Grey Seal Breeding Census Skomer Island 2022

Report No: 653

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Contents

List of Figures

List of Tables

Crynodeb Gweithredol

Mae'r Morlo Llwyd (*Halichoerus grypus*) yn rhywogaeth Atodiad ll y gellir dynodi Ardal Cadwraeth Arbennig (ACA) ar sail ei phresenoldeb ac mae'n un o'r prif resymau dros ddewis ACA Forol Sir Benfro. Mae'r morlo llwyd hefyd yn cael ei gydnabod fel un o nodweddion Parth Cadwraeth Morol Skomer.

Ym 1983, sefydlwyd dull systematig o fonitro morloi ar Skomer, a dilynwyd y dull hwn gan ddefnyddio'r un fethodoleg neu o leiaf methodoleg debyg - a chyda mwy o ymdrech mewn rhai blynyddoedd na rhai eraill - tan 1996 pan safonodd Jim Poole y broses o fonitro morloi ar Skomer ymhellach drwy gyflwyno'r Llawlyfr Monitro Morloi. (Alexander, 2015). Yn 2022, fel mewn blynyddoedd blaenorol, arsylwyd gweithgarwch bridio'r morloi llwyd ar Ynys Skomer a'i gofnodi gan ddefnyddio'r fethodoleg hon.

Cafodd 255 o loi eu geni ar Skomer, sef 10 yn llai nag yn 2021. Ar Benrhyn Marloes cafodd 192 o forloi bychain eu geni, gan roi cyfanswm o 447 o forloi bychain ar gyfer Parth Cadwraeth Morol Skomer i gyd, sef un morlo bach yn fwy na'r flwyddyn flaenorol.

Cafodd llo bach cyntaf y tymor ei eni ym Mae Driftwood ar 4/8/22. Ganwyd 28 o loi i gyd ym mis Awst, 147 ym mis Medi, 50 ym mis Hydref a 3 ym mis Tachwedd. Y traethau mwyaf cynhyrchiol oedd North Haven (52 o loi