 Lobster Potter scaring seals into water at Driftwood Bay on 11/11/16

8. Seal Behaviour

2016 was a quiet season in terms of unusual seal behaviour. Of interest was the mother of pup 115 who wasn't able to feed her pup, see section 4.3.

Also noteworthy was the behaviour of the mother of pup 153. She is fond of pupping on a rocky ledge on the south side of Matthew's Wick (she pupped there also in 2015). This ledge is approximately five meters above ground at low tide which the cow has to overcome in order to feed her pup.

Plate 9 Mother of 153 climbing to ledge

Plate10 Pup 153 and its mother at bottom

9. Disease

In 2016, as in previous years, quite a large number of small and ill-looking weaners were observed. As the survival rate of weaners born on Skomer is unknown no assumption to the extent of mortality in weaners can be made. Observations suggest that a large proportion of young seals die within weeks of being weaned.

The usual cases of eye infections among seal pups were observed in 2016. It seems to affect mostly pups on Matthew's Wick. A possible explanation for this is the fact that Matthew's Wick only gets flooded during large tides so seal excrements, dead pups etc. accumulate on the beach possibly spreading diseases. Furthermore Matthew's Wick, being a busy pupping and haul-out site, could also lead to a higher rate of disease transmission as seals lie closely bunched up on the shore.

One young female was observed with a prolapse on Matthew's Wick on 9/11/16.

Plate 11 Female with prolapse

10. Identification of individual seals

For the twelfth year photographic monitoring of adults continued in 2016 and has now completely replaced the old method of drawing sketches. In 2007 David Boyle developed a catalogue of seal ID photos which has been updated annually and now comprises nearly 800 individual seals and ca. 2500 photos. Identifying seals by matching pictures with the existing catalogue became more and more laborious and a new way of identifying seals was needed especially as the photo work was expanded to the MNR (now MCZ) team (Kate Lock) on the Marloes Peninsula and by surveyors on Ramsey Island (Lisa Morgan) in 2010.

NRW have been continuing to develop the Wales Seal Photo ID database called EIRPHOT. Photos are entered using head and neck profiles and standardised patches of pelage patterns extracted and matched within the database. In 2014 NRW contracted workers and trained volunteers to get as many of the seal ID images onto this database as possible and by March 2015 all existing Pembrokeshire photos (2007 to 2014) had been entered.

Since 2014 only animals with obvious scars have continued to be identified by eye. Photos of unscarred seals get stored in preparation to be entered into the Wales Seal Photo ID database.

In 2016, as in previous years photos of all breeding females were taken if possible. Photos of dominant bulls and seals with scars or netting were also taken. A total of 409 of these photos are stored ready to enter the Wales Seal Photo ID database. 102 seals with obvious scars were identified by eye, of these 53 were re-identified from previous years.

Of the 202 breeding females we managed to photograph 133 (66%) well enough for identification by eye and/or inclusion in the database.

Of the 78 seals identified by eye

- 36 of them were re-identified from previous photos.
- 42 new seals were photographed and added to the ID catalogues.
- In 2016 the oldest cow to have returned to Skomer was LBK-003. She pupped for the first time on Skomer in 2001, then again in 2002, 2004, 2005 and from 2009 to 2012 every year and then again in 2014.
- The oldest bull to have returned to Skomer was NK-067 which was first recorded in 2012.

Table 21 Year of first sighting of seals seen on Skomer Island in 2016

Year	No. of animals first seen on Skomer
2001	1
2002	3
2003	1
2004	2
2005	1
2006	0
2007	3
2008	3
2009	2
2010	1
2011	4
2012	2
2013	2
2014	10
2015	3

