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Grey Seal Breeding Census Skomer Island 2020

Nathan Wilkie and Sylwia Zbijewska
The Wildlife Trust of South and West Wales

NRW Evidence Report 535

15/2/2020

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Summary

248 pups were monitored on Skomer Island in 2020, of which 243 were born on Skomer and five pups turned up either just before the start of moult, or moulting (wanderers).

The total of 243 pups born on Skomer Island is five more than in 2019 and is the highest total recorded.

A total of 422 pups were born within the Skomer Marine Conservation Zone, of which 179 were born on the Marloes Peninsula. See section 4.2.

In 2020 the busiest week was week 38 (17/9-23/9) with 50 pups born. Week 39 (24/9-30/9) was the second busiest week with 46 pups born. In 2019 the busiest period was evenly spread over three weeks with 42 pups born in week 38 (17/9-23/9), 41 pups born in week 39 (24/9-30/9) and 42 pups born in week 40 (01/10-07/10). See section 4.2.

The most productive beaches were North Haven (54 pups), Matthew's Wick (36 pups), South Haven (34 pups), Driftwood Bay (33 pups) and The Wick (32 pups). See section 4.2.

177 pups are known, or assumed, to have survived on Skomer, the fate of 8 pups were unknown, giving a survival rate of 75%. See section 4.3

In 2020 the maximum haul-out (on the main haul-out sites of North Haven, Castle Bay, Matthew's Wick and Driftwood Bay) of 384 seals was recorded on 4 November 2020, which is 132 more seals and 14 days earlier than in the previous year. See section 5.

In 2020 18 seals (17 females, 1 male) were photographed with obvious signs of being entangled in nets at some time in their lives. See section 6.

Crynodeb

Cafodd 248 o loi bach eu monitro ar Ynys Sgomer yn 2020, ac o'r rhain cafodd 243 eu geni ar Sgomer a daeth pum llo bach i'r golwg naill ai ychydig cyn y cyfnod bwrw blew, neu yn ystod y cyfnod bwrw blew (crwydriad).

Mae'r cyfanswm o 243 o loi bach a anwyd ar Ynys Sgomer bum gwaith yn fwy nag yn 2019 a dyma'r cyfanswm mwyaf a gofnodwyd erioed.

Ganed cyfanswm o 422 llo bach o fewn Parth Cadwraeth Morol Sgomer, ac o'r rhain cafodd 179 eu geni ar Benrhyn Marloes. Gweler adran 4.2.

Wythnos brysuraf 2020 oedd wythnos 38 (17/9-23/9) a ganwyd 50 llo bach. Yr ail wythnos brysuraf oedd wythnos 39 (24/9-30/9) a ganwyd 46 llo bach. Yn 2019 roedd y cyfnod prysuraf wedi'i wasgaru'n gyfartal dros gyfnod o dair wythnos a ganwyd 42 o loi bach yn wythnos 38 (17/9-23/9), ganwyd 41 o loi bach yn wythnos 39 (24/9-30/9) a ganwyd 42 o loi bach yn ystod wythnos 40 (01/10-07/10). Gweler adran 4.2.

Y traethau mwyaf cynhyrchiol oedd North Haven (54 llo bach), Matthew's Wick (36 llo bach), South Haven (34 llo bach), Driftwood Bay (33 llo bach) a The Wick (32 llo bach). Gweler adran 4.2.

Gwyddys, neu tybir bod 177 llo bach wedi goroesi ar Sgomer, ni wyddys beth ddigwyddodd i 8 llo bach, ac mae hyn yn rhoi cyfradd oroesi o 75%. Gweler adran 4.3

Yn 2020, cofnodwyd ar 4 Tachwedd bod y nifer uchaf o anifeiliaid, sef 384, wedi gadael y dŵr (yn y prif safleoedd gadael yn North Haven, Castle Bay, Matthew's Wick a Driftwood Bay), sef 132 o forloi yn fwy, a 14 diwrnod yn gynharach na'r flwyddyn flaenorol. Gweler adran 5.

Yn 2020, tynnwyd ffotograffau o 18 o forloi (17 benyw, 1 gwryw) a oedd ag arwyddion amlwg eu bod wedi mynd yn sownd mewn rhwydi rywbyrd yn ystod eu bywydau. Gweler adran 6.

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1. Introduction

Between 30th July and 22nd November 2020, 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, 2015), and are also mentioned in the individual site sections of this report.

It is important to acknowledge that 2020 was an unusual year due to the covid-19 outbreak. In light of the covid-19 lockdown announced on 23 March 2020, the Wildlife Trust of South and West Wales had to reduce the negative financial impact of the lockdown by implementing the furlough scheme within the organization. The government's guidelines were followed and the island was closed to the public for the entire season.

The team on Skomer was heavily reduced and only a skeleton staff remained on the island to carry out the important monitoring and to protect the island. Despite these difficulties and the increased workload for the remaining of the Skomer's team, the majority of the monitoring was successfully accomplished.

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 30 July and 22 November 2020 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, until it was quiet enough to switch to checking them every other day. 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 four to six days. The Wick and South Stream Cave were checked more regularly during the peak pupping season.

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

Due to access difficulties, some of the main cave sites (The Lantern, Seal Hole and South Castle Beach Cave) were checked whenever conditions allowed. Entry to these 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. Access to Seal Hole was not always possible due to an adult seal being in the way, therefore on one or two occasions two visits were made during the same week.

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 the SMRU five-stage age classification system (see appendix 1).

Sites were visited when necessary to mark pups. This was done in accordance with the Skomer MCZ & Skomer Island NNR Grey Seal Management Plan (Alexander, 2015), unless otherwise stated due to recent safety recommendations (Nathan, 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 every effort was made to keep disturbance 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. Pups \geq size 3 were assumed successful, whereas pups smaller than size 3 were assumed unsuccessful.

4. Census Results

4.1 General

248 pups were monitored on Skomer Island in 2020, of which 243 were definitely born on Skomer and five pups turned up either just before the start of moult, or moulting (wanderer).

The total of 243 pups born on Skomer Island is five more than in 2019 and is the highest total recorded.

The first pup of the season was born on Matthew's Wick on 09/08/19. It was found on 10/08/19. Which incidentally is the same date and location as the first pup in 2019.

25 pups were born in August, 158 in September, 55 in October and 5 in November. The busiest month therefore was September.

In 2020 the busiest week was week 38 (17/9-23/9) with 50 pups born. Week 39 (24/9-30/9) was the second busiest week with 46 pups born.

177 pups are known, or assumed, to have survived on Skomer, the fate of 8 pups were unknown, giving a survival rate of 75%.

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

Plate 1 Skomer Island overview

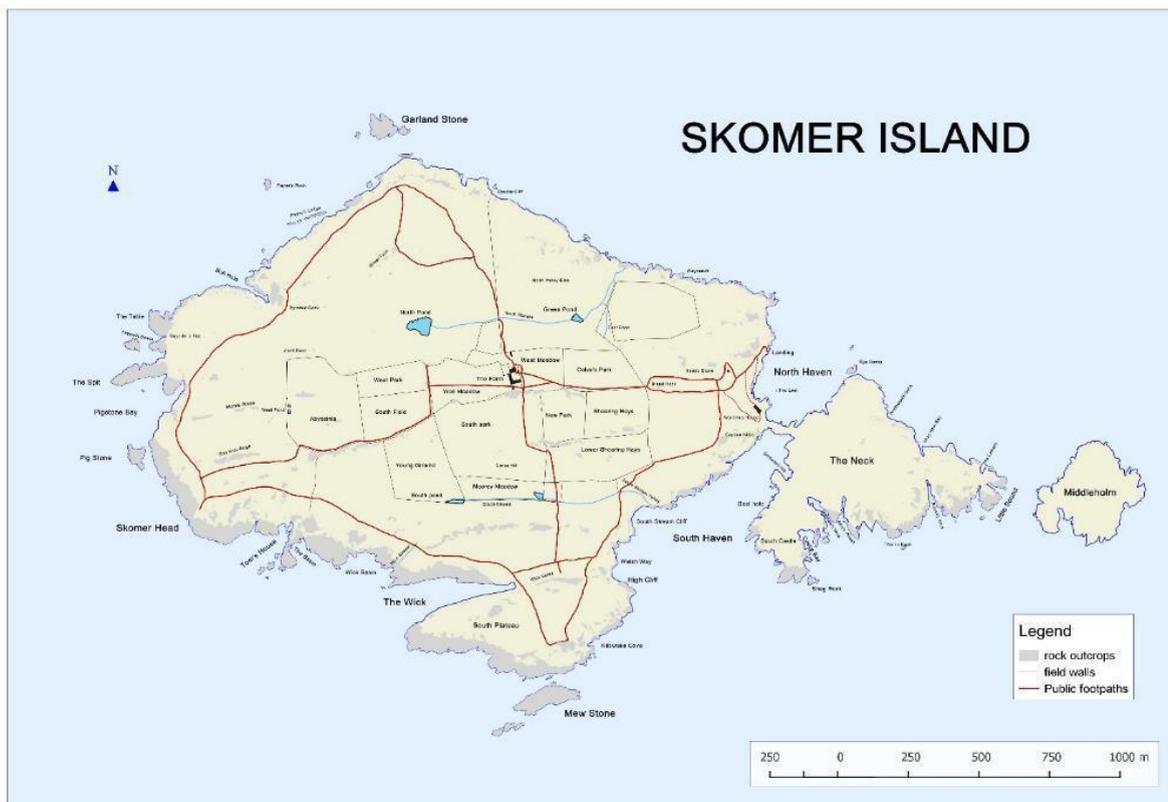
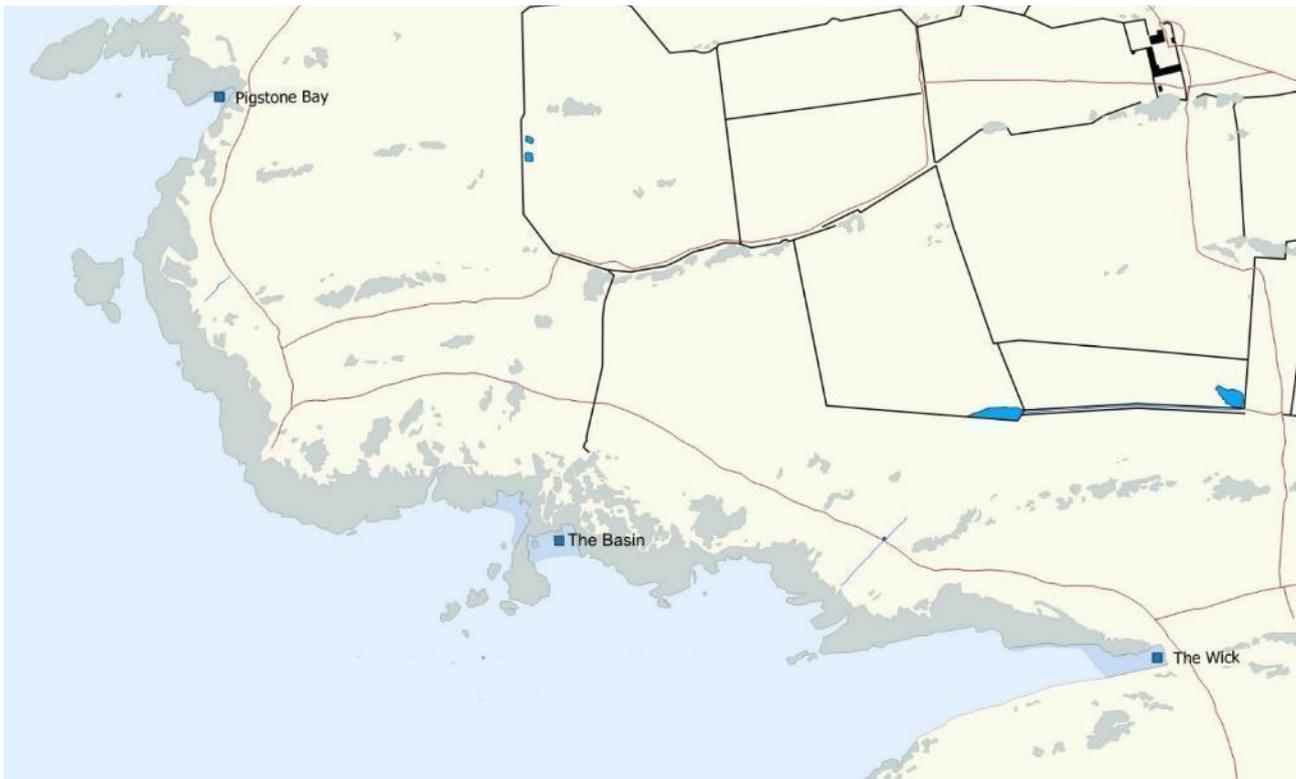


Plate 2 Skomer Island Grey Seal pupping sites East



Plate 3 Skomer Island Grey Seal pupping sites West



4.2 Pup Numbers

2020 was an excellent breeding season for the seals within the Skomer Marine Conservation Zone (MCZ) with a total of 422 pups born, 14 more than in the previous record year of 2019. Of the 422 pups born this year 179 were born on the Marloes Peninsula.

On Skomer 248 pups were monitored in 2020. 243 of them were definitely born on Skomer and 5 pups (wanderers) turned up either just before the start of moult, or moulting. These pups were potentially also born within the Skomer MCZ but not recorded as they may have been born elsewhere or in a location hidden from view.

In 2016 the number of seal pups born on Skomer dipped slightly after two years of exceptional pup numbers. In 2017 the numbers were up again to 225 and in 2018 they reached a new record of 241 pups. The seal pup numbers on the Marloes Peninsula were also good in 2018 with 154 pups born, resulting in a total of 395 pups within the Skomer MCZ and the highest number of seal births since records began. This increase was experienced again in 2019 with 170 pups born on the Marloes Peninsula resulting in a total of 408 pups and a new record number of births for the Skomer MCZ.

Figure 1 Number of seal pups born in Skomer MCZ 1983-2020

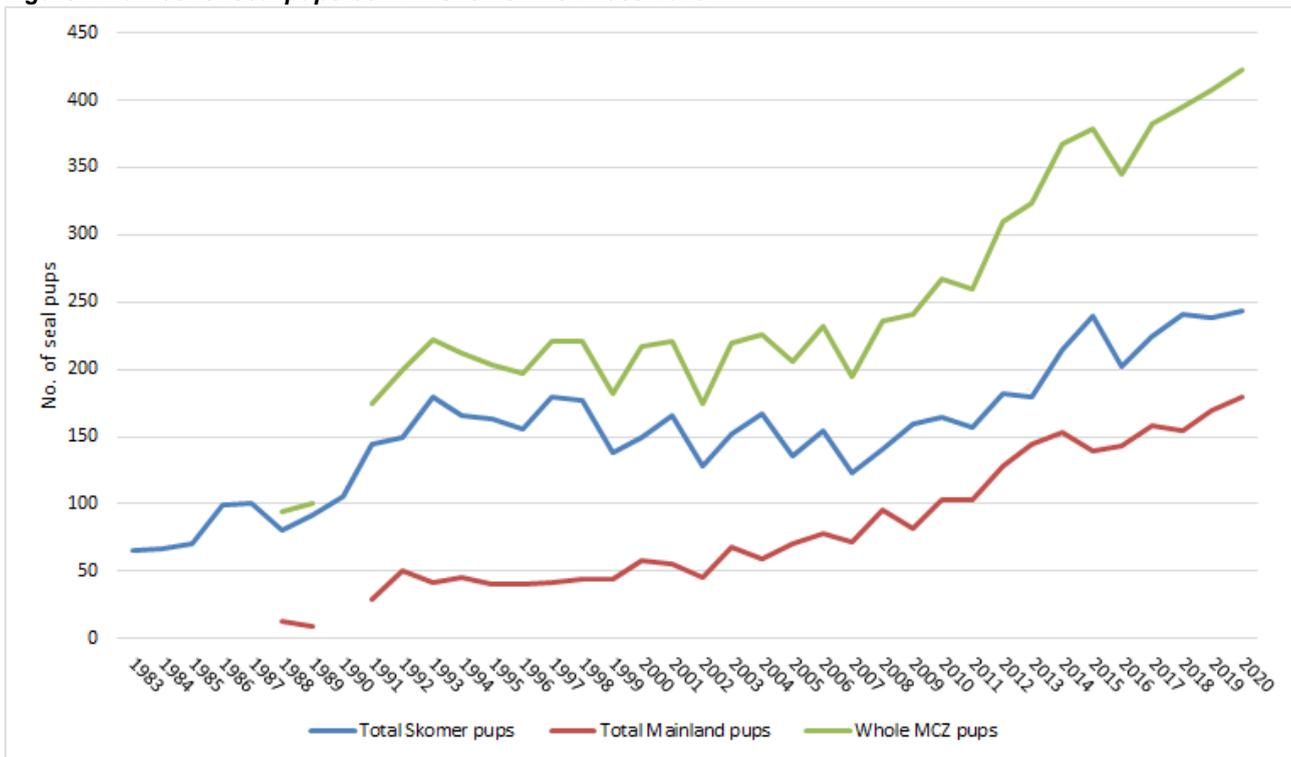


Figure 2 Daily totals of seal pups born on Skomer Island in 2020

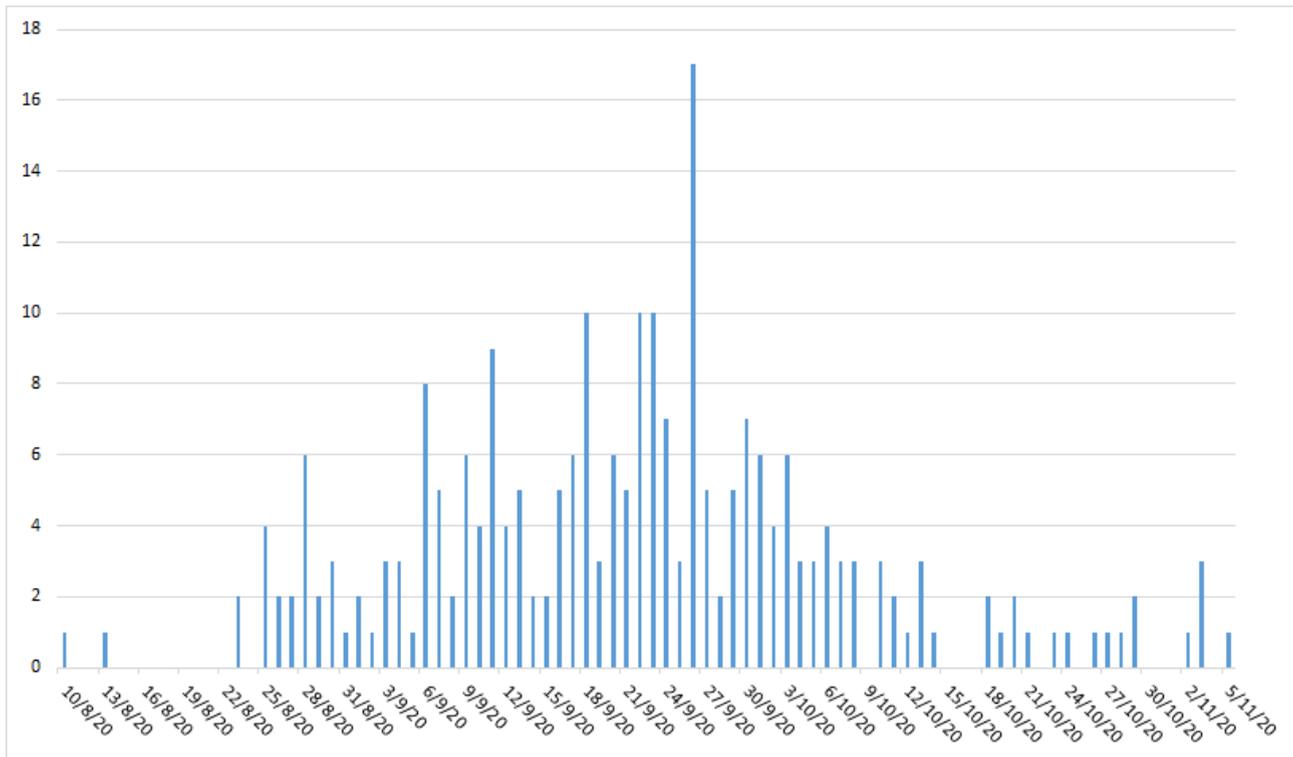


Table 1 Monthly number & percentage of seal pup births on Skomer Island 1983-2020

Year	July	August	September	October	November
2020	0	25 (10.3%)	158 (65.0%)	55 (22.6%)	5 (2.1%)
2019	0	16 (6.7%)	144 (60.5%)	73 (30.7%)	5 (2.1%)
2018	1 (0.4%)	22 (9.1%)	125 (51.9%)	87 (36.1%)	6 (2.5%)
2017	2 (0.9%)	12 (5.3%)	146 (64.9%)	57 (25.3%)	8 (3.5%)
2016	0	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%)

Year	July	August	September	October	November
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%)

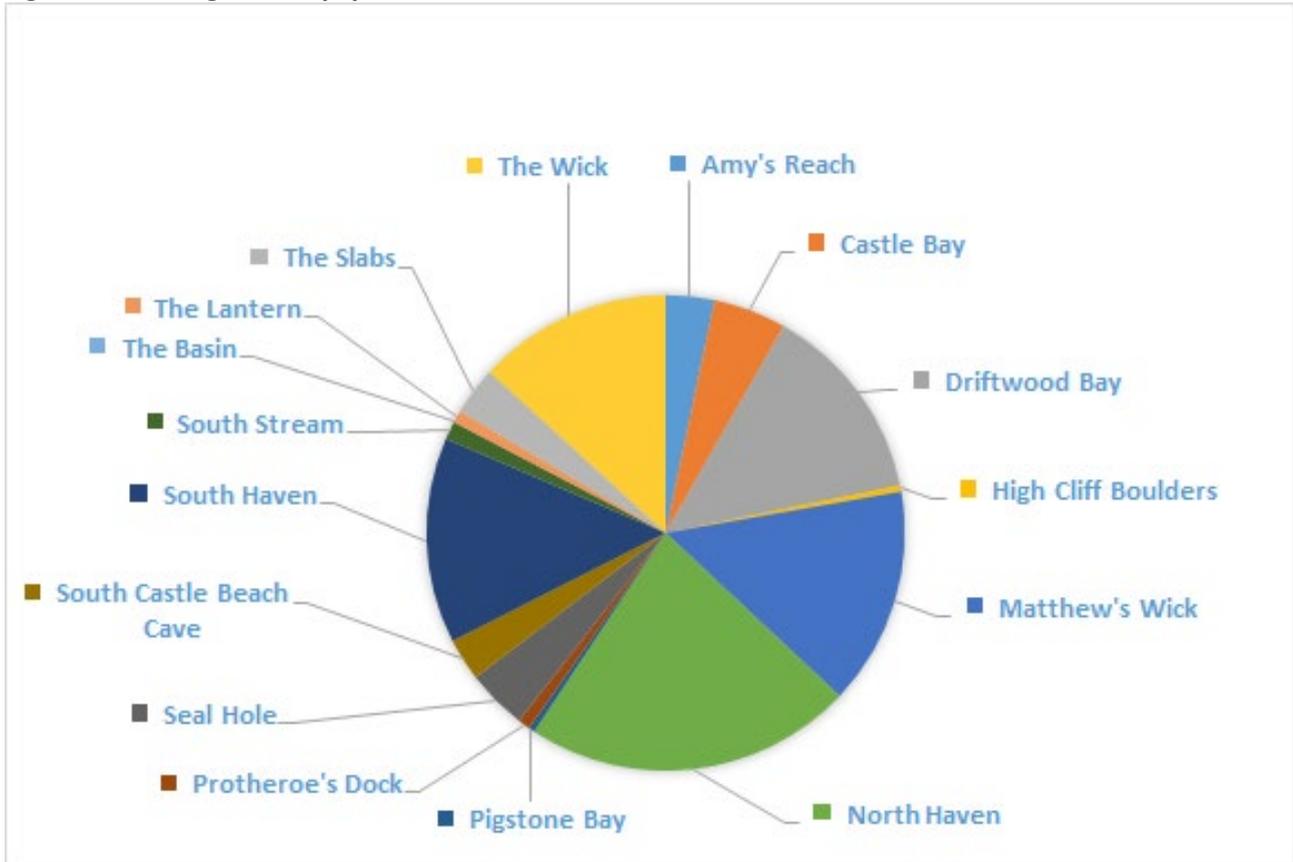
Seal observations continued to mid-December in 1983, 1985 and 1986 and to the end of January in 1984 and 1987. The following data was recorded in these survey years: 1983 Dec: 3 (4%), 1984 Dec: 6 (9%), Jan: 6 (9%). 1985 Dec: 14 (19%), 1986 Dec: 5 (5%), 1987 Dec: 15 (15%), Jan: 5 (5%). From 1989 onwards the survey has only continued up to the end of November, when the island gets 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 and these are included in the table, however the full survey, with routine site visits, does not commence till August.