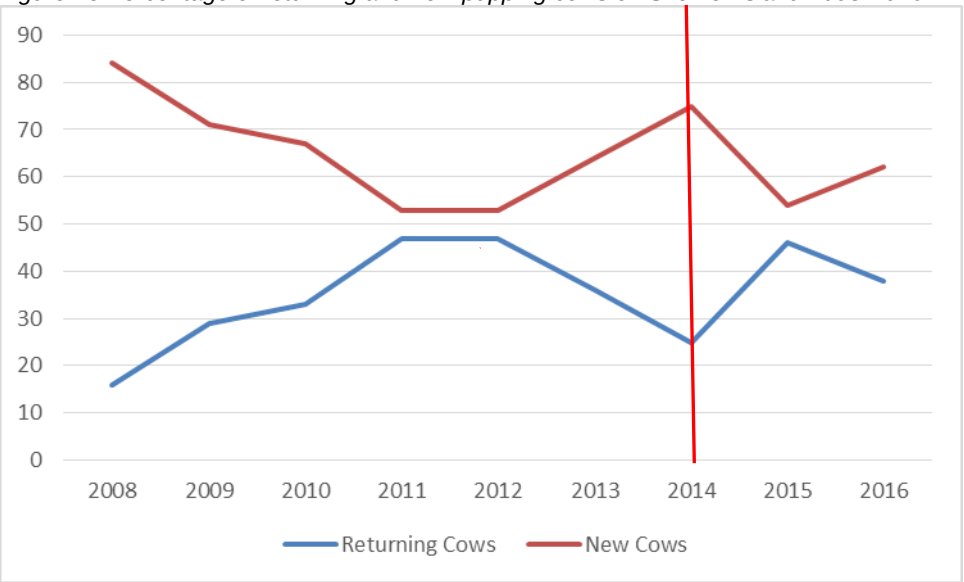
10.1 Breeding Cows Returning In 2016

Boyle, D (2012) says that the main reason for expanding the seal identification work was to try and learn more about the pupping cows on Skomer Island. He had assumed there was going to be a 'resident' Skomer population which could be largely identified in a few years. In his report for 2012 he stated that 32% of the breeding cows had bred the previous year and that over the five year period, when the majority of breeding cows were photographed, only 47% of the cows had given birth to pups sometime during the previous five years. Alexander, M (2015) suggests that the Skomer MCZ animals are part of a much larger, but ill-defined, mobile population, which can use a range of different areas for breeding and hauling out. It is possible that any or all of the individuals which are part of the Irish Sea and southwest British population could, for certain periods in their lives, spend time in the Skomer MCZ.

Of the 202 cows which pupped on Skomer in 2016, 42 had distinctive markings/scars and were photographed well enough for comparing with the catalogue. 16 matches were found, hence 38% of identifiable breeding cows were returning cows. The percentage of returning cows is smaller than in 2015 (46%). It seems that the annual variation is the result of a combination of factors such as different photographic equipment, observer skill, weather conditions and most of all unknown dynamics in the seal population.

- Seven (44%) of the 16 matched cows that pupped on Skomer in 2016 had also pupped in 2015 (55% in 2015, 60% in 2014).
- Four cows (25%) pupped on Skomer in three consecutive years (30% in 2015, 40% in 2014).
- Three cows pupped on Skomer every year since 2011.
- One cow (LBK-030) has pupped every year on Skomer since 2010. She was first recorded with a pup in 2008 and was seen pregnant in 2009 but was not observed with a pup that year.

Figure 43 Percentage of returning and new pupping cows on Skomer Island 2008-2016



— Change in methodology (only scarred seals identified by eye).

10.1.2 Site fidelity

- Of the seven cows that pupped on Skomer in both 2016 and 2015, four (57%) returned to pup at the same site (45% in 2015, 78% in 2014).

- Of the four cows that pupped on Skomer in three consecutive years 2014-2016, two (50%) used the same site in all three years (40% in 2015, 67% in 2014).

- In 2016 07.C114.SHV pupped for the eighth time on South Haven beach (in non-consecutive years). She is very site faithful and has pupped on this beach ever since she was first observed in 2007. The only years she was not seen with a pup on Skomer are 2008 and 2010. In 2009 she was not observed at all and in 2010 she was seen pregnant on South Haven beach but no up was noted, so she either moved to another beach to pup or her pup died before it was detected.