In 2020 the busiest week was week 38 (17/9-23/9) with 50 pups born. Week 39 (24/9-30/9) was the second busiest week with 46 pups born. The busiest period in 2019 was evenly spread over three weeks with 42 pups born in week 38 (17/9-23/9), 41 pups born in week 39 (24/9-30/9) and 42 pups born in week 40 (01/10-07/10).

The most productive beaches were North Haven (54 pups), Matthew's Wick (36 pups), South Haven (34 pups), Driftwood Bay (33 pups) and The Wick (32 pups).

Figure 3 Percentage of seal pups born at each site on Skomer Island in 2020



4.3 Survival Rate

The fate of 235 pups (of 243 born) is known with relative certainty. The fate of 8 pups were unknown and thus excluded from the survival rate calculation.

The survival rate is calculated as the total number of pups

- a) assumed to have survived (disappeared before beginning of moult (class III, size ≥ 3)
- b) survived to beginning of moult (started moult (class IV) but disappeared before completion, in a healthy state)
- c) survived and were weaned (finished moult (class V), in a healthy state)

divided by the total number of pups born (where the fate is known).

177 pups are known, or assumed, to have survived on Skomer, giving a survival rate of 75%, which is 4% lower than the average since records began.

On the mainland 149 pups are known, or assumed to have survived, giving a survival rate of 83%.

The overall survival rate for the whole of the Skomer MCZ is 79%.

Figure 4 Percentage of seal pups surviving in Skomer/MCZ 1983-2020

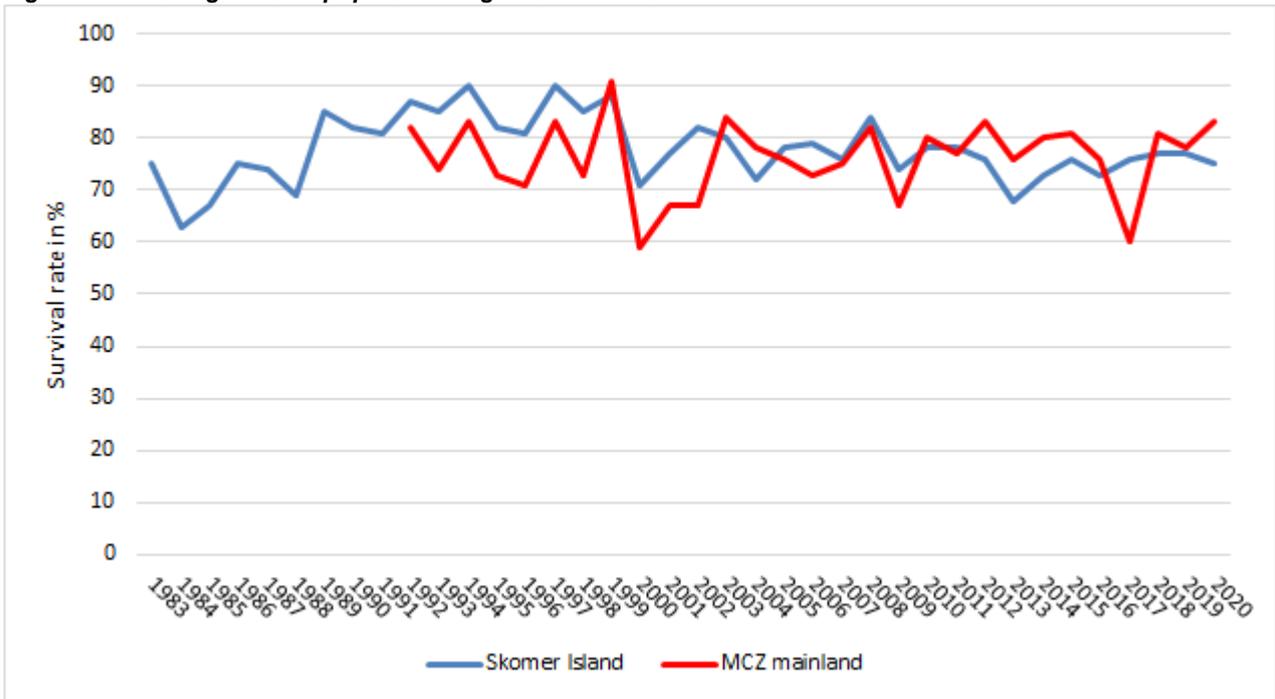


Figure 5 Weekly seal pup births and deaths on Skomer Island in 2019 and 2020

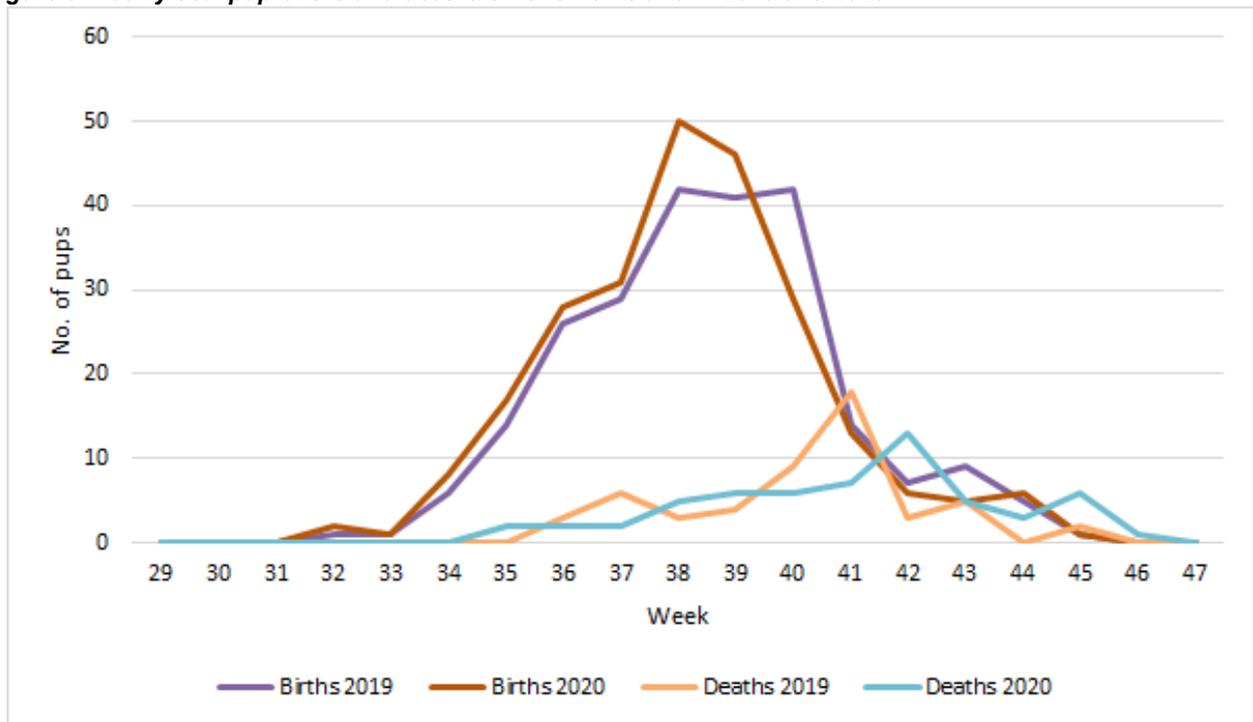


Table 2 Survival rates per site on Skomer Island 2016-2020

Site	Total Number of pups raised per beach (excl. pups whose fate is unknown)					No of pups survived					Survival Rate %				
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020
Amy's Reach	5	5	6	3	8	3	3	5	3	6	60	60	83	100	75
Castle Bay	16	14	22	13	12	9	10	17	11	8	56	71	77	85	68
Driftwood Bay	21	28	34	32	33	15	23	31	29	26	71	82	91	91	74
Garland Stone	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
High Cliff Boulders	0	1	1	3	1	0	0	1	3	n/a	n/a	n/a	100	100	n/a
Matthew's Wick	39	42	50	39	36	27	31	32	30	28	69	74	64	77	78
Mew Stone	0	0	0	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
North Haven	25	41	39	42	54	19	31	32	33	38	76	76	82	79	70
Pigstone Bay	1	1	2	0	1	1	0	1	n/a	0	100	0	50	n/a	0
Protheroe's Dock	1	3	3	0	2	0	3	2	n/a	1	0	100	67	n/a	100
Seal Hole	8	7	9	8	10	7	3	7	6	4	88	43	78	75	44
South Castle Beach Cave	7	4	3	4	7	4	4	3	2	3	57	100	100	50	100
South Haven	44	40	38	52	34	27	6	30	36	29	61	15	79	69	88
South Stream	6	2	4	4	3	5	1	2	3	3	83	50	50	75	100
The Basin	1	2	1	1	0	0	2	1	1	n/a	0	100	100	100	n/a
The Lantern	4	3	2	2	2	3	1	2	1	1	75	33	100	50	100
The Slabs	4	8	3	8	8	2	7	2	3	8	50	88	67	38	100
The Wick	20	23	18	21	32	14	17	13	18	23	70	74	72	86	72

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 for 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 2020

Cause of death	No. of pups	% of deaths	% of total pups born
Abandoned/separated/starved	16	27.59	6.58
Accident/injured/killed	6	10.34	2.47
Disappeared ≤ stage 3	14	24.14	5.76
Diseased	1	1.72	0.41
Drowned	9	15.52	3.7
Stillborn	3	5.17	1.23
Unknown	9	15.52	3.7
Other	0	0	0
Total	58	N/A	N/A

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 and big tides. The beach is a popular haul-out site and it can become impossible to try and see hidden pups without disturbing hauled out animals. The North Haven site also includes North Haven Slip and the cave by the ladder.

A total of 54 pups were born in North Haven in 2020, 12 more than in the previous year. The fate of all 54 pups is known, of which 38 are assumed to have survived to the beginning of moult or were weaned, giving a survival rate of 70%, which is 9% lower than last year.

Figure 6 Number of seal pups born in North Haven 1983–2020

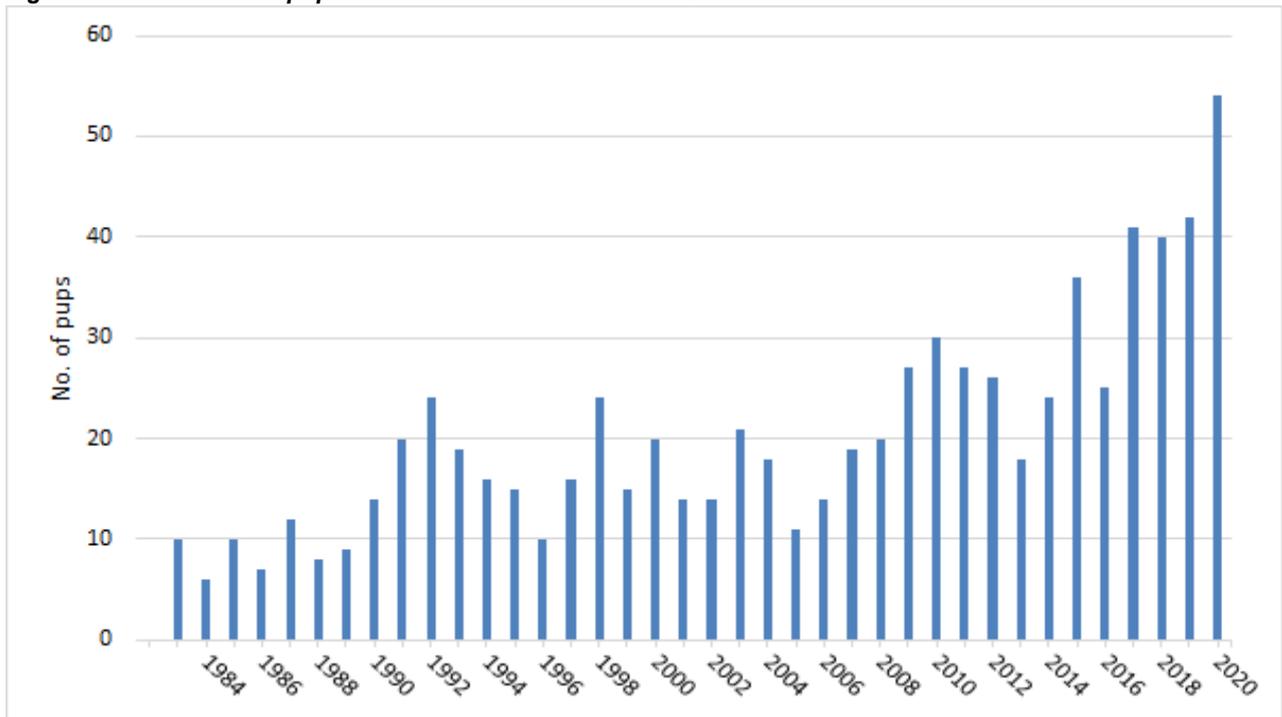


Figure 7 Weekly seal pup births in North Haven in 2020

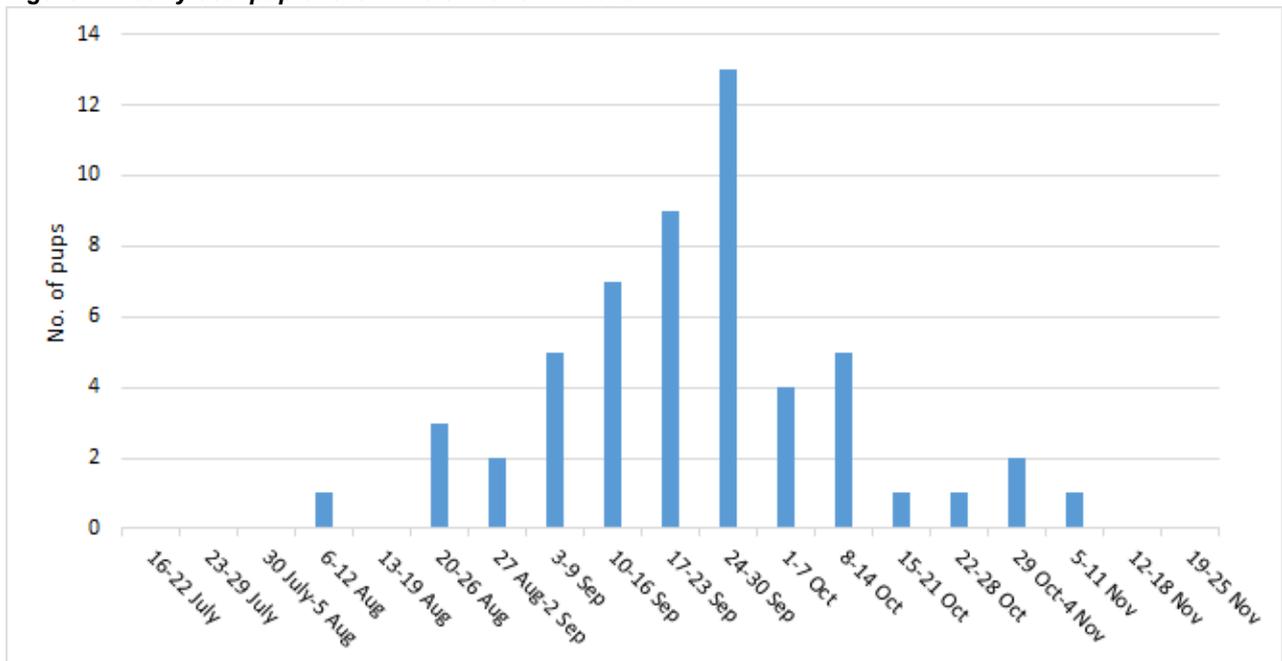


Table 4 Fate of pups in North Haven in 2020

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	4
Survived to weaning	33
Assumed dead	5
Dead	11
Unknown	0
Total	54

Table 5 Causes of seal pup deaths on North Haven beach in 2020

Cause of death	No. of pups
Abandoned/separated/starved	5
Accident/injured/killed	3
Disappeared \leq stage 3	4
Diseased	0
Drowned	2
Stillborn	0
Unknown	2
Other	0
Total	16

4.4.2 Protheroe's Dock

In 2020 two pups were born on Protheroe's Dock, one in week 37 and the other in week 38. Six site visits were conducted to Protheroe's Dock during the monitoring period. Unfortunately, due to a combination of bad weather conditions and neap tides at the wrong time, it was not possible to access Protheroe's Dock within the required time frame to obtain an accurate estimate on the fate of one of the pups and therefore its fate is classed as unknown and removed from survival analysis. The other pup is known to have survived to at least the beginning of moult, giving a survival rate of 100%.

Figure 8 Number of seal pups born in Protheroe's Dock 1983-2020

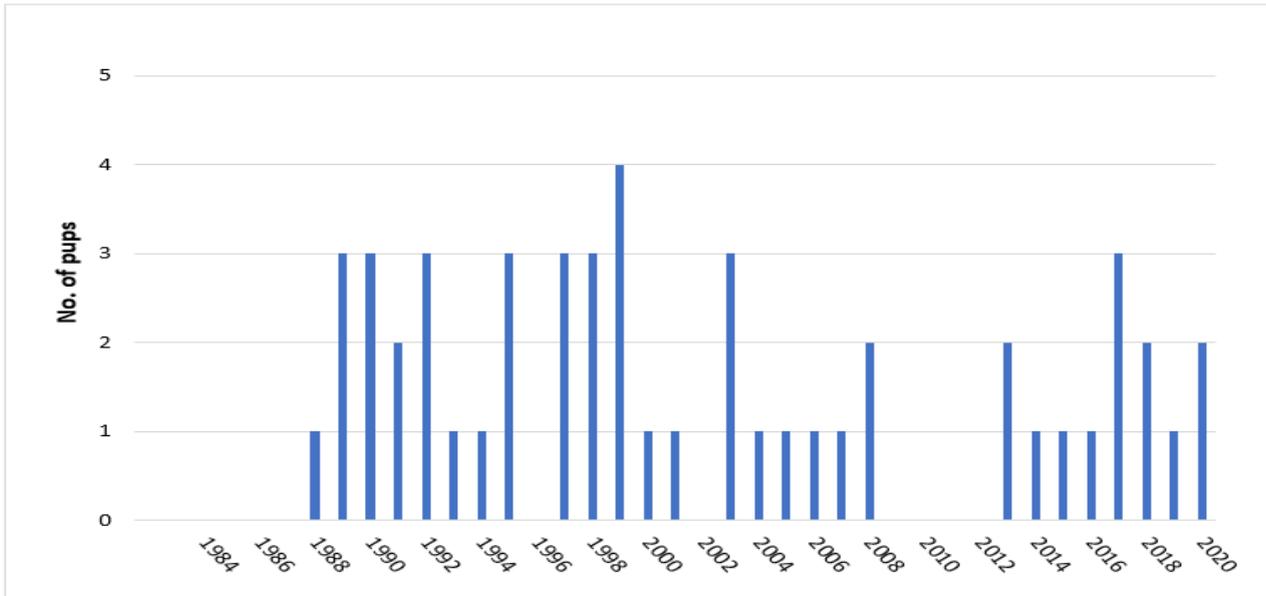


Figure 9 Weekly seal pup births on Protheroe's Dock in 2020

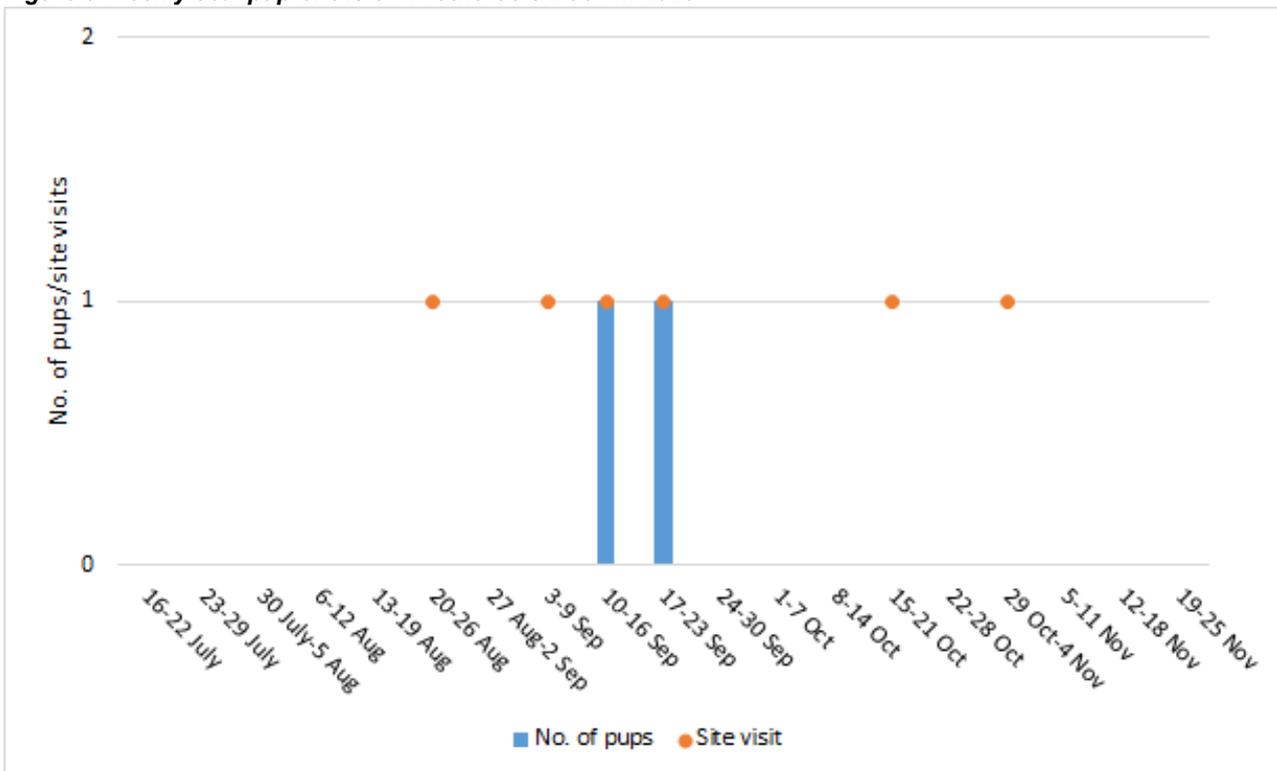


Table 6 Fate of pups on Protheroe's Dock in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	1
Survived to weaning	0
Assumed dead	0
Dead	0
Unknown	1
Total	2

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 and speeds up the site visit.

In 2020 the Lantern was checked four times and two pups were found. These pups were born in week 35 and 39. The fate of one pup is unknown (and therefore removed from survival analysis), and the other survived to the beginning of moult, giving a survival rate of 100%.

Figure 10 Number of seal pups born in The Lantern 1983-2020

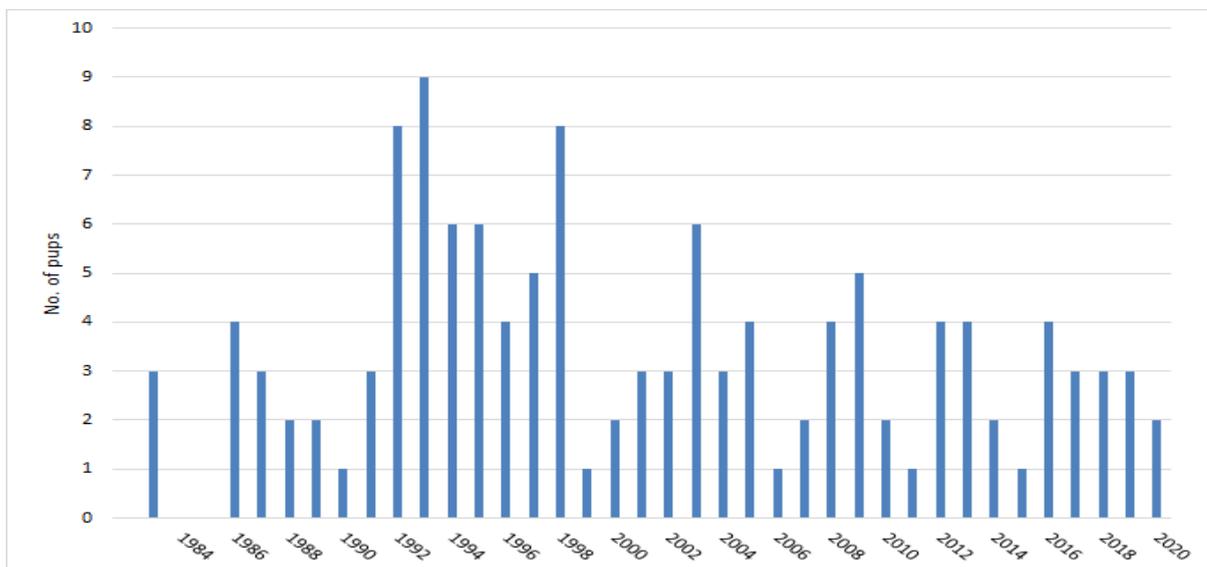


Figure 11 Weekly seal pup births in the Lantern in 2020



Table 7 Fate of pups in the Lantern in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	1
Survived to weaning	0
Assumed dead	0
Dead	0
Unknown	1
Total	2

4.4.4 Amy's Reach

Eight pups were born on Amy's Reach, six of which either survived and weaned, survived at least to the beginning of moult or were assumed to have survived and two pups were known to have died; one drowned as a two day old pup and the cause of death for the other is unknown, in part due to the difficulty of seeing pups at Amy's Reach. This results in a survival rate of 75%.

Figure 12 Number of seal pups born in Amy's Reach 1983–2020

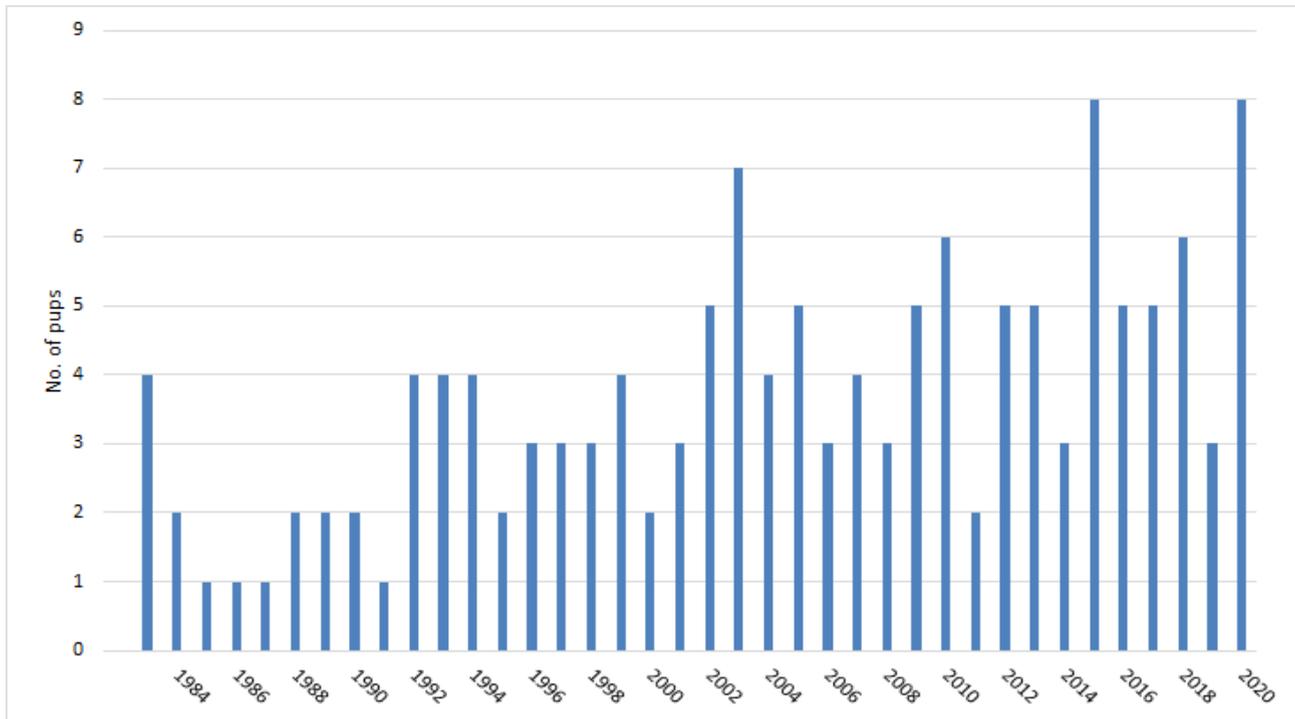


Figure 13 Weekly seal pup births in Amy's Reach 2020

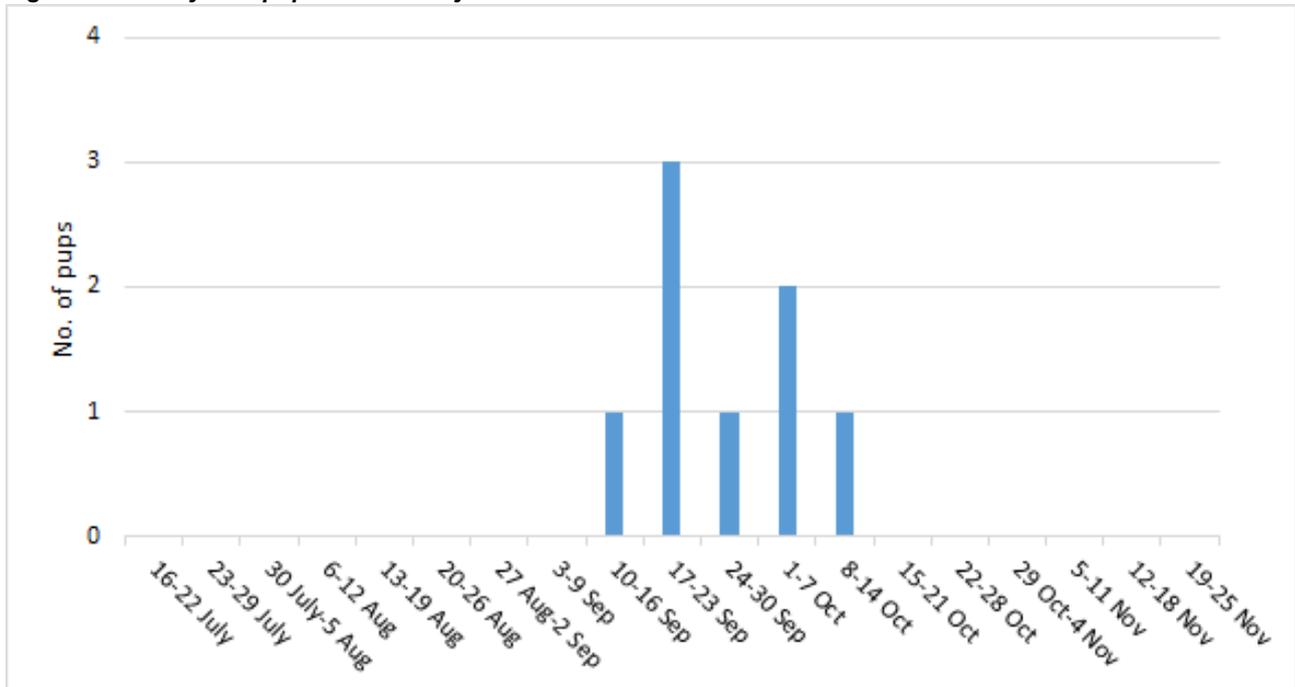


Table 8 Fate of pups in Amy's Reach in 2020

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	2
Survived to weaning	3
Assumed dead	0
Dead	2
Unknown	0
Total	8

4.4.5 Matthew's Wick

In 2020 36 pups were born on Matthew's Wick which is 3 less than in 2019. One of these pups moved to South Stream but spent more time on Matthew's Wick. Three pups were found in the cave on the south east of Matthew's Wick, but still come under Matthew's Wick. 28 pups are assumed to have survived, survived to the beginning of moult or survived and were weaned. This gives a survival rate of 78% which is 1% more than last year.

Figure 14 Number of seal pups born in Matthew's Wick 1983–2020

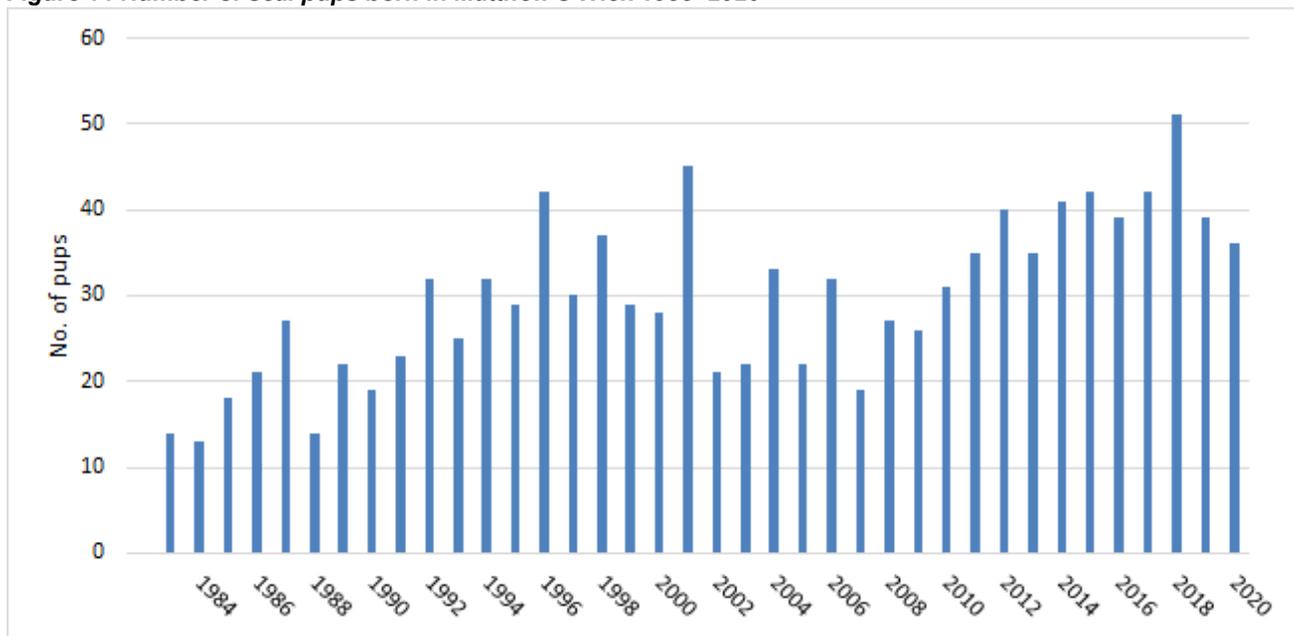


Figure 15 Weekly seal pup births in Matthew's Wick in 2020

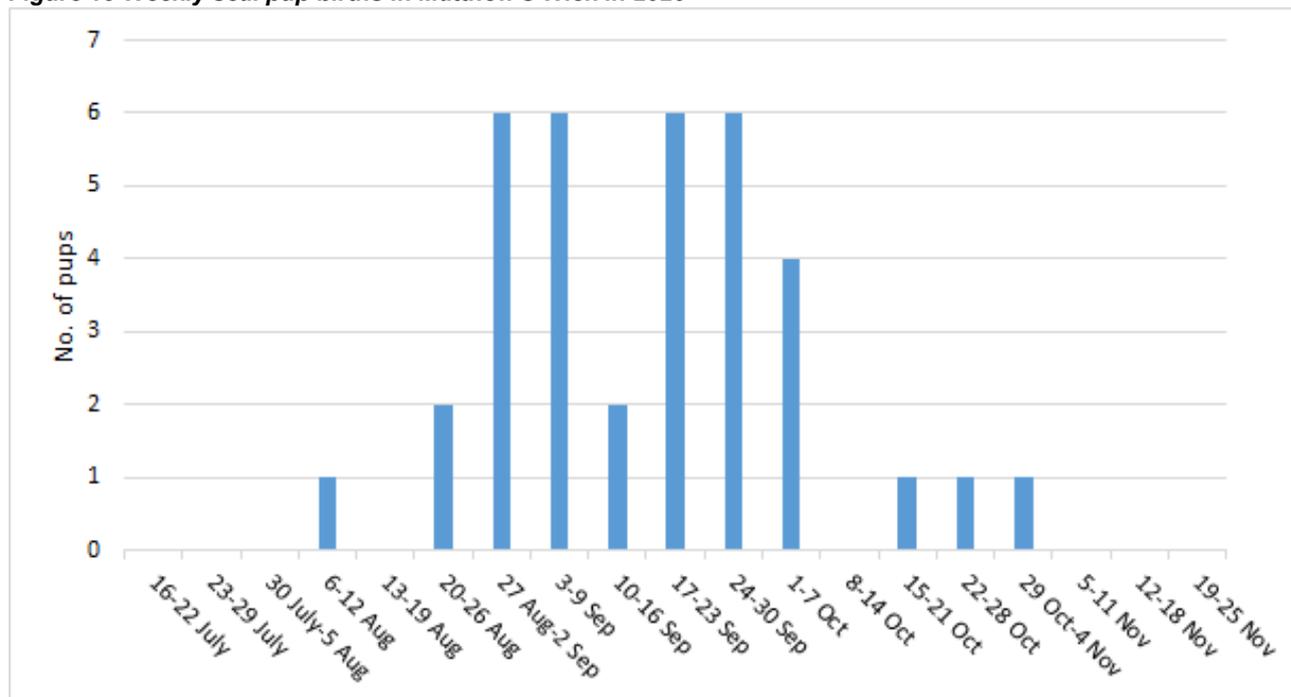


Table 9 Fate of pups on Matthew's Wick in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	4
Survived to weaning	24
Assumed dead	3
Dead	5
Unknown	0
Total	36

Table 10 Causes of seal pup deaths on Matthew's Wick in 2020

Cause of death	No. of pups
Abandoned/separated/starved	1
Accident/injured/killed	1
Disappeared ≤ stage 3	0
Diseased	1
Drowned	3
Stillborn	1
Unknown	1
Other	0
Total	8

4.4.6 Castle Bay

Access to Castle Bay is impossible and pups born there do not get marked. Hence monitoring is more challenging than on other beaches and potentially less accurate. 12 pups were born in Castle Bay in 2020. 8 pups are assumed to have survived, survived to the beginning of moult or survived and weaned, giving a survival rate of 68% which is 17% lower than last year. This is consistent with the survival rate from Castle Bay, which is usually below the whole island survival rate as it is directly facing into the prevailing wind direction and gets fully flooded during storm tides. However, the beach is rather wide which protects the pups on all but the biggest 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. Of the four Castle Bay pups that died in 2020, one disappeared before stage 3, two drowned and the cause of death for the other ones is unknown.

Figure 16 Number of seal pups born in Castle Bay 1983-2020

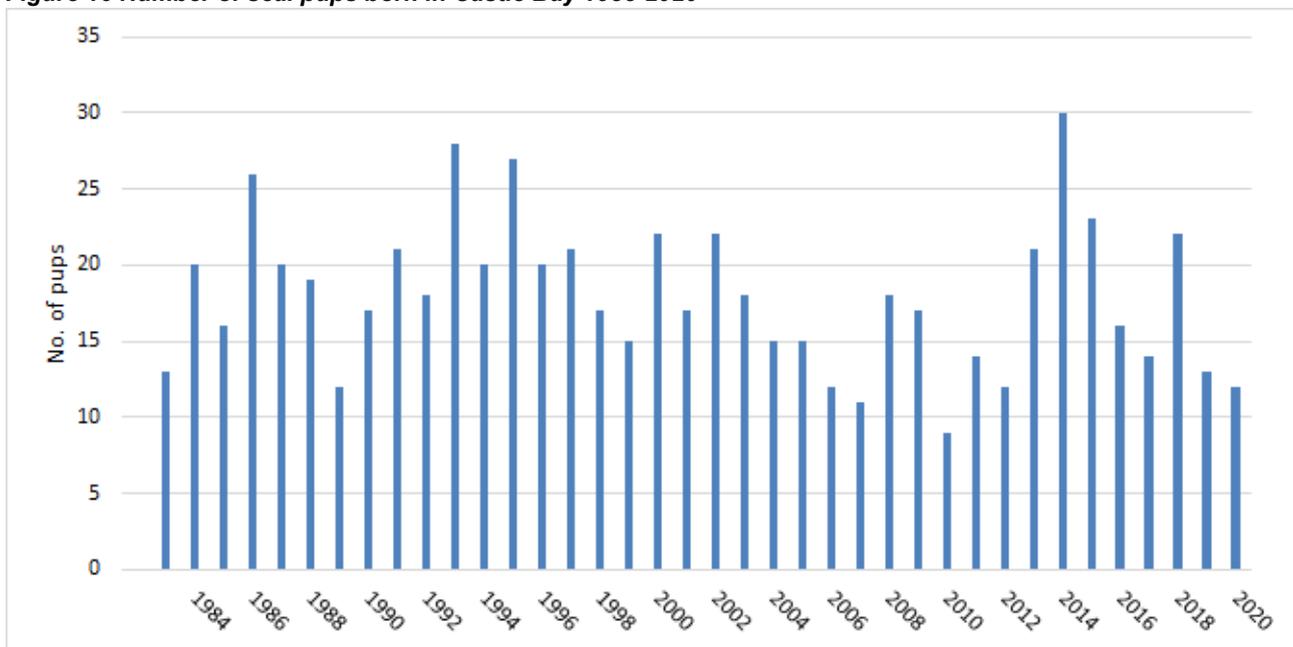


Figure 17 Weekly seal pup births in Castle Bay in 2020

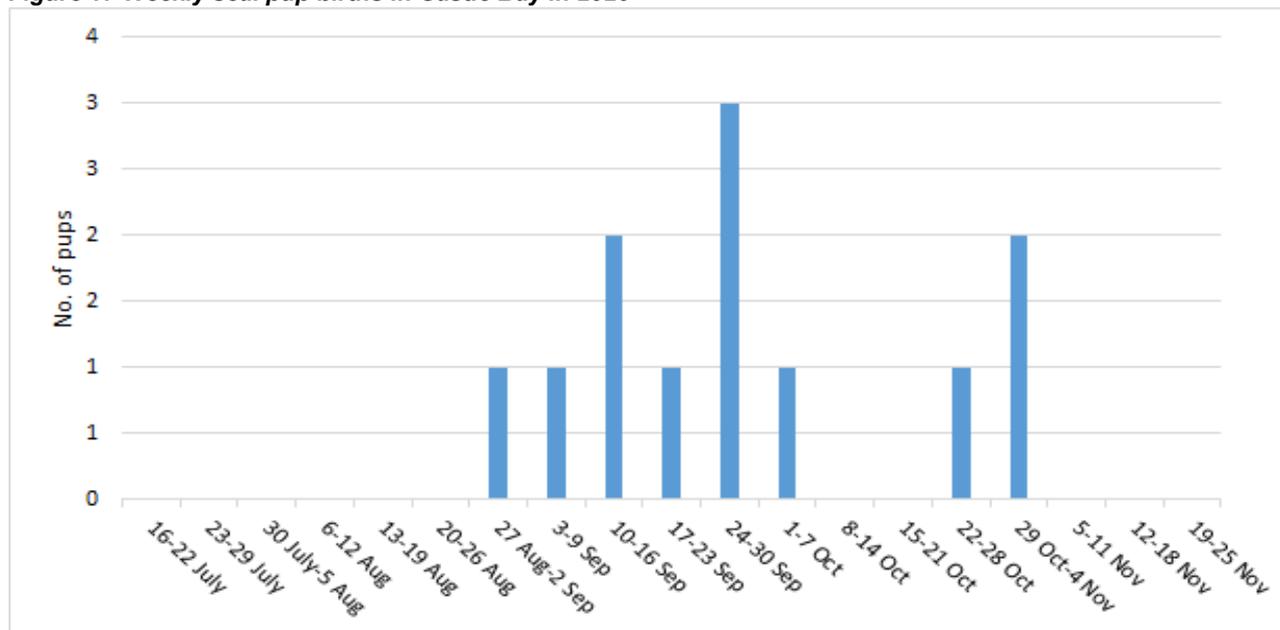


Table 11 Fate of pups on Castle Bay in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	3
Survived to weaning	5
Assumed dead	3
Dead	1
Unknown	0
Total	12

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 was (and remains) 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). However, in 2015 the route was reassessed 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 on numerous occasions.