This year's data shows once again, that there are cows which have preferred pupping sites but most animals are not site faithful and have the ability to switch between sites, possibly influenced by weather conditions and competition. It also seems likely that cows use different sites on Skomer but also that they migrate to other beaches within the Skomer MCZ or travel even further.

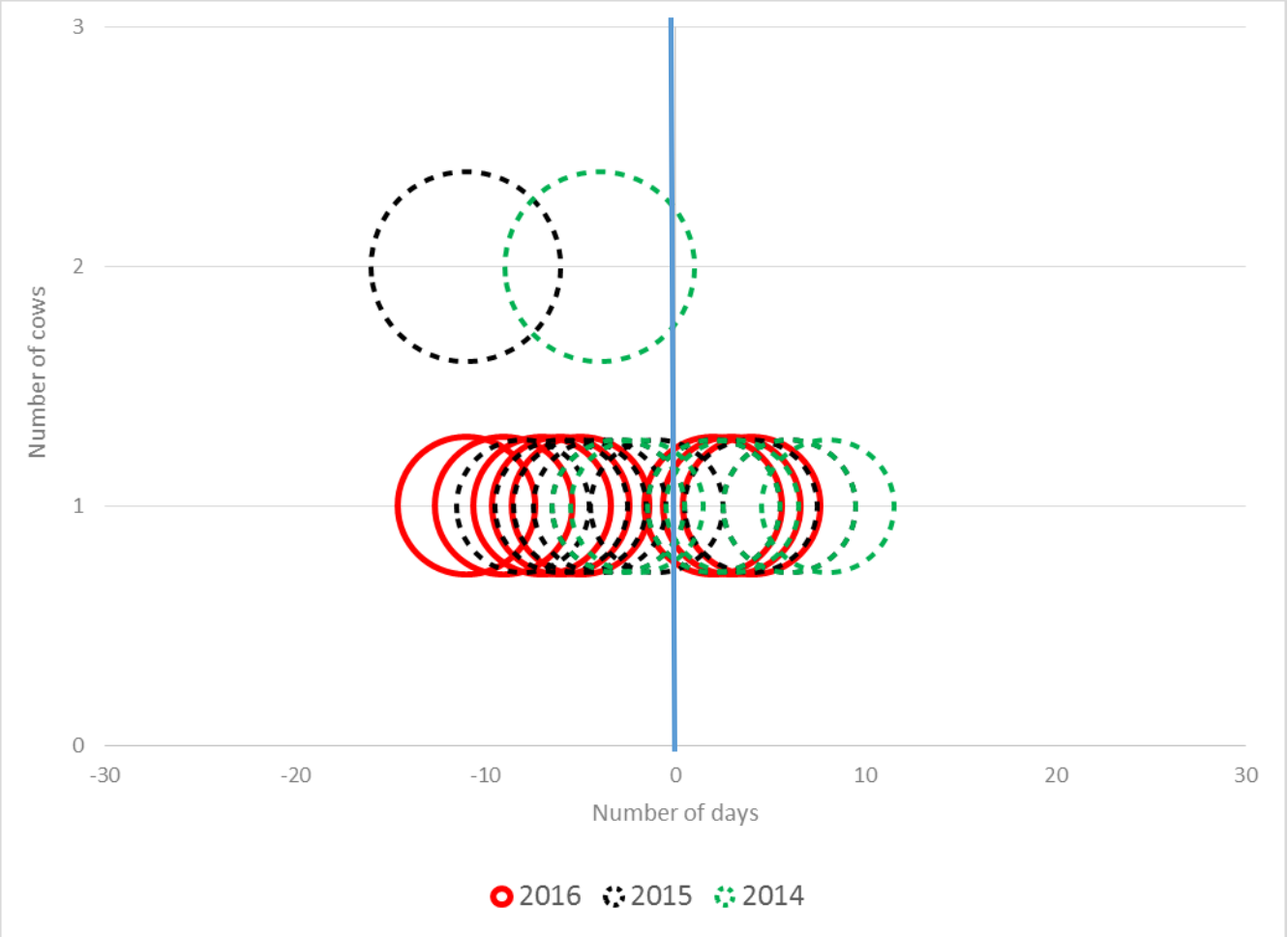
11.1.3 Pupping date

Table 22 Pupping date of returning cows on Skomer Island in 2013-2016

	Pupping date 2016	2015 Pupping date	Pupping date 2014	Difference (Days)	Difference (Days)	Average difference
				2016/15	2015/14	(Days)
07.C114.SHV	04-Oct	13-Oct	08-Oct	-9	5	-2
13.SC-BK-037.MWK	26-Aug	02-Sep		-7		
14.SC-BK-079.SHV	26-Sep	23-Sep	29-Sep	3	-6	-1.5
14.SC-LBK-024.SBS	10-Sep	n.a.	11-Sep			
14.SC-LBK-033.SHV	14-Sep	n.a.	15-Sep			
14.SC-LBK-091.DWB	25-Sep	n.a.	03-Oct			
14.SC-LS-058.NHV	22-Sep	n.a.	27-Sep			
14.SC-RS-178.MWK	07-Oct	n.a.	26-Oct			
15.SC-HD-129.SHV	08-Oct	06-Oct	n.a.	2		
15.SC-LS-121.DWB	24-Sep	05-Oct	n.a.	-11		
BK-004	21-Sep	n.a.	n.a.			
LBK-003	27-Aug	n.a.	02-Oct			
LBK-030	06-Sep	12-Sep	16-Sep	-6	-4	-5
LBK-046 = LS-018	10-Oct	06-Oct	n.a.	4		
LBK-065	18-Sep	23-Sep	22-Sep	-5	1	-2
LS-005	08-Oct	n.a.	n.a.			

Due to the small sample size it is difficult to make an accurate statement about the timing of breeding. However, looking at the distribution of the bubbles in the bubble graph below (which show the difference in pupping date for the seven identified cows) it seems that 2016 was an early to average year whereas 2014 was late to average.