Access to South Castle Beach Cave was limited due to numerous factors including bad weather during spring tides and larger numbers of cows present. This potentially impacted on the number of pups known to be born, seven, and resulted in the fate of four of these pups being unknown and therefore removed from the survival analysis. Three pups survived and weaned, survived to the beginning of moult or survived. Seven site visits were made to South Castle Beach Cave during the observation period.

Figure 18 Number of seal pups born in South Castle Beach Cave 1990-2020

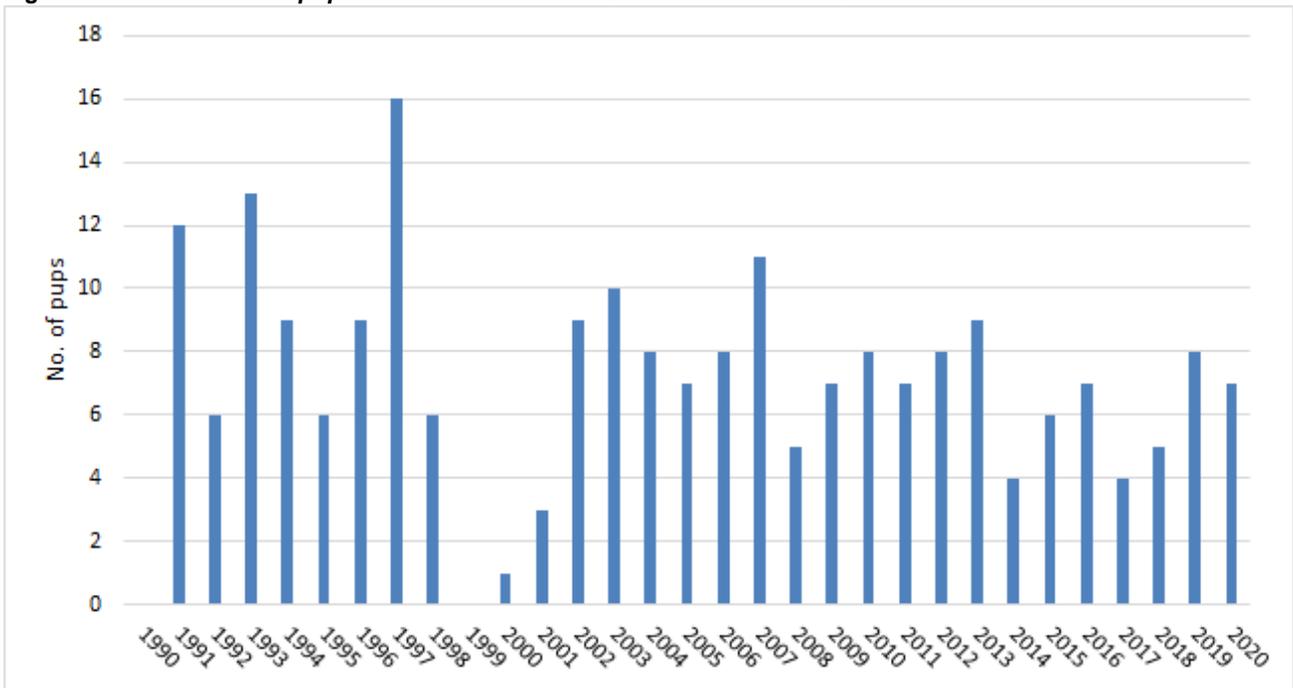


Figure 19 Weekly seal pup births in South Castle Beach Cave in 2020

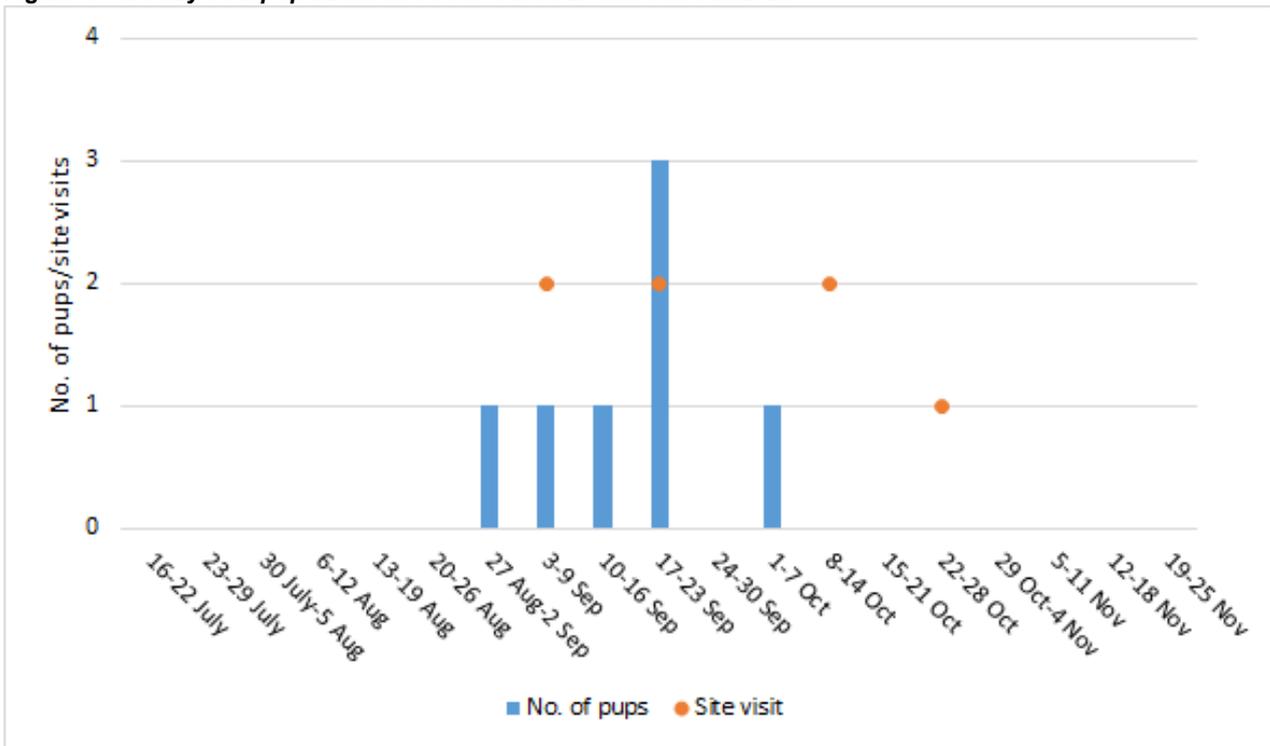


Table 12 Fate of pups in South Castle Beach Cave in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	1
Survived to weaning	2
Assumed dead	0
Dead	0
Unknown	4
Total	7

Plate 4 Blue Purple, 227 pup born in South Castle Beach Cave, found alone in Peter’s Bay on Skokholm Island on 21/10/2020 at 16 days. Photo by Richard Brown.



4.4.8 Seal Hole

10 pups were born in Seal Hole in 2020, one pup moved from Seal Hole to Driftwood Bay and another to South Stream, but both spent the majority of their time as unweaned pups in Seal Hole, thus will remain attributed to Seal Hole. Due to a combination of bad weather during spring tides and cows remaining in the cave reducing the number of visits possible, one pup’s fate is unknown and has therefore been removed from survival analysis. Four pups are assumed to have survived, survived to the beginning of moult or survived and were weaned, giving a survival rate of 44% which is significantly lower than last year’s survival rate of 75%. This was most likely due to strong south westerly winds. Of the five pups that died, one is thought to be due to injury, one due to being abandoned, another due to disappearing before stage 3 and the fate of the other two are unknown. In 2020 nine site visits were made to Seal Hole.

Figure 20 Number of seal pups born in Seal Hole 1983-2020

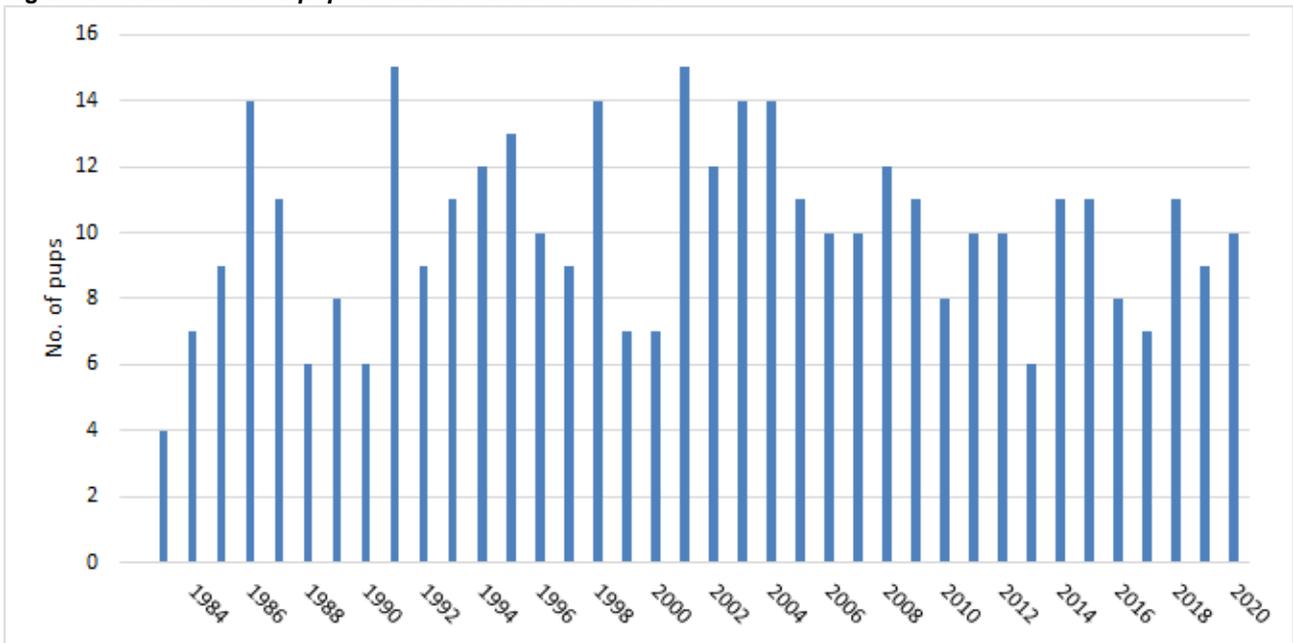


Figure 21 Weekly seal pup births in Seal Hole in 2020

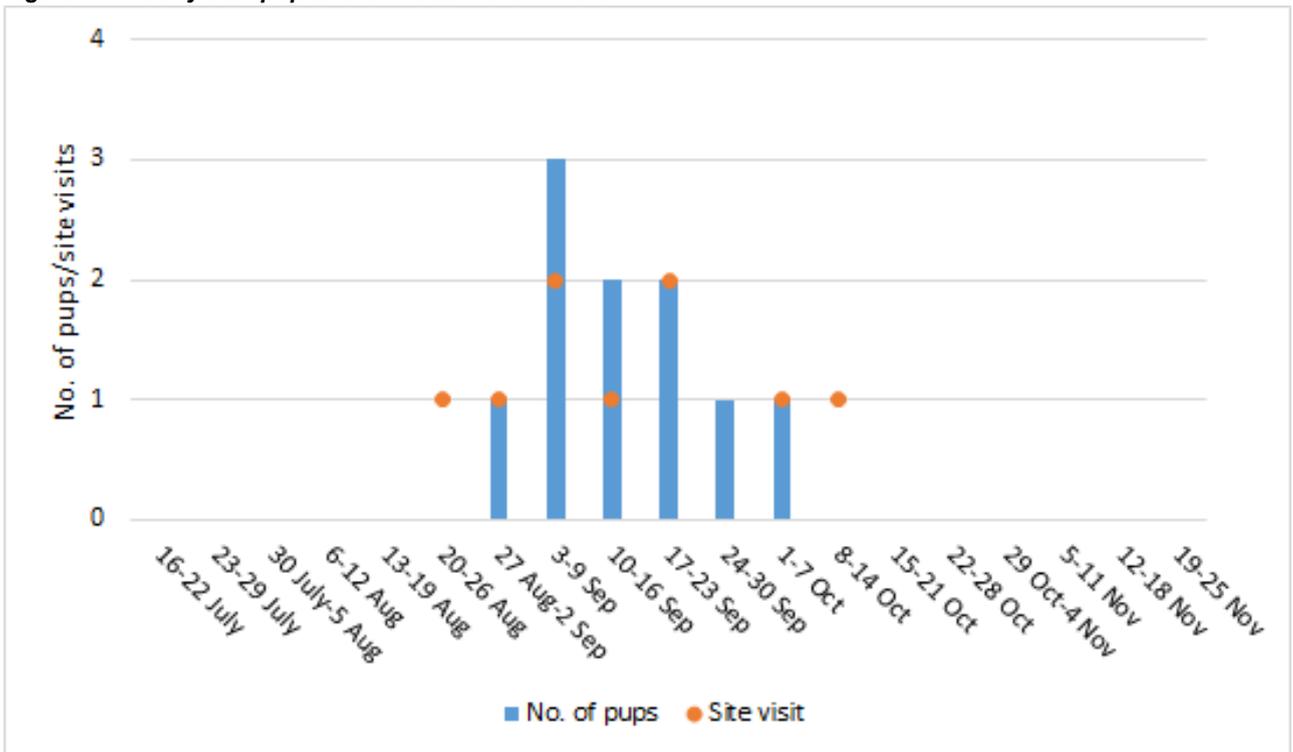


Table 13 Fate of pups in Seal Hole in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	1
Survived to weaning	3
Assumed dead	1
Dead	4
Unknown	1
Total	10

4.4.9 The Slabs

Eight pups were born on The Slabs in 2020, one of which moved to Driftwood Bay and spent the majority of its time there prior to weaning and thus is attributed to Driftwood Bay. Of the seven pups attributed to the Slabs, all eight pups are assumed to have survived, survived to the beginning of moult or survived and weaned.

Figure 22 Number of seal pups born on The Slabs 1983-2020

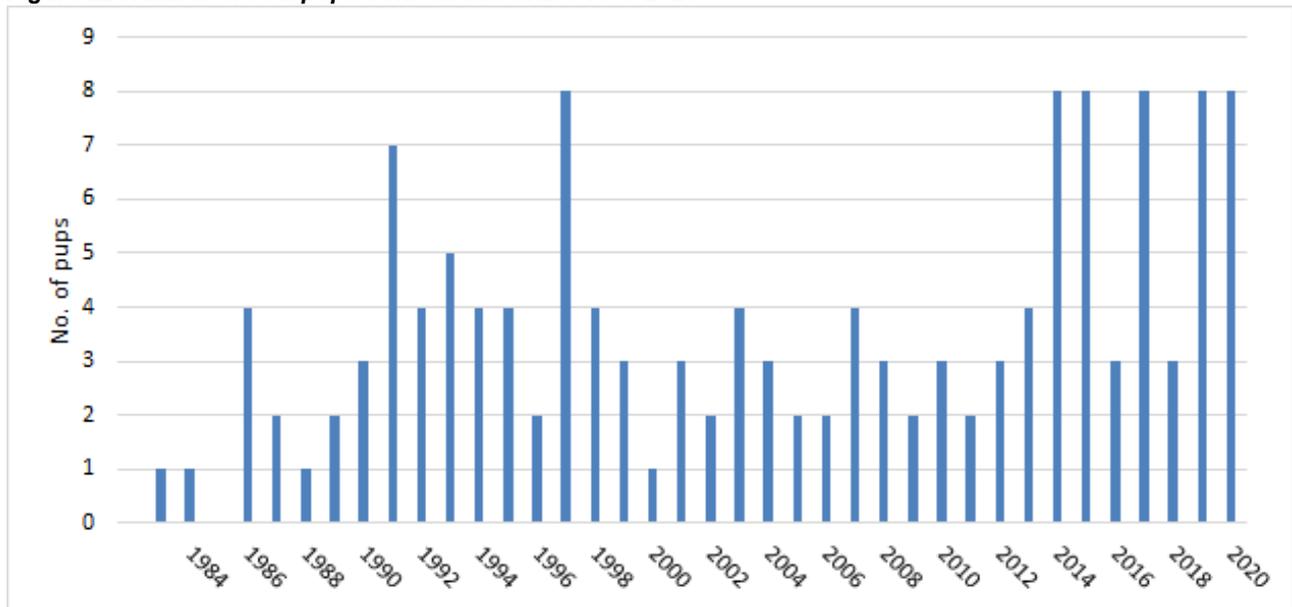


Figure 23 Weekly seal pup births on The Slabs in 2020

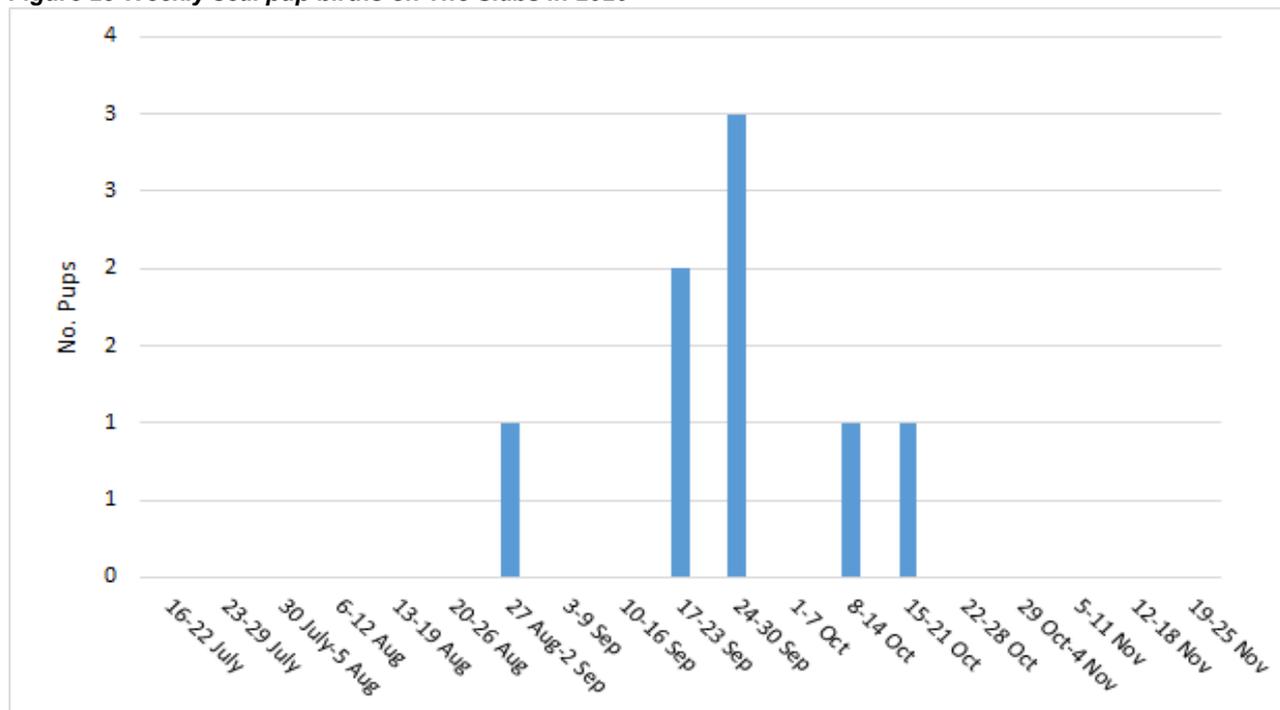


Table 14 Fate of pups on The Slabs in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	3
Survived to weaning	5
Assumed dead	0
Dead	0
Unknown	0
Total	8

4.4.10 Driftwood Bay

33 pups were born in Driftwood Bay in 2020, which is the most on record. Additionally, one pup moved from the Slabs and another from South Haven, spent the majority of their time prior to weaning on Driftwood Bay and therefore are attributed to Driftwood Bay. Of the 35 pups spending the majority of their time prior to weaning on Driftwood Bay, 26 are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 74%, which is 17% less than the previous year, which is potentially a reflection of a generally rough sea conditions, which included various storms, some from the south or southwest.

Figure 24 Number of seal pups born in Driftwood Bay 1983-2020

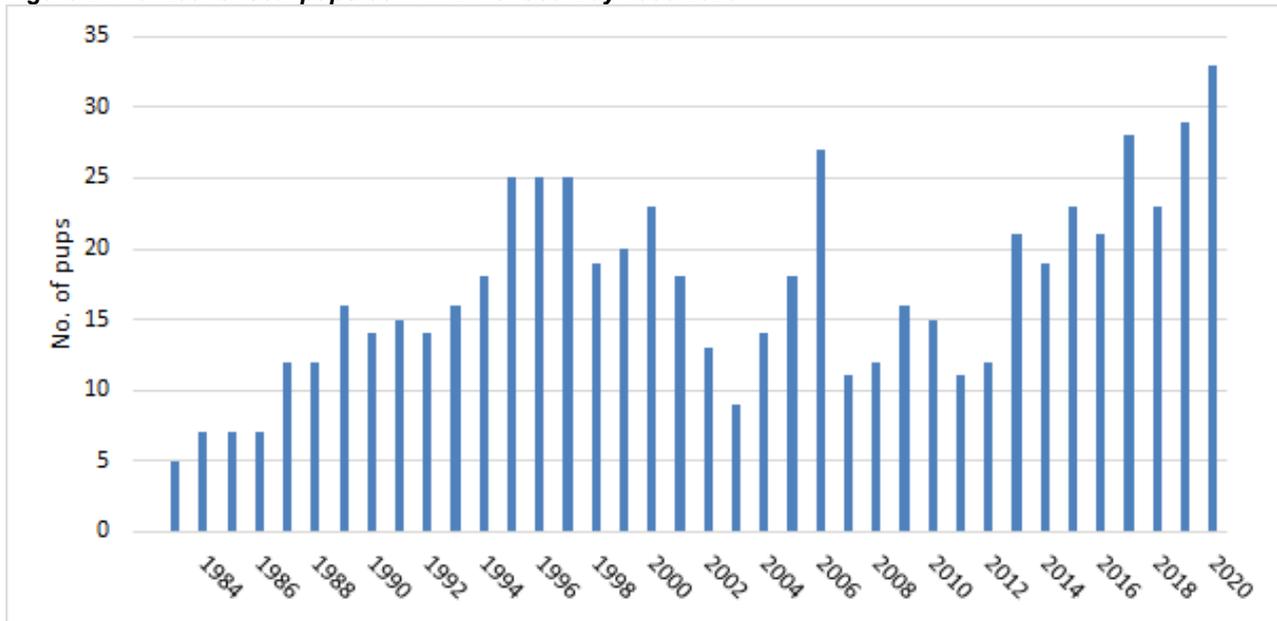


Figure 25 Weekly seal pup births in Driftwood Bay in 2020

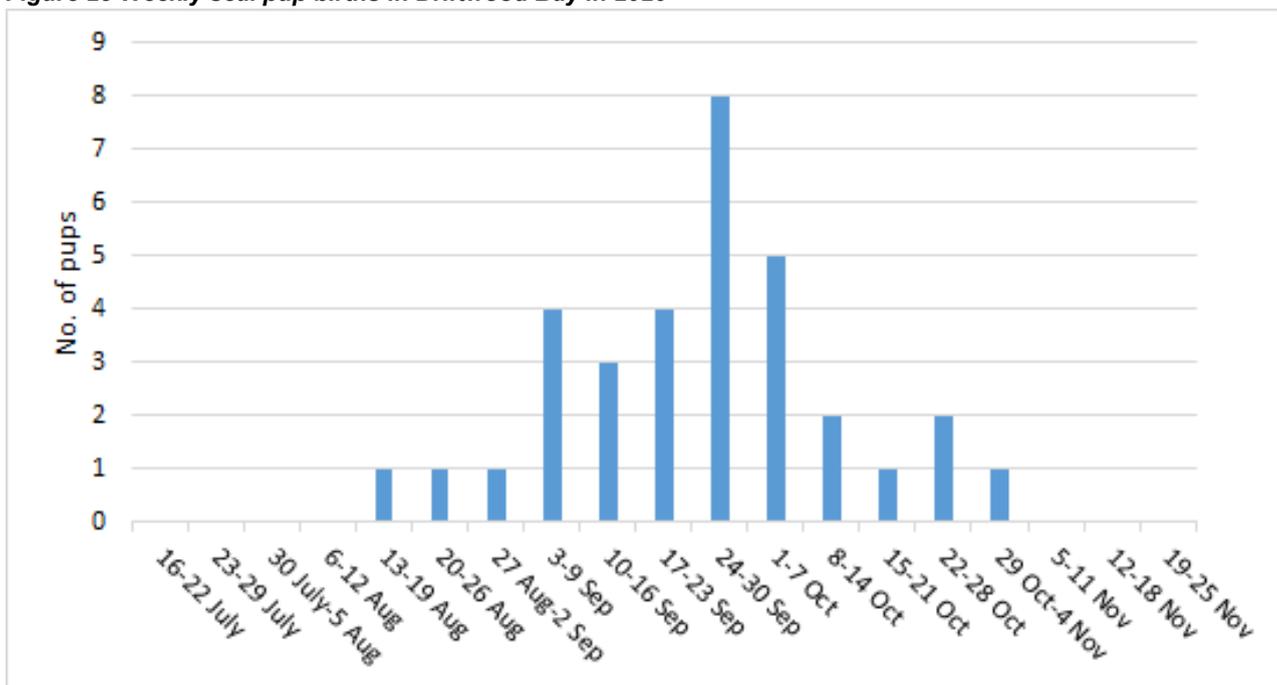


Table 15 Fate of pups on Driftwood Bay in 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	7
Survived to weaning	19
Assumed dead	1
Dead	8
Unknown	0
Total	35

Table 16 Causes of seal pup deaths on Driftwood Bay in 2020

Cause of death	No. of pups
Abandoned/separated/starved	6
Accident/injured/killed	0
Disappeared \leq stage 3	1
Diseased	0
Drowned	0
Stillborn	2
Unknown	0
Other	0
Total	9

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, moreover, pups tend to move out of the caves within their first week and can be observed from above thereafter.

In 2020 34 pups were born in South Haven, substantially less than the 54 born in 2019. one pup moved from South Haven to Driftwood Bay and spent most of their time before weaning there. Of the 33 pups which were raised on South Haven beach 29 are assumed to have survived, survived to the beginning of moult or survived and were weaned, giving a survival rate of 88%, which is more than the previous year's 69%. Of the four pups that died, three disappeared before stage 3 and the cause of death for the other was unknown.

Figure 26 Number of seal pups born in South Haven 1983-2020

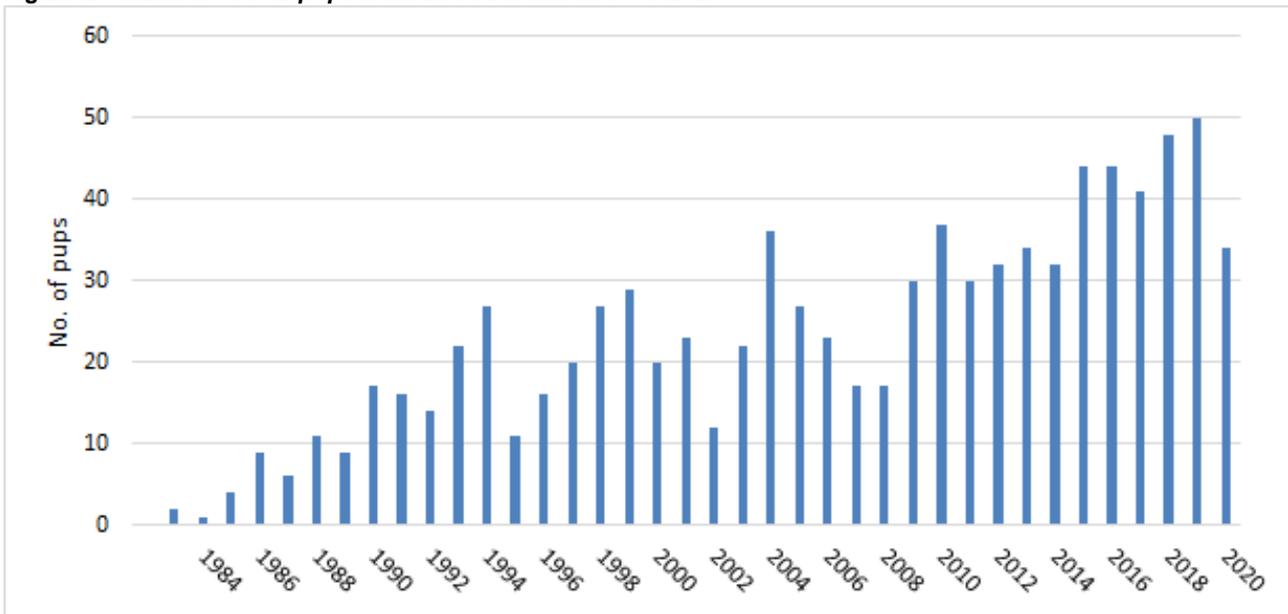


Figure 27 Weekly seal pup births in South Haven in 2020

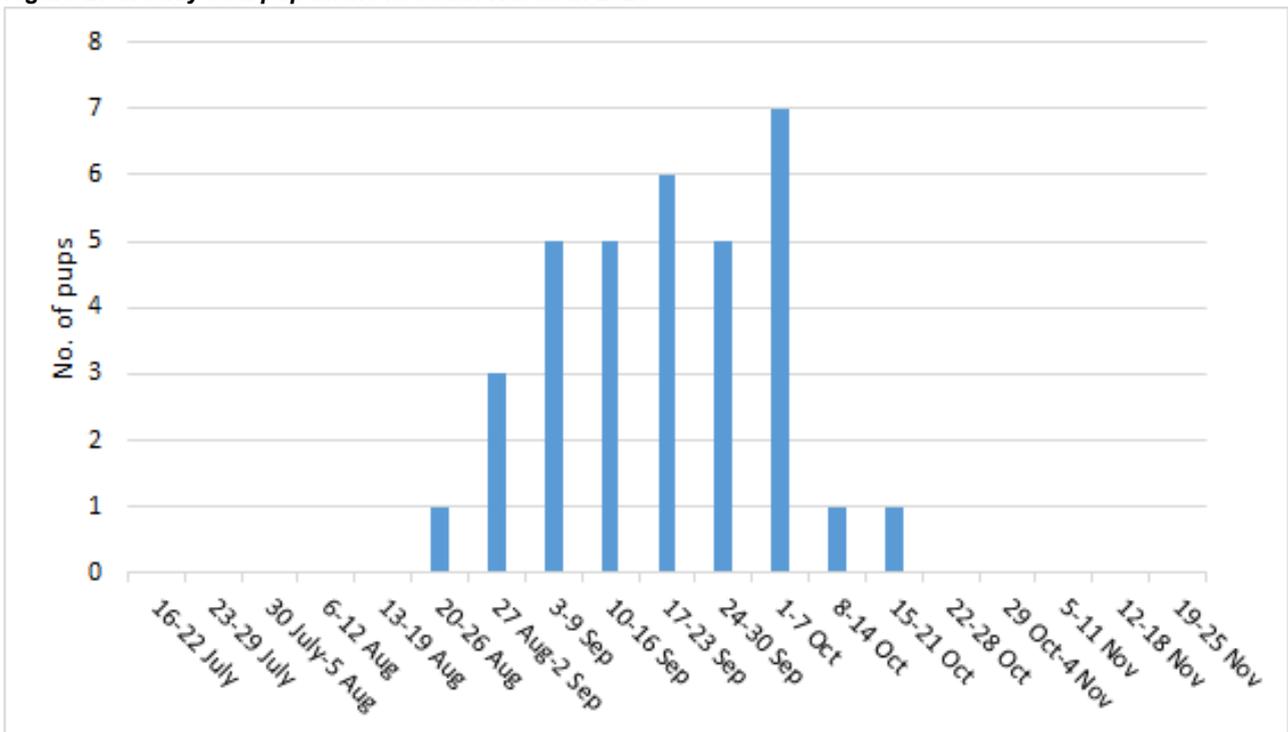


Table 17 Fate of pups in South Haven in 2020

Fate	No. of pups
Assumed survived	3
Survived to beginning of moult	7
Survived to weaning	19
Assumed dead	2
Dead	2
Unknown	0
Total	33

4.4.12 South Stream Cave and Boulders

South Stream Cave and Boulders (hereafter South Stream) 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 it was discovered that pups can easily be missed when inspecting from such a distance. In 2020 the site was checked from South Stream outfall every two to three days, sometimes less often if the weather conditions prevented the site from being safely accessed and, as activity was low, only one full site visit was necessary.

Three pups were born at South Stream in 2020, of which all three were assumed to have survived, survived to the beginning of moult or survived and were weaned.

Figure 28 Number of seal pups born in South Stream 1983-2020

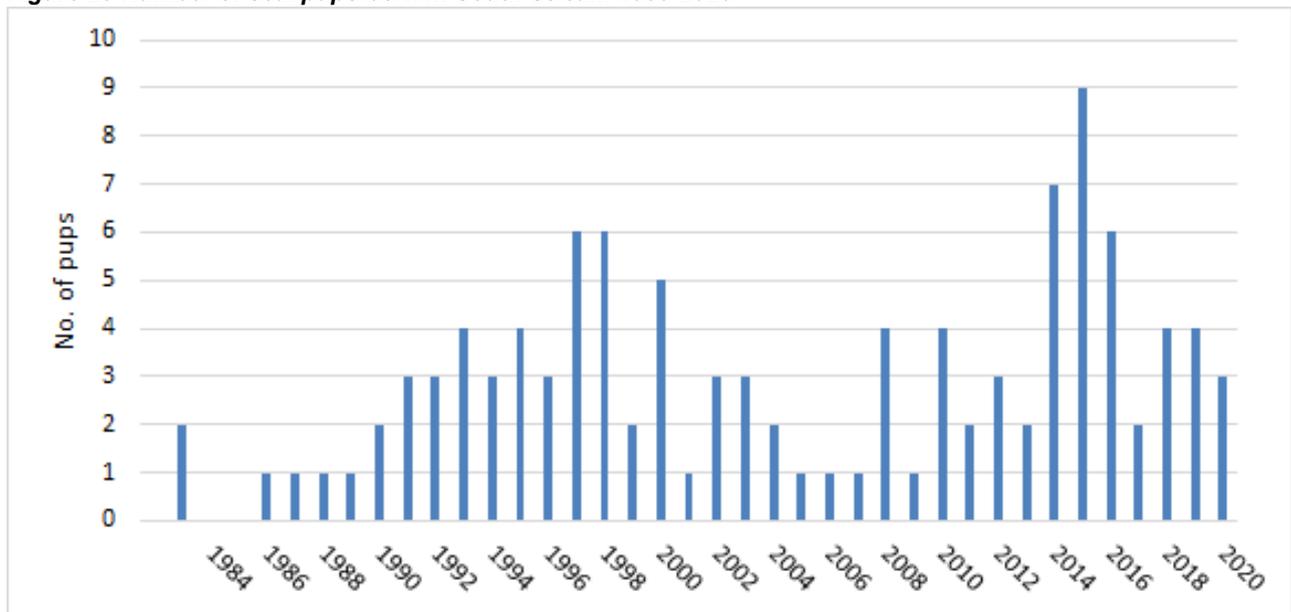


Figure 29 Weekly seal pup births in South Stream in 2020

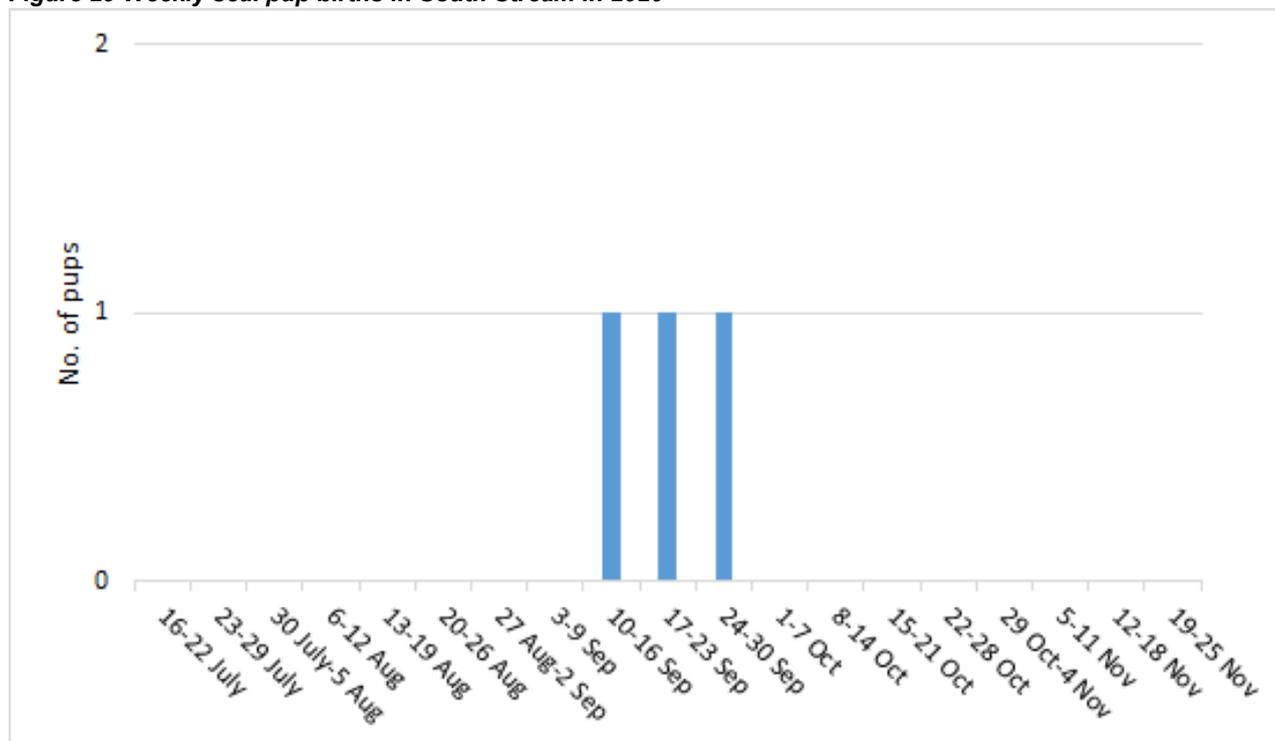


Table 18 Fate of pups in South Stream in 2020

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	2
Survived to weaning	0
Assumed dead	0
Dead	0
Unknown	0
Total	3

4.4.13 High Cliff Boulders

High Cliff Boulders is a site which is difficult to monitor as the boulders can 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 three pups were found. One pup was born at High Cliff Boulders in 2020, unfortunately due to the difficulties of monitoring the site and reduced numbers of staff because of Covid-19, the fate of this pup is unknown and thus removed from survival analysis.

Figure 30 Number of seal pups born at High Cliff Boulders 1983-2020

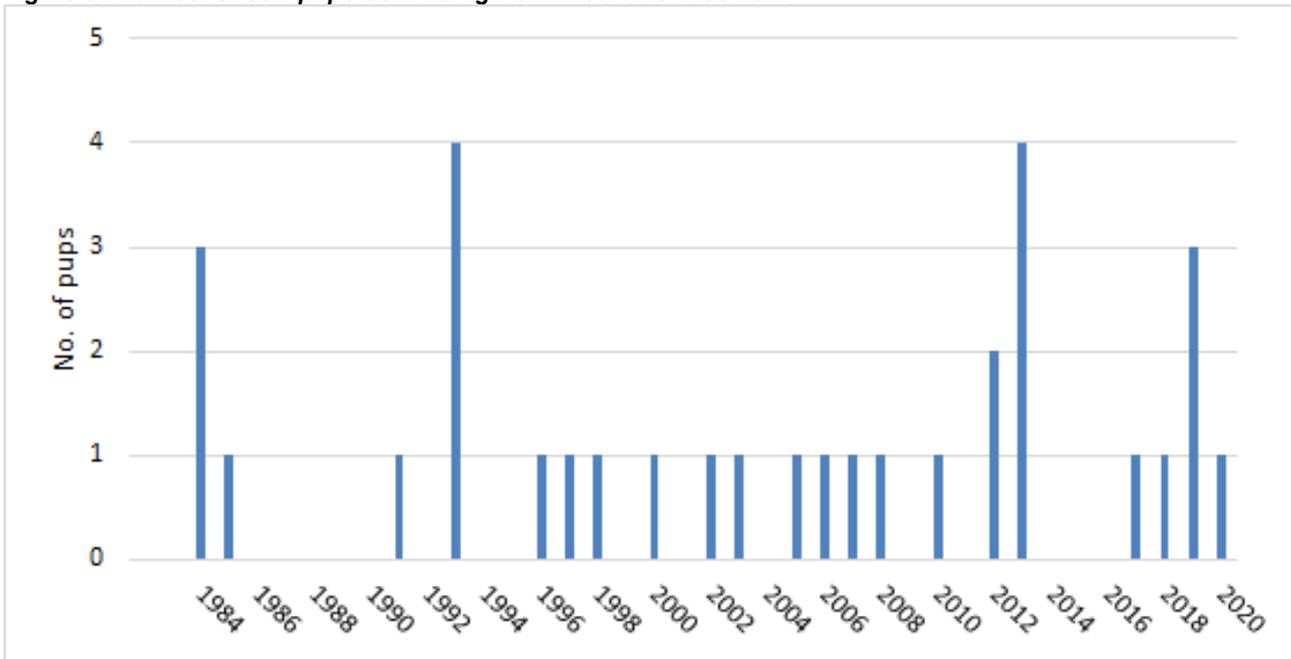
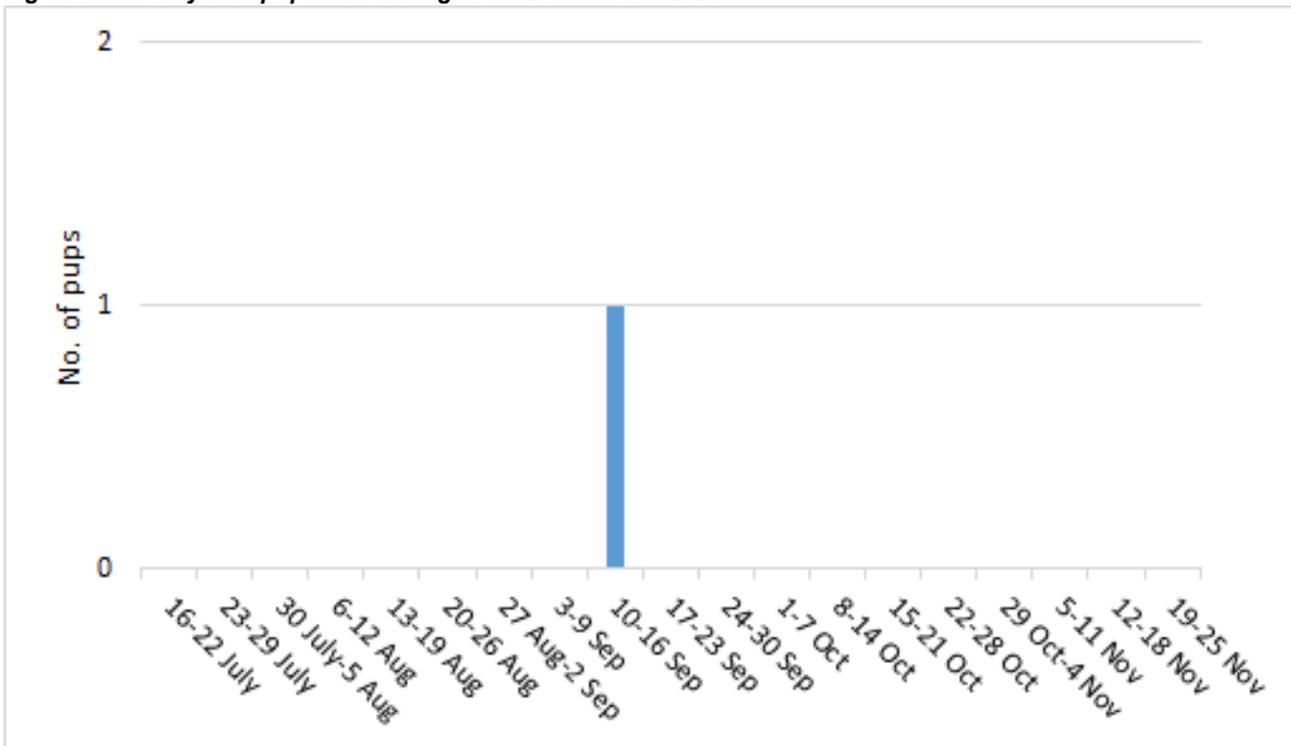


Figure 31 Weekly seal pup births at High Cliff Boulders in 2020



4.4.14 The Wick

32 seal pups were born on The Wick in 2020, which was a considerably higher count compared to 2019 (21).

23 pups are assumed to have survived, survived to the beginning of moult or survived and were weaned, giving a survival rate of 72%.