Figure 44 Difference in pupping date of returning cows on Skomer Island 2013-2016



For pupping site fidelity and pupping date details see “2016 Returning Cows Raw Data” file.

10.2 Returning Bulls

21 bulls were identified in 2016, of which eleven had been recorded previously on Skomer.

11. Skomer Seals Seen Elsewhere

On 21/10/16 an immature seal with an orange flipper tag with a black code (80138) turned up on Castle Bay beach. He had been tagged by RSPCA West Hatch Wildlife centre in Somerset after having been found with a large wound on his left flank and malnourished on Gower in October 2015.

Plate 12 Tagged immature on Castle Bay

We have had two reports of “Skomer” seals on Ramsey: LBK-005 (or RC118 in Ramsey nomenclature) pupped approximately on 4/7 2016 on a popular pupping beach called Rhod Uchaf (RUF) on Ramsey's north east coast and NK-069 pupped on Ramsey on 1/9 at a site called Gwelltog.

No further matches were available at time of writing.

Acknowledgments

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Appendix 1 SMRU Age classification of pups

I first day or two after birth, fresh pink umbilicus, poor coordination, ribs visible, white coat stained yellow

II usually days 3-9, white coat, ribs less prominent early on, good coordination

III usually days 10+, white coat (although dark marks around head/flips may be visible), noticeably fat – abdomen rounded out

IV usually days 14+, some white coat, but moulting

V anytime from day 16+, no white coat left, fully moulted.