Figure 32 Number of seal pups born in The Wick 1983-2020

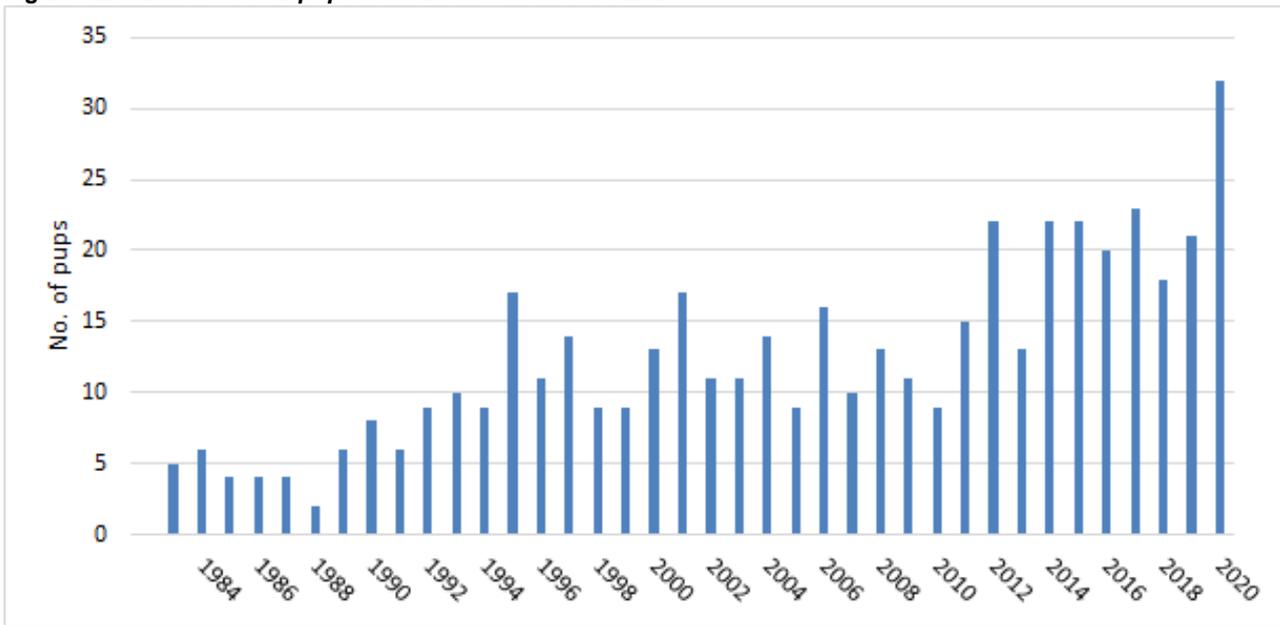


Figure 33 Weekly seal pup births in The Wick in 2020

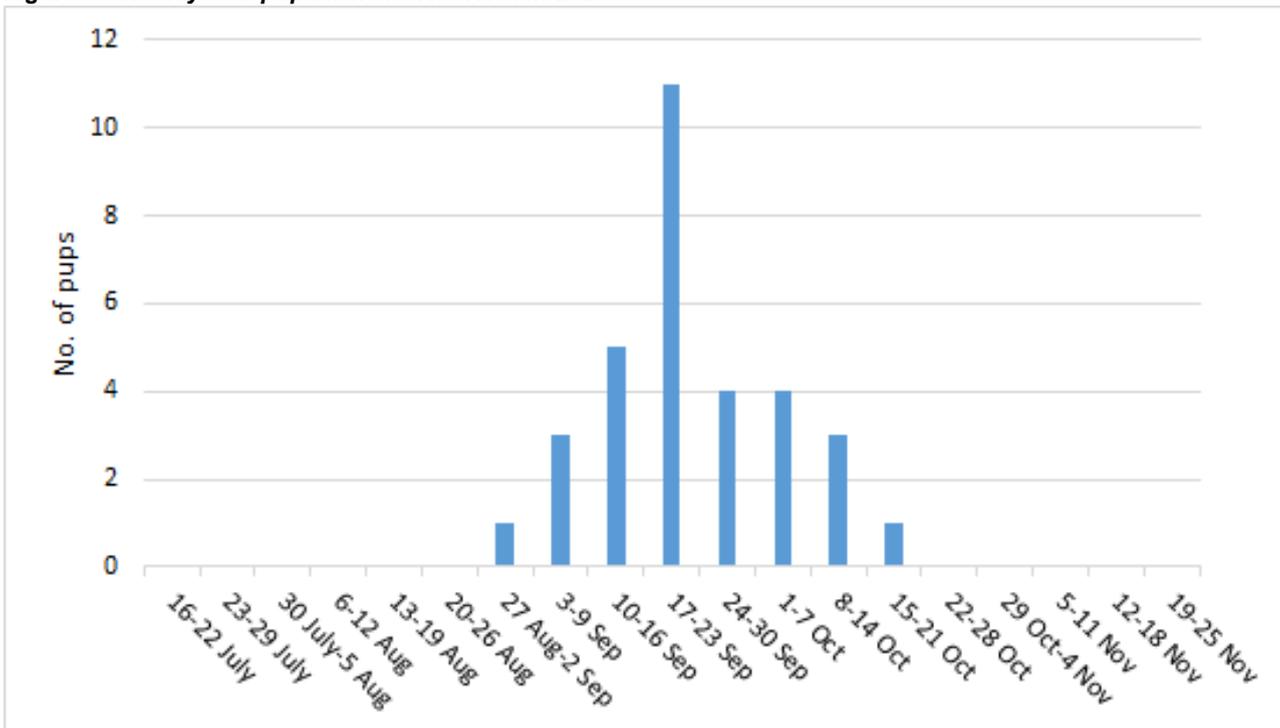


Table 19 Fate of pups on The Wick 2020

Fate	No. of pups
Assumed survived	0
Survived to beginning of moult	6
Survived to weaning	17
Assumed dead	6
Dead	3
Unknown	0
Total	32

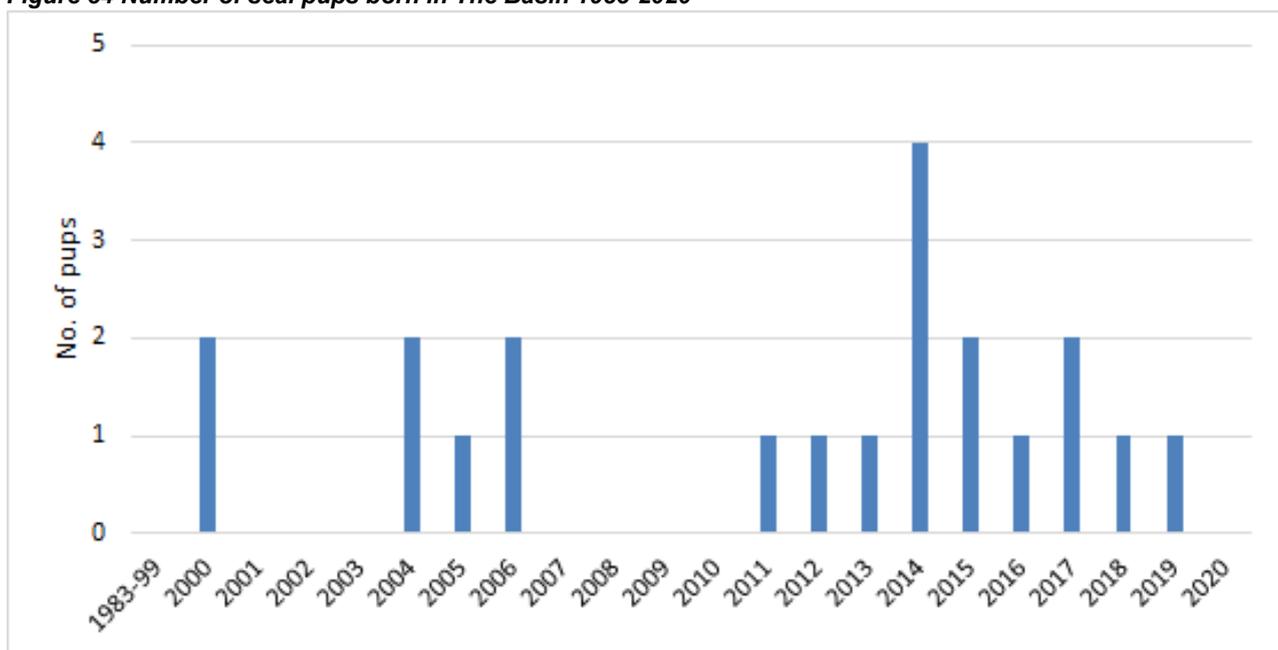
Table 20 Causes of seal pup deaths on The Wick in 2020

Cause of death	No. of pups
Abandoned/separated/starved	3
Accident/injured/killed	1
Disappeared ≤ stage 3	4
Diseased	0
Drowned	0
Stillborn	0
Unknown	1
Other	0
Total	9

4.4.15 The Basin

In 2020 no pups were known to be born at the Basin in 2020.

Figure 34 Number of seal pups born in The Basin 1983-2020



4.4.16 Pigstone Bay

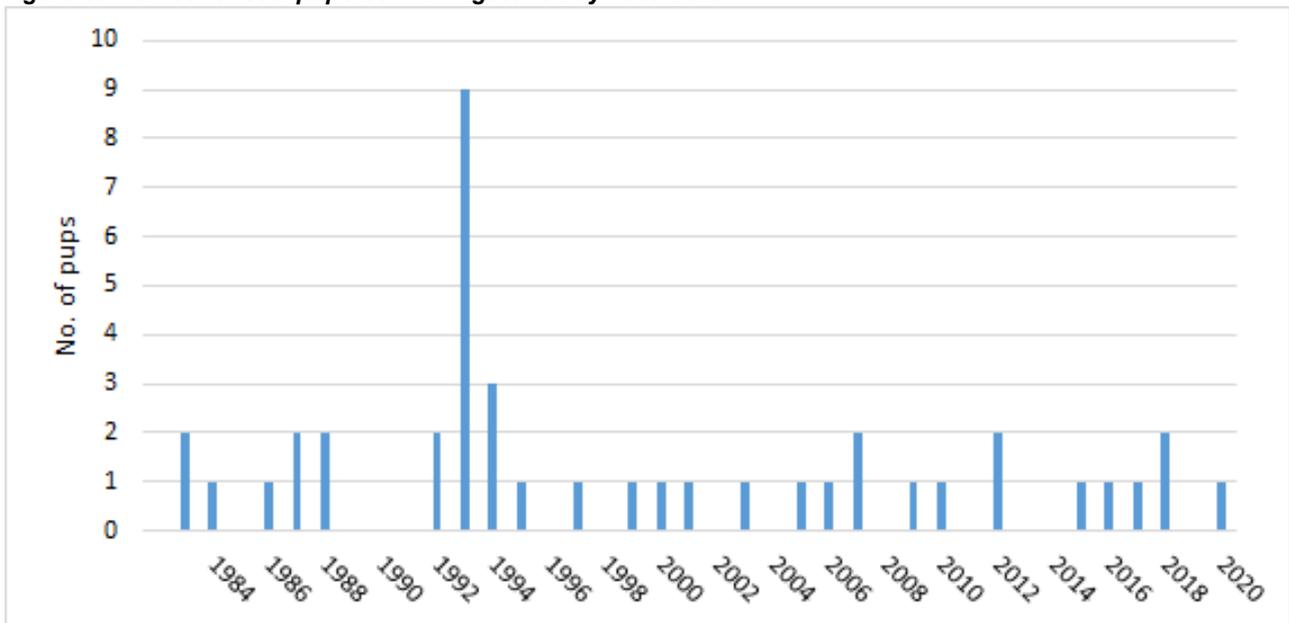
Pigstone Bay is a difficult site to monitor as there is a sea cave, which is impossible to access from land. The cave was entered by boat in 1985 and found to end in a shingle beach which held about a dozen hauled out seals and it was considered the cave could be an important pupping site (Alexander & 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, or washed onto when displaced from the cave. Up until 2016 Pigstone Bay was monitored solely from the cliff top but, as only half the beach is visible from above, a route down to the beach was sought and is now used on occasions.

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.

In 2020 the site was monitored approximately every four to seven days when the weather allowed during the main pupping time. One pup was born at Pigstone Bay in 2020 in week 38, this pup unfortunately died.

Figure 35 Number of seal pups born in Pigstone Bay 1983-2020



4.4.17 The Garland Stone

No pups were born at the Garland Stone in 2020. Single pups were born at this site in 2015, 2007 and in 2001.

4.4.18 The Mew Stone

No pups were born at the Mew Stone in 2020. This site was only used once in 2015 when a freshly dead pup was found floating at the base of the Mew Stone.

4.4.19 Robert's Wick

No pups were observed in Robert's Wick in 2020. This site was possibly used once, in 2001.

4.4.20 Tom's House

No pups were observed at Tom's House in 2020. The site has only been used once, in 1997, when a single pup was born.

4.4.21 Rye Rocks

No pups were observed at Rye Rocks in 2020. The last time the site was used in 2018.

4.5 Movements

During 2020, 9 pups were recorded making movements between beaches on Skomer (25 if we include movements between North Haven beaches and between South Haven caves and beach). The survival rate of the 9 pups is 100%, with 7 pups surviving to weaning and 2 surviving to at least the beginning of moult.

According to Boyle (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. This is certainly true however, pups seem to move frequently between Seal Hole, Driftwood Bay and South Haven and between North Haven main beach and North Haven slip, irrespective of tides.

Table 21 Movements of pups on Skomer Island in 2020

Pup No.	Natal Site*	Destination *	Age (on arrival at destination)	Fate*
23	MWK	SS	18	SBM
43	WCK	Basin	21	SW
46	DWB	SHV	5	SW
57	SHO	SS	16	SW
133	SHV	DWB	6	SW
138	DWB	SHV	17	SBM
181	SHV	DWB	18	SW
222	SBS	DWB	3	SW
227	SCBC	Skokholm	16	SW

* see Appendix 2 for key to abbreviations

4.6 Wanderers

Five pups were recorded as wanderers. Wanderers 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.

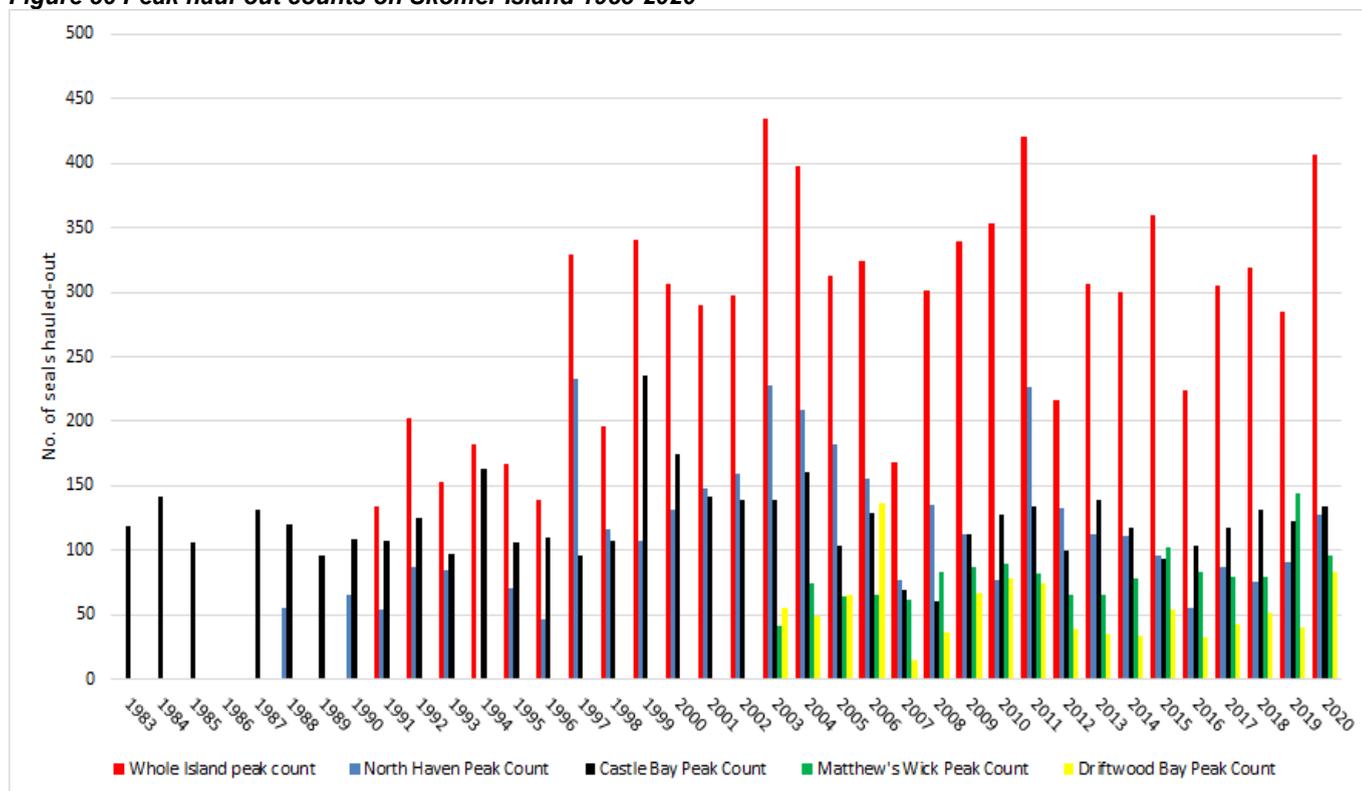
5. Haul-outs in 2020

In 2020 the maximum haul-out (on the main haul-out sites of North Haven, Driftwood Bay, Castle Bay and Matthew’s Wick) of 384 seals (132 more than in 2019) was recorded on 4th November 2020, 14 days earlier than in the previous year.

The average maximum haul-out on the main haul-out sites for the last ten years is 309, hence the peak number of seals using Skomer to haul-out in 2020 was above the ten-year average.

In 2020 North Haven had its peak haul-out count on 19/11/20, Driftwood Bay on the 19/11/20, Castle Bay had its haul-out peak count on the 22/10/20 and Matthew’s Wick on the 19/11/20.

Figure 36 Peak haul-out counts on Skomer Island 1983-2020

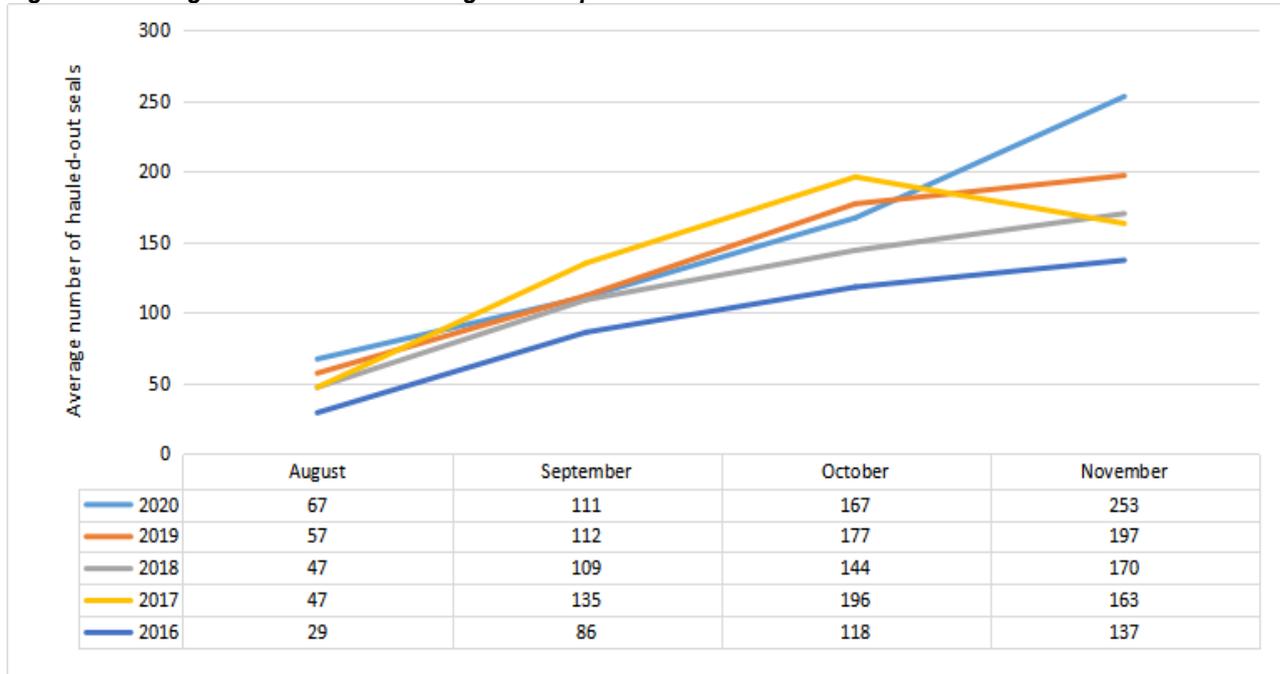


For haul-out details see “2020 Haul-outs” raw data file.

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 using Skomer on a

daily basis or every few days. Whole island haul-out counts were not conducted as often as it was hoped for due to the lack of staff and storms making it dangerous to visit some of the sites.

Figure 37 Average number of seals using Skomer per month 2015-2020



The number of hauled-out animals during the entire observation period was similar to that of 2019. The trendline of haul-outs is typical for Skomer, with the counts increasing throughout the season.

When looking at the average number of seals hauled-out per site in 2020, Castle Bay (including Shag Rock) was again the most popular haul-out site with an average daily haul-out of 45 seals. Also, as with the previous year, the second most popular beach was North Haven (including Rye Rocks and the slip beach) with an average daily haul-out of 42 individuals. Matthew’s Wick was the third most important haul-out site with a daily average of 25 seals. Driftwood Bay remained the fourth most numerous haul-out site with an average of 17 seals. The Garland Stone doesn’t seem to play a major role as a haul-out site during the autumn, although seals do use it to rest all year round. A daily average of only 9 seals was recorded during the monitoring period. As shown in Figure 38, below, in week 42 the number of seals hauled-out in Castle Bay substantially decreased, this was due to strong winds from the south-east coinciding with very high tides, it would appear some seals chose to haul-out at the more sheltered Driftwood Bay instead.

The number of seals hauled-out per site varies significantly from day to day and is most likely determined by weather conditions. How weather and sea condition impacts on the haul-outs was especially visible when looking at the numbers at Garland Stone throughout the monitoring period with many consecutive days of no seals due to strong winds and big swells.

Not as many haul-outs were recorded in 2020 as usual due to the number of storms and the lack of staff being able to check the whole island sites as often as it was hoped for.