Appendix 2 Key

Fate:

SBM	Known to have survived to the beginning of moult
SW	Known to have survived and weaned
D	Known to have died
ASM	Assumed to have survived to the beginning of moult
AD	Assumed to have died

Birth Sites:

AMR	Amy's Reach
BAS	The Basin
CBY	Castle Bay
DWB	Driftwood Bay
GST	Garland Stone
HCB	High Cliff Boulders
LTN	The Lantern
MWK	Matthew's Wick
NHV	North Haven
NHV(S)	North Haven Slip
NHV(SC)	North Haven Slip Cave
MST	Mew Stone
PSB	Pigstone Bay
SBS	The Slabs
SCBC	South Castle Beach Cave
SHO	Seal Hole
SHV	South Haven
SHV(C)	South Haven Cave
SHV (CKI)	South Haven (Captain Kites Inlet)
SSC	South Stream Cave
WCK	The Wick

Condition at Beginning of Moult:

1	Very Small	Assumed not to have survived long after moult
2	Small, but healthy	In good condition, should have a reasonable chance of survival
3	Good Size	Most should survive
4	Very good size	All should survive
5	Super-moulter	An exceptionally sized pup

Appendix 3 Disturbance Log

Level of disturbance 1= little or no disturbance (lifting of heads); 2= Seals enter water in response to perceived threat; 3= major disturbance involving abandonment of pup or similar		
Date	**Details**	**Level of disturbance**
29/08/16	Yacht anchored in SHV within "voluntary no access zone" very close to beach, six people going for swims in front of DWB	1
13/09/16	Yacht in voluntary no access zone in SHV	1
14/09/16	Yacht anchored in the voluntary no access zone, activity possibly contributed to abandonment of pup	2-3
14/09/16	Motorboat anchored in the voluntary no access zone, close to DWB, activity possibly contributed to abandonment of pup	2-3
17/09/16	Three yachts anchored within the voluntary no access zone	1
21/09/16	Lobster pot line very close to mouth of CBY and MWK, line got caught on Shag Rock	1
08/10/16	Motorboat was in voluntary no access zone in SHV watching seals	1
15/10/16	Motorboat was in voluntary no access zone in SHV	1
21/10/16	Large motorboat with 12 passengers in voluntary no access zone watching seals	1
29/10/16	Lobster Potter dropping pots in front of SHO in voluntary no access zone. Line of pots only 5-10m off SBS and SHO, line hooked over rocks	1
30/10/16	Motorboat in voluntary no access zone in SHV	1
31/10/16	Large motorboat driving into SHV voluntary no access zone very fast	1
02/11/16	Line of lobster pots in the mouth of MWK and AMR	1

29/08/16	Yacht anchored in SHV within "voluntary no access zone" very close to beach and 6 people went swimming, a mum of seal pup was possible put off feeding her calling pup, she was seen at water's edge but then didn't go up the beach to her pup	2
08/10/16	Dive boat maneuvering close to Rye Rocks at LT	1
17/09/16	Two zodiacs with 2 and 5 people on went up to Rye Rocks to watch seals. Went too close and drove past several times and scared seals into the water	2
08/10/16	Red dive RIB far too close to NHV main beach putting all cows in water	2
24/10/16	Lobster Potter potting close in to Rye Rocks and NHV main beach, two males left RR and they were close to a pregnant cow on the beach, photo available	2
01/11/16	Lobster Potter in SHV and close to SSC. Noise of activity caused mum on SSC to enter water	2
11/11/16	Lobster Potter potting very close to DWB disturbing seals off beach including one mother of a pup video available	2
11/11/16	Lobster Potter potting around The Loaf in NHV and the landing disturbing 10 seals off the main beach and 2 seals off the landing, video available	2
14/09/16	Norwegian Yachters landed on SHV beach and walked up to Isthmus, said they flushed seals, one abandoned pup found two days later	2-3

Level of disturbance

1= little disturbance (lifting of heads)
2= seals enter water in response to perceived threat
3= major disturbance involving abandonment of pup or similar

Appendix 4 Incidents of breach of the marine code of conduct

18/08/16	2 swimmers walking around on DWB ignoring the no landing and voluntary no access zone of the marine code of conduct