Figure 38 Average haul-out at the main haul-out sites per week in 2020

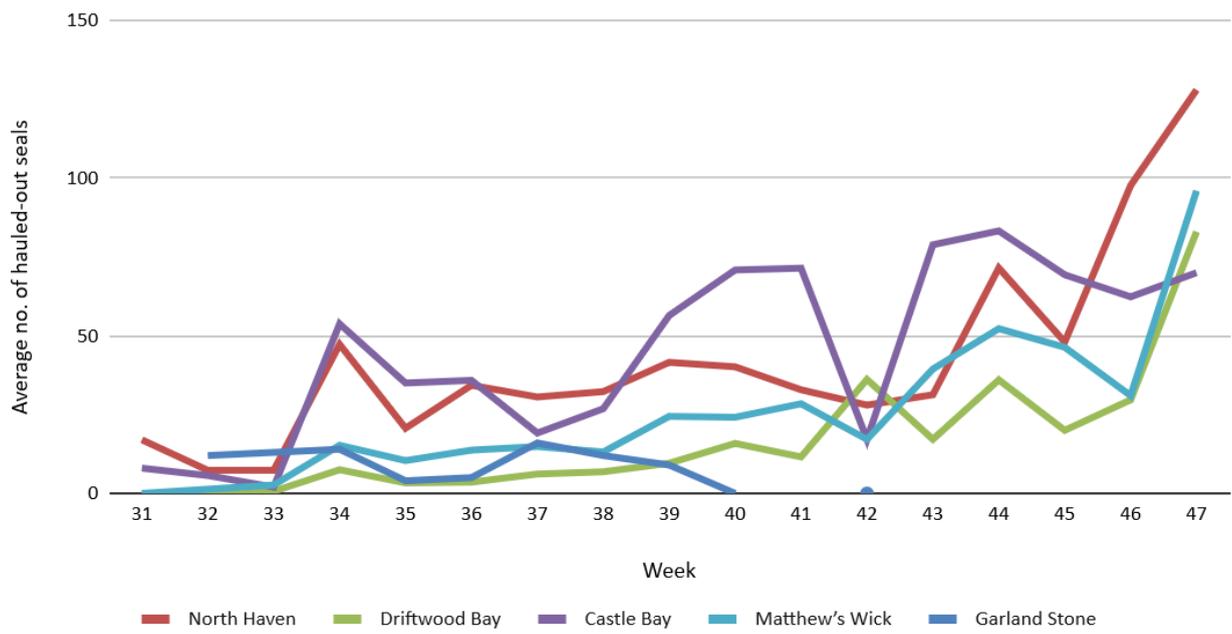


Figure 39 North Haven haul-out in 2020

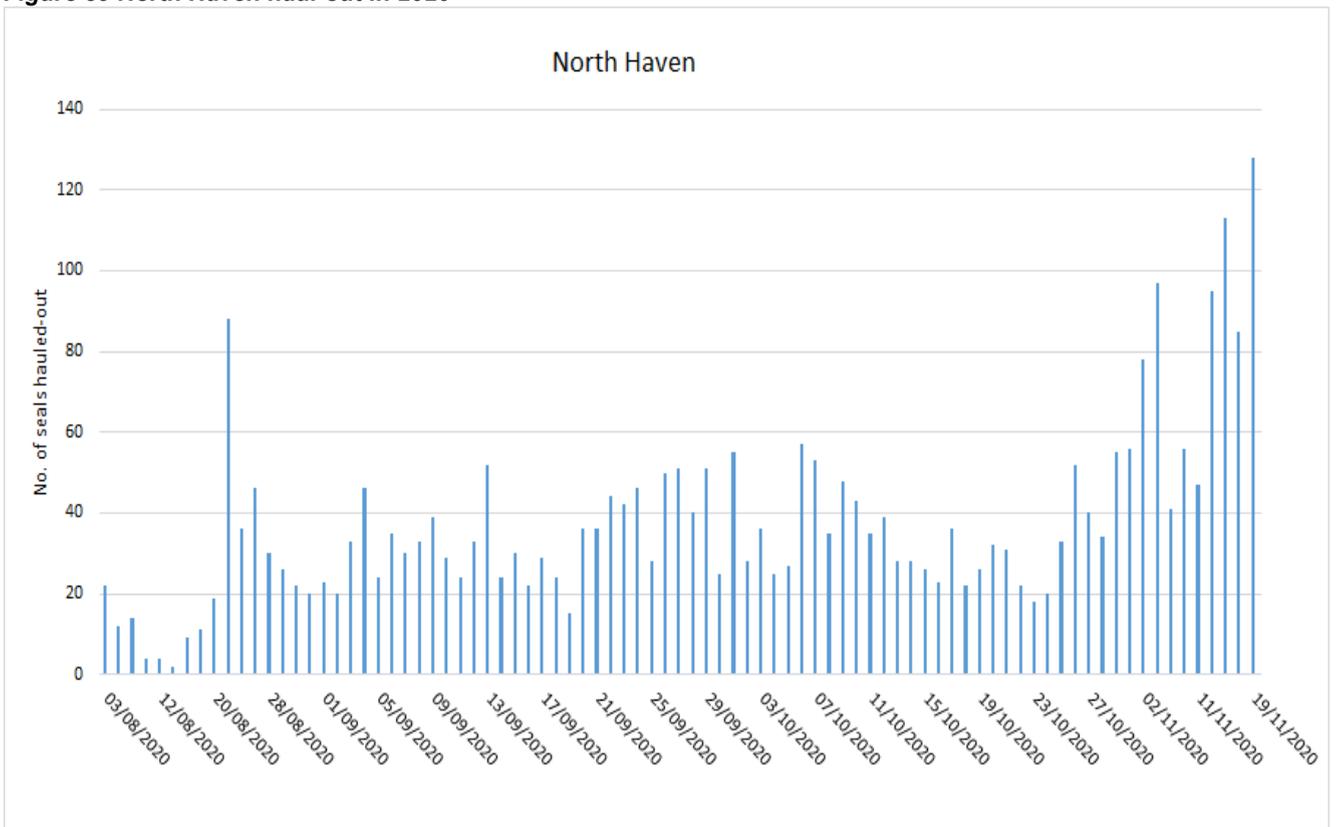


Figure 40 Castle Bay haul-out in 2020

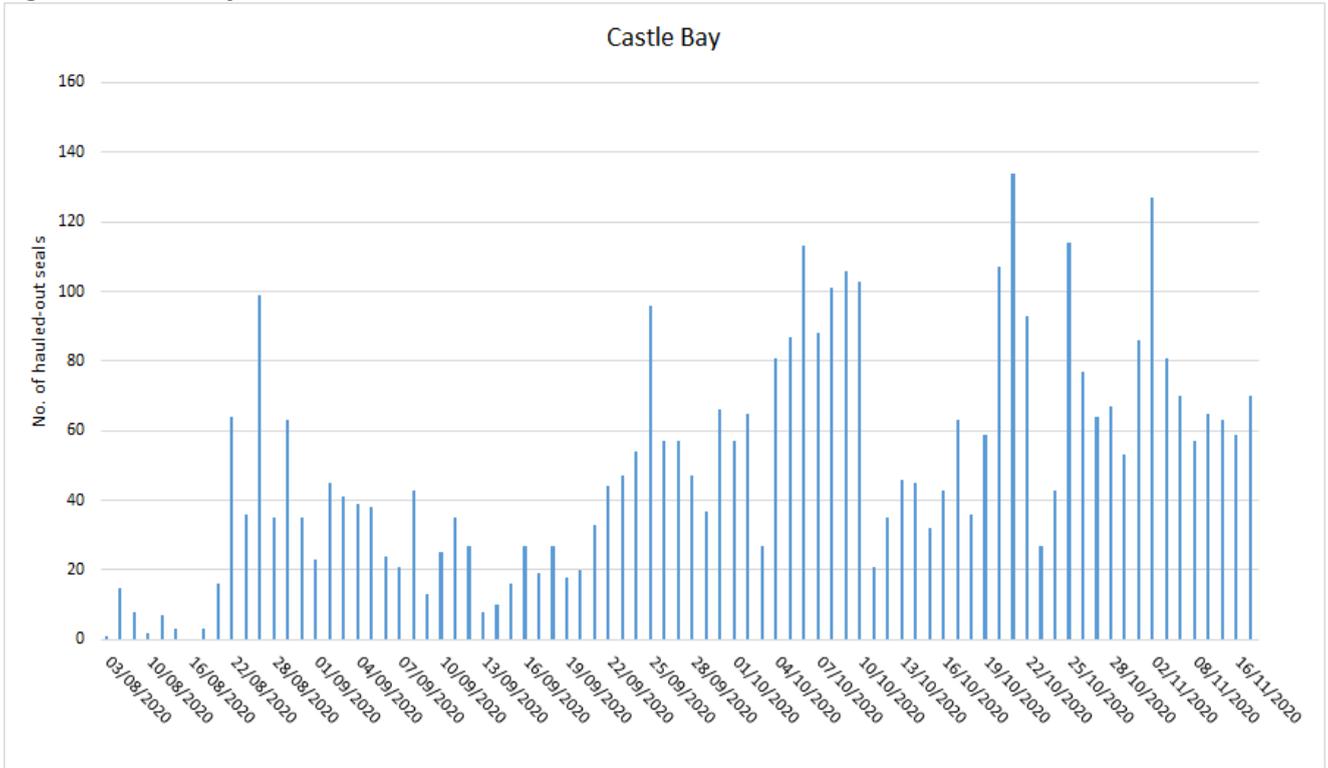


Figure 41 Driftwood Bay haul-out in 2020

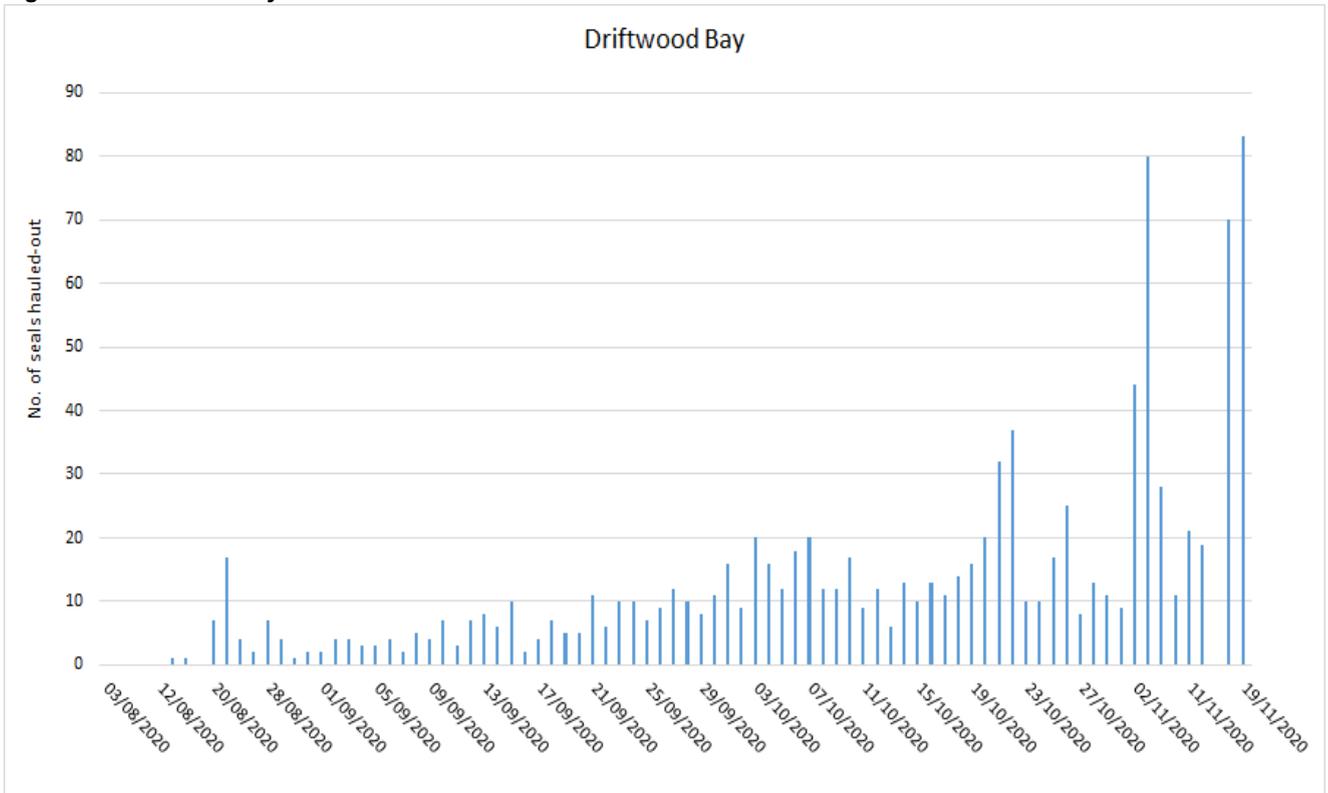


Figure 42 Matthew's Wick haul-out in 2020

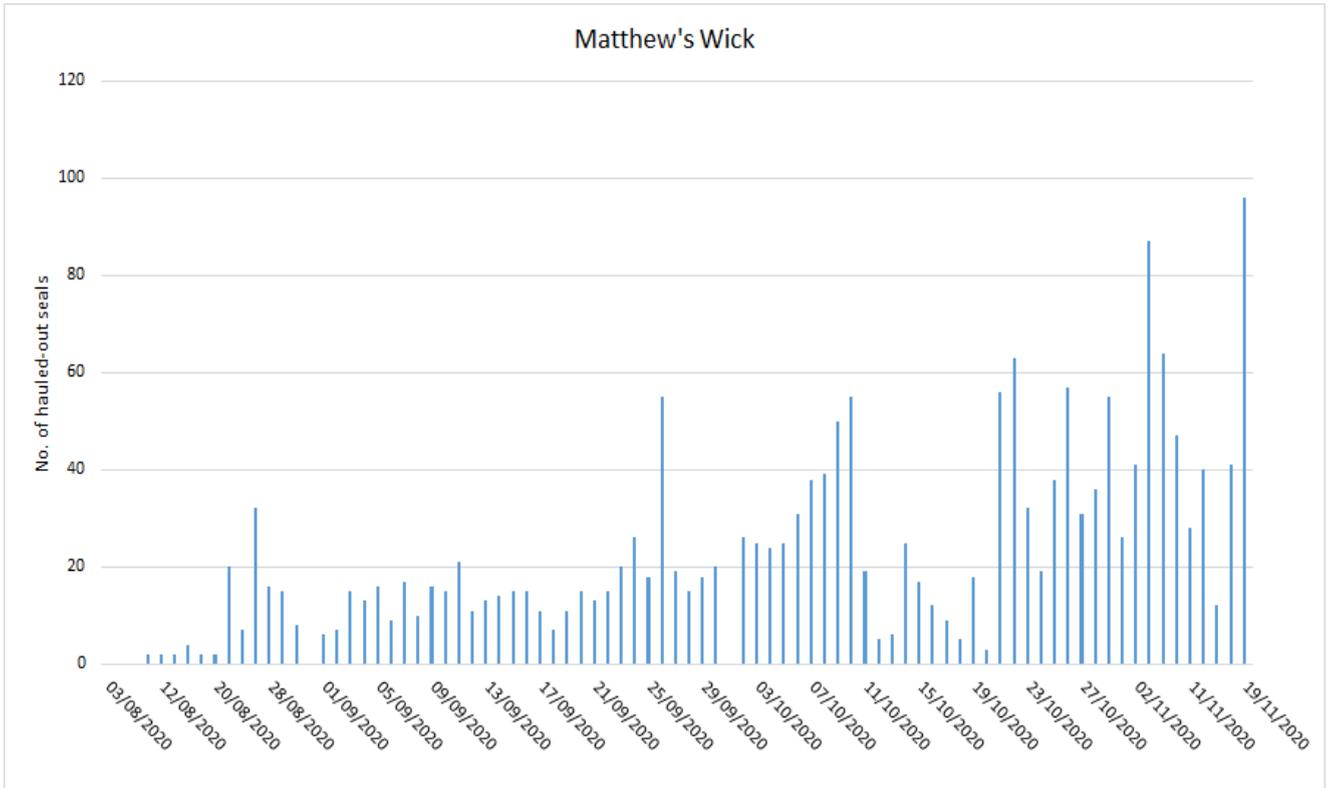


Figure 43 Garland Stone haul-out in 2020

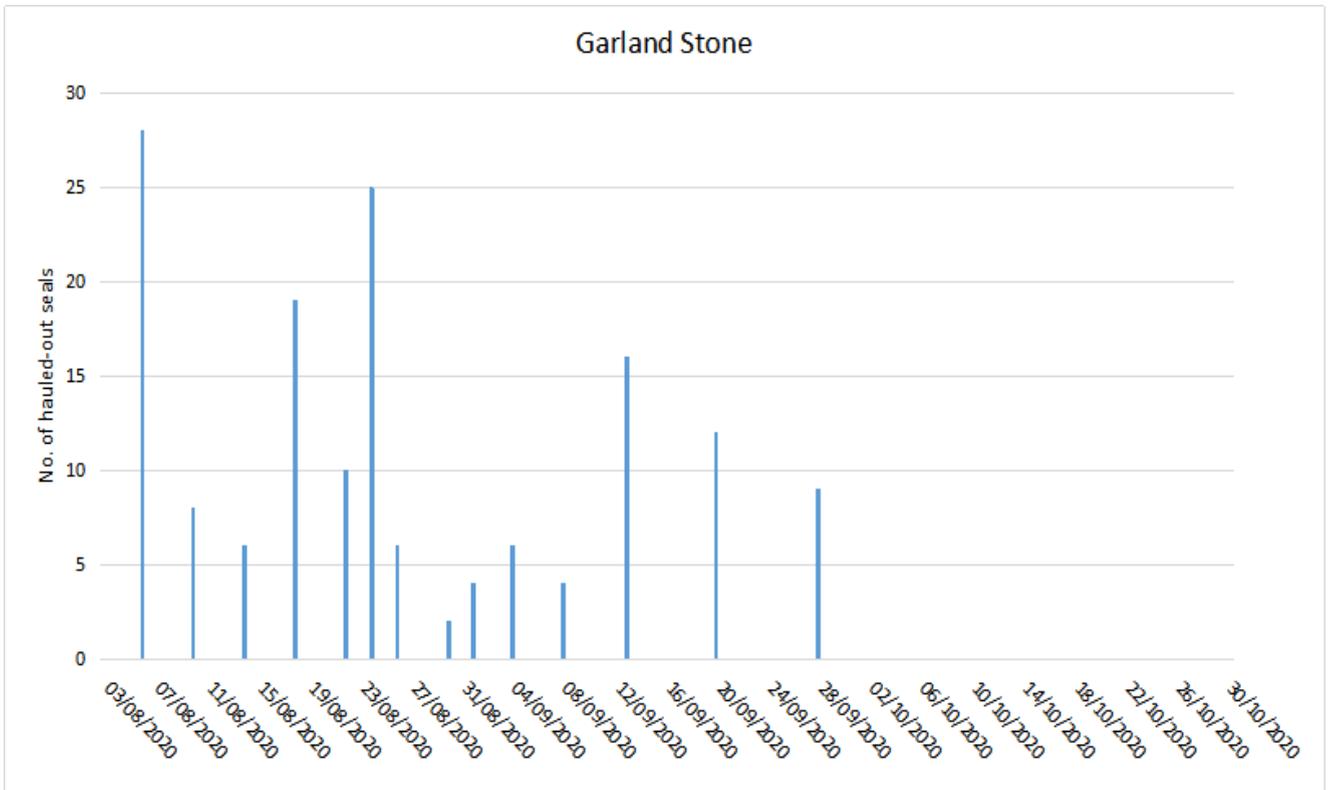
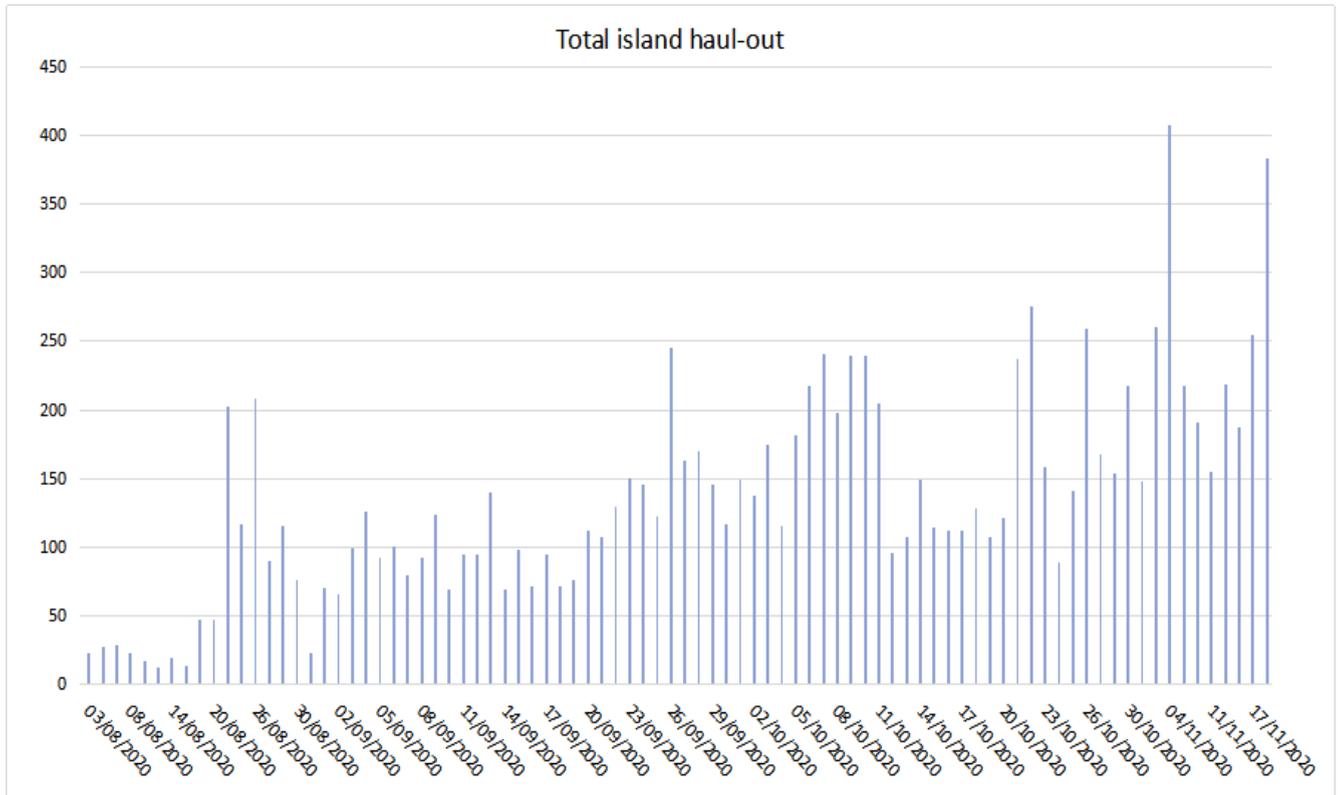


Figure 44 Total island haul-out counts in 2020



6. Pollution

6.1 Netting

Typically, monofilament line and netting were the most obvious pollutants affecting seals in 2020. 16 seals (9 females, 3 males and 4 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 2020 two seals with scars caused by netting were known from previous years and they are both adult females.

Plate 5 Cow NK-033 in South Haven 13/09/2020



NK-033 successfully weaned a pup at South Haven in 2020, which was also the case in 2017 and 2018, this cow has been seen in 7 years since 2009.

Plate 6 Cow BK-066 on North Haven beach 01/04/2020



BK-066 has been recorded most years since she was first recorded in 2011; 2013, 2015, 2017, 2018, 2019 and in 2020 was seen in a haul-out on North Haven

6.2 Oil/Tar

Skomer's beaches remain relatively clean, no pollution by oil or tar was observed in 2020.

6.3 Plastic

Attempts were made before the beginning of the seal breeding season to clear beaches of plastic, however there was still plastic present on the beaches throughout the season. Especially immature seals were observed playing with pieces of plastic bags or plastic fishing containers. Stormy weather caused a lot of movement of pollutants but there did not seem for more plastic to be present on the beaches than usual.

7. Disturbance

During the busiest pupping time which was between the second and the last week of September a notable disturbance occurred on the 20th of September when a RIB caused 8+ seals to enter the water, including a few females.

Additional information on boats and kayaks entering voluntary no access zone but causing no disturbance can be found in Appendix 2.

Table 22 Seal disturbance (records made internally) on Skomer Island in 2020

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

Date	Details	Level of disturbance
14/08/2020	Boat with 12-15 divers drove around Garland stone causing seals to look towards boat, and in a couple of cases, to enter the water	1-2
24/08/2020	Cleaning boat resulted in an adult female and juvenile seal looking up and eventually enter the water	1-2
14/09/2020	Diving boat accessed 'voluntary no access zone' with divers and flushed a few seals hauled-out in North Haven into water	1-2
14/09/2020	Lobster pot boat entered North Haven 'voluntary no access zone' and flushed a few seals hauled-out on Rye Rocks into water	1-2
20/09/2020	Four people on the rib flushed 8+ seals from Rye Rocks (North Haven) into water	1-2
15/10/2020	Fishing boat accessed the 'voluntary no access zone' to drop lobster pots and caused seals hauled-out on Rye Rocks to lift their heads	1

8. Seal Behaviour

Limited unusual seal behaviour was observed in 2020. No more than usual aggressive behaviour towards pups or females was coming from the bulls and no bulls were particularly prone to biting pups, compared to last year.

It is quite noticeable that female seals choose where to pup based on the sea conditions, probably amongst many other factors. Evidently, one of the busiest pupping beaches is South Haven one, on which significantly fewer pups were born in 2020 compared to 2019 this might be due to the persistent storms, but also probably due to the big quantities of debris, mostly insulation foam and metal aluminium plate pieces laying around the beach. The debris comes from the insulated container, which fell off a tanker transporting food products in December 2019. Some of the debris and the main container parts were cleared off in December and then later in the season but some metal sections, which must have been submerged at the time of beach clearing, have been emerging from underneath the rocks and being pushed out onto the beach.

Interestingly, quite a few pups were seen swimming, exploring and playing with their mums compared to last year. The probable reason for it may be the prevailing storm conditions, therefore the beaches being flooded more often, which might have forced them into the water more than usual. This could have resulted in the pups being more familiar with being in the water and braver as a result.

9. Disease

In 2020, as in previous years, the usual amount of small and ill-looking weaners was observed, it was especially evident from around the middle and towards the end of the pupping season. 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.

Eye infections were the most common illnesses among seal pups in 2020. It seems to affect mostly pups on Matthew's Wick as usual and some at the Wick. A possible explanation for this is the fact that Matthew's Wick only gets flooded during large tides so rotting seaweed, seal excrement, dead pups etc. accumulate on the beach, possibly spreading diseases. This is similar at the Wick but not quite to the same extent as Matthew's Wick, only a small part of the beach does not get submerged at the rate other beaches do. The number of pups born at the Wick was significantly higher compared to previous years and this could potentially also be the reason why the eye infection was more apparent in those pups. 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.

10. Identification of individual seals

For the 15th year photographic monitoring of adults continued in 2020 but not to quite the same extent because of the reduced number of staff able to photograph and identify the individuals. The old method of drawing sketches is now completely replaced with photographs. 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 other Pembrokeshire sites: Marloes Peninsula and Ramsey Island in 2010.

NRW developed 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 workers and trained volunteers were contracted 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. Photos for 2015 and 2016 are stored ready for entering into the database.

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 2020, as in previous years, as many distinctively marked/scarred seals were photographed as possible, for identification by eye and/or inclusion in the database. Photos of all breeding females were taken where possible. These photos are stored and ready to be used for identification in order to find any returning individuals.

- 12 cows and 3 bulls were re-identified from previous photos.
- The oldest cow to have returned to Skomer was LS-002. She was first seen hauled out on Matthew's Wick in 2003, in 2020 she successfully raised a pup on Driftwood Bay. She is normally one of the first cows to pup, in 2020 she was second.
- The oldest bull to have returned to Skomer in 2020 was 15.SB-LBK-002.NHV, which was first recorded in 2015, this individual was a dominant bull in North Haven in 2020.

Table 23 Year of first sighting of seals seen on Skomer Island in 2020

Year first observed	No. of seals seen in 2020 which were known from previous years
2019	0
2018	1
2017	3
2016	2
2015	3
2014	0
2013	1
2012	0
2011	0
2010	1
2009	1
2008	0
2007	1
2006	1
2005	0
2004	0
2003	1
2002	0
TOTAL	15

10.1 Breeding Cows Returning In 2020

Boyle (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 (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 243 cows which pupped on Skomer in 2020, 29 cows known to have pupped on Skomer had distinctive markings/scars. 9 matches were found, hence 31% of identifiable breeding cows were returning cows, similar to last year (39%). The percentage of returning cows usually lies around 40% (the 10 year average is 39.2%) and annual variation is possibly the result of a combination of factors such as different photographic equipment, observer skill, time availability, weather conditions and, most of all, unknown dynamics in the seal population.

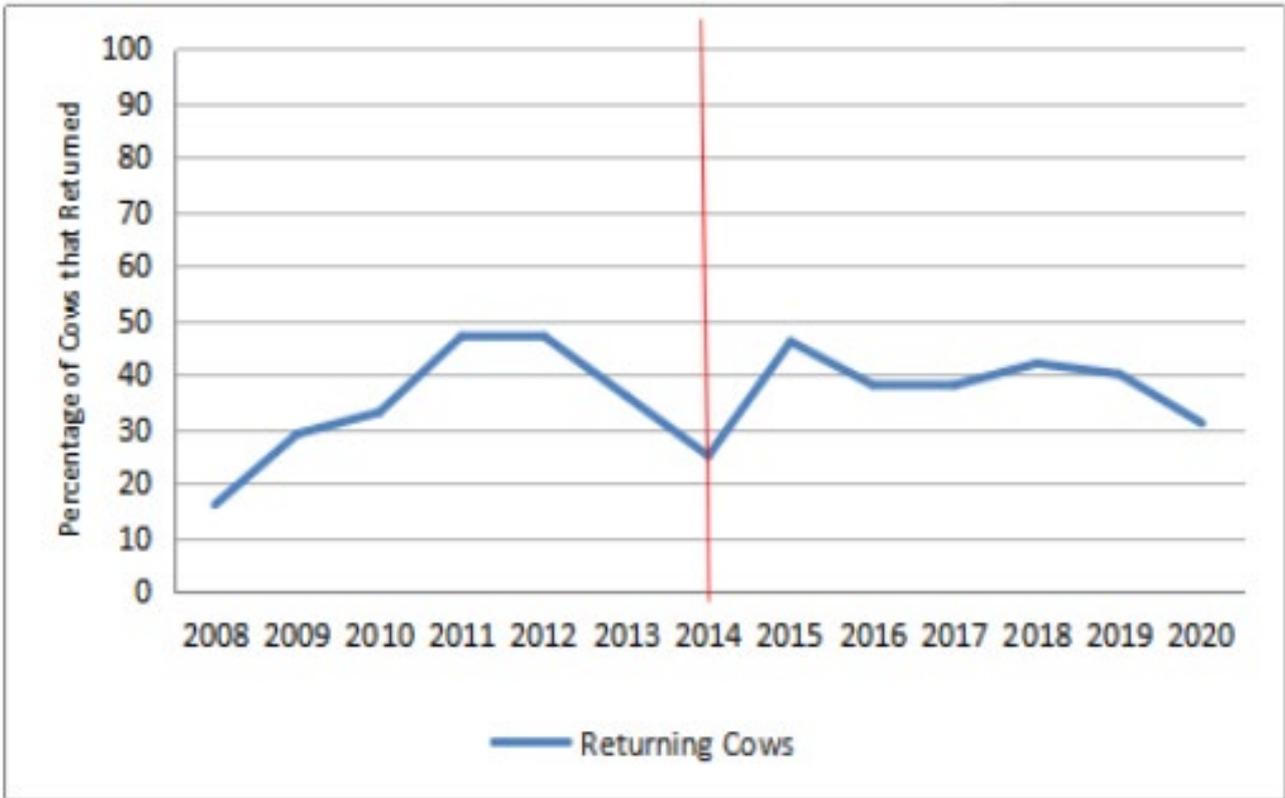
- 2 (22%) of the 9 matched cows that pupped on Skomer in 2020 also pupped on Skomer in 2019 (29% in 2019, 68% in 2018, 38% in 2017, 44% in 2016).

- 1 cow (11%) pupped in 3 consecutive years on Skomer (14% in 2019, 18% in 2018, 8% in 2017).
- 17.SC-LBK-131.DWB is known to have pupped in four consecutive years on Skomer

Plate 7 Cow 17.SC-LBK-131.DWB on Driftwood Bay beach 10/09/2020



Figure 45 Percentage of returning and new pupping cows on Skomer Island 2008-2020



Change in methodology (only scarred seals identified by eye since 2014).

10.1.2 Site fidelity

- Of the 2 cows known to have pupped on Skomer in both 2020 and 2019, 1 (50%) returned to pup at the same site (75% in 2019, 40% in 2018, 60% in 2017, 57% in 2016, 45% in 2015, 78% in 2014).
- 17.SC-LBK-131.DWB, the only cow known to have pupped on Skomer in three consecutive years 2018-2020, pupped in Driftwood Bay again, after pupping on Matthew's Wick for 2 years.
- Of the 9 cows known to have pupped on Skomer in 2020 that have previously pupped on Skomer, 5 cows pupped at a site they have previously pupped at. All 5 of these cows pupped at a site they have pupped at more than 50% of the years they have been known to have pupped on Skomer.
- LS-002 pupped on Driftwood Bay in 2020; the fifth site on Skomer it is known to have pupped at.

This year's data shows once again that there are cows which have preferred the same pupping sites they used in the past but some animals are not site faithful and 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.

10.1.3 Pupping date

Table 24 Pupping date of returning cows on Skomer Island in 2017-2020

Cow	Pupping date 2017	Pupping date 2018	Pupping date 2019	Pupping date 2020	Difference (days) 2017/18	Difference (days) 2018/19	Difference (days) 2019/20	Average difference (days)
17.SC-LBK-131.DWB	28/09/17	19/09/18	12/09/19	09/09/20	-9	-7	-3	-6
13.SC-BK-037.MWK	n/a	26/08/18	n/a	23/08/20	n/a	n/a	n/a	-3
14.SC-NK-033.SHV	n/a	18/09/18	n/a	11/09/20	n/a	n/a	n/a	-7
17.SC-RS-035.DWB	n/a	18/09/18	n/a	30/08/20	n/a	n/a	n/a	-19
LS-002	n/a	22/08/18	n/a	13/08/20	n/a	n/a	n/a	-9
17.SC-LBK-025.SBS	05/09/17	n/a	n/a	04/09/20	n/a	n/a	n/a	-1
16.SC-US-117.SHV	07/10/17	04/10/18	n/a	29/09/20	-3	n/a	n/a	-4
15.SC-BK-031.SHO	n/a	n/a	n/a	06/10/20	n/a	n/a	n/a	n/a
16.SC-BK-177.MWK	13/10/17	n/a	06/10/19	20/09/20	n/a	n/a	-16	-11.5

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 Figures 46 and 47 below, it seems that 2020 was an earlier pupping season than in two previous years, which matches what was anecdotally experienced.

Figure 46 Difference in pupping date of returning cows on Skomer Island 2018-2020

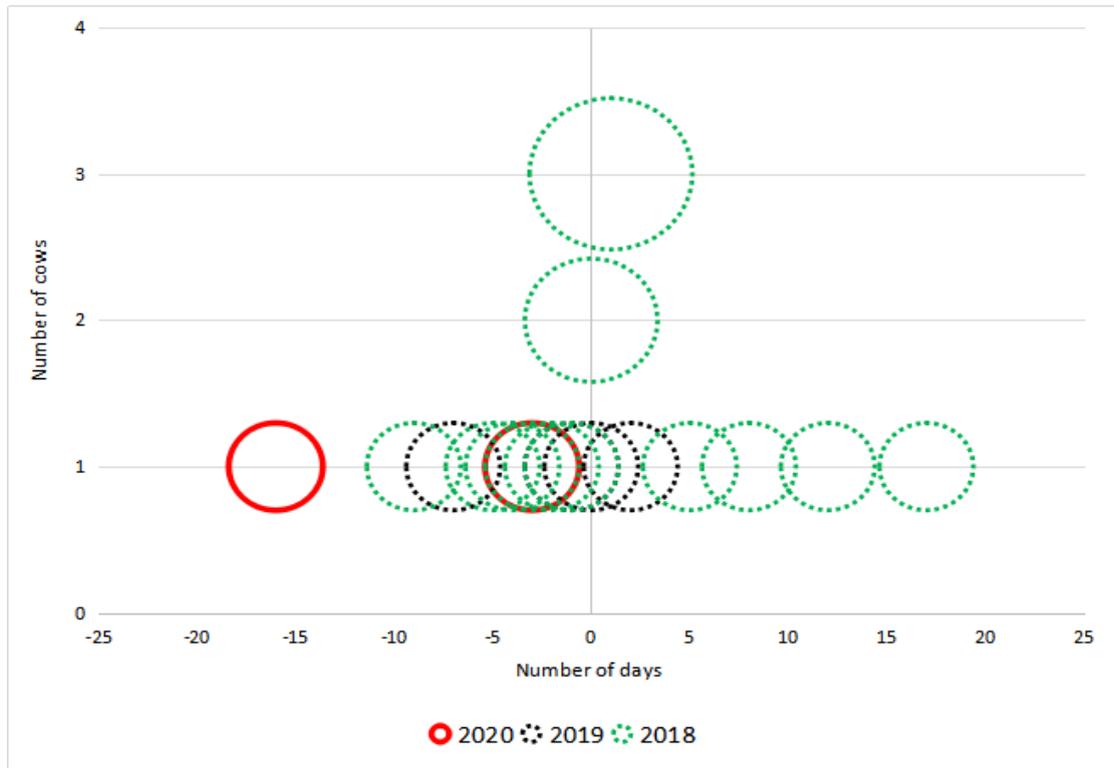
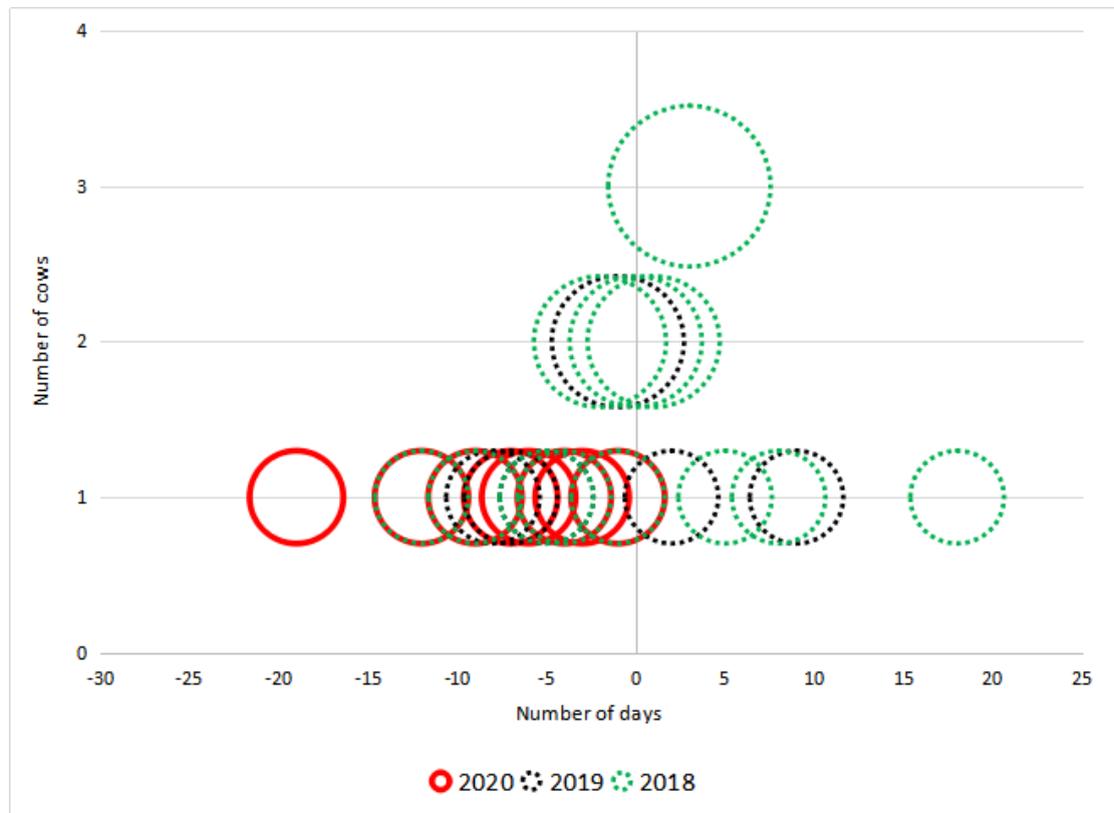


Figure 47 Difference in the average pupping date of returning cows on Skomer Island 2018-2020



For pupping site fidelity and pupping date details see “2020 Returning and new seals” raw data file.

10.2 Returning Bulls

3 bulls were identified in 2020, of which one was recorded in 2019 on Skomer.

11. Seals from elsewhere seen on Skomer

On the 8th of September **Orange 80212** was seen in Seal Hole - the seal is called 'April', it is a female found at Newquay in Cornwall and admitted to the RSPCA West Hatch Wildlife Centre on 20/12/16. She was an underweight orphan and weighed 17.9 kg on admission. She was released at Combe Martin in N. Devon on 17/02/17 and weighed 43.5kg at release.

Also **Red 80298** was seen and photographed on the 11th of November in North Haven - the seal is called 'Nomad', it is a male found at St Ives in Cornwall on 21/01/18. He had an infected hind flipper, was underweight and a little dehydrated and weighed 12.3kg on admission. He was released at Combe Martin on 03/05/18 and weighed 39.5 kg at release.

Plate 8 Tagged male known as Nomad 11/11/2020



Red 80390 was seen and photographed on the 10th of October in North Haven - the seal's name is 'Sparkford'. It is a female found at Freshwater East, Pembrokeshire and admitted to the RSPCA West Hatch Wildlife Centre on 14/10/19. She was an orphan, weighing 12.98kg on admission. She was released at Combe Martin on 03/01/20 and weighed 42kg at release.

Plate 9 Tagged female known as Sparkford 10/10/2020



Additionally, on the 25th of May the **Red 80392** was photographed in North Haven - her name is 'Lyng', it is a female found at Mother Ivey Bay, Cornwall and admitted to the RSPCA West Hatch Wildlife Centre on 30/10/19. She had puncture wounds, was underweight and dehydrated and weighed 18.2kg on admission. She was released at Combe Martin on 03/12/19 and weighed 36kg at release.

Plate 10 Tagged female known as Lyng 25/05/2020



12. Further Research

There was no additional research conducted on the island in 2020. However, a paper based in part on seals GPS tagged on Skomer in 2019 by the Sea Mammal Research Unit at the University of St Andrews, was published, Carter, M. I. D. et al. (2020).

13. Study recommendations

Quite a few recommendations were made in the previous reports and those recommendations are still applicable. The workload still increases with the increasing number of pups born on the island and due to identification catalogues increasing in size each year. This year we would like to suggest a method of monitoring seals in caves, which hopefully could reduce disturbance, increase the accuracy of data. Data obtained using the method described below could even be analysed by an external person if the number of staff available is limited to conduct the seal monitoring as was the case in 2020.

In 2020 it was evident that the number of pups born in certain caves was higher compared to the previous years, therefore we would like to introduce a slightly altered method to monitor pups inside the caves, or could perhaps consider it as an addition to the current method.

Only rope access qualified staff can access caves on Skomer Island and it should be acknowledged that a limited number of qualified staff may be available at the time of monitoring of the grey seals. More importantly it is the disturbance we are at risk of increasing if the monitoring of caves continues with the current method. Caves are small and narrow, at times the number of cows and pups is high, which prevents accessing them to mark-spray the pups. Distant observation is regularly the only method option that can be used to obtain any information about the individuals inside these caves, which often results in the lack of photographs taken and the lack of ability to accurately class pups and match them with their mothers.

Considering that pups and cows can be washed away from the majority of caves in storms and appear on different beaches, it increases the probability of misidentification and inability to track some of the pups, which can result in a breeding success score error.

We would like to propose a use of GoPro or similar camera traps via installation inside the caves in order to monitor the pups and their mums without causing disturbance, which could also opportunistically enable us to learn more about the grey seals' behaviour. Installation of the camera traps should be done before the pupping season starts, they should be waterproof and installed in the "ceiling" of the caves, which do not get fully submerged at spring tides (which of course will be difficult to establish), but initially a trial of only the most tricky to visit caves could be done using a couple of cameras. Camera traps could be fixed to the rock by drilling in the holes, using some resin and screws or possibly using a different method.

In 2020, a different combination/pattern of spray was used to mark the pups. This pattern was used in the earlier years of monitoring, which was tested again in 2019 and concluded to be a more effective method. The method was to use horizontal lines, in the usual location of the pup's lower back. This allows for all colour combinations to be known (e.g. yellow top,

blue middle, purple bottom) even if only one side of the pup's back is seen. On occasion, the number of pups present on beaches was higher than the number of available line spray combinations, therefore spraying dot combinations were used to provide additional options. This method involves spraying from one to three dots in the usual location of the pup's lower back. Based on our three seasons of Skomer seal monitoring, this line pattern spraying method does appear to be the most effective one.

Acknowledgments

Many thanks to Natural Resources Wales who funded this project in 2020.

A big thank you goes to Julie Riordan, who assisted us in the busiest time of the seal monitoring. Thanks to Rhian Taylor for her help up until the end of August and to Ed Betteridge for his assistance between August and September and Lisa Morgan for project support. We would also like to thank Kate Lock and Phil Newman for proof-reading and invaluable advice; everyone from seal rescue centres, RSPCA, BDMLR and the Cornwall Seal Group Research Trust, especially Sue Sayer and Paul Oaten for helping to trace and identify tagged seals.

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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 Boats and kayaks in voluntary no access zone

Date	Details
01/09/2020	A Cornish cruising yacht landed 3 people on the steps using their dingy, one went for a walk, the other two landed again on the slip beach to look for the passenger. Assumed no disturbance but can't know for certain.
08/09/2020	A diving boat club entered the North Haven no voluntary access zone for diving
10/09/2020	A motorboat accessed the NHV no access zone
12/09/2020	Fishing boat entered the NHV no voluntary access zone to drop lobster pots
13/09/2020	A diving boat entered the no access voluntary zone for diving
14/09/2020	A yacht entered the voluntary access zone in SHV
14/09/2020	A diving boat entered the voluntary no access zone in NHV with several divers

15/09/2020	A motorboat entered the voluntary no access zone in North Haven
17/09/2020	A lobster fishing boat entered the voluntary no access zone in North Haven
20/09/2020	A rib entered the voluntary no access zone in North Haven
21/09/2020	A fishing boat entered the voluntary no access zone in North Haven
21/09/2020	A rib entered the voluntary no access zone in North Haven
27/09/2020	Two diving boats entered the voluntary no access zone in North Haven
15/10/2020	A fishing boat entered the voluntary no access zone in North Haven
18/10/2020	A fishing boat entered the voluntary no access zone in North Haven

Appendix 3 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
LAN The Lantern (former LTN)
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 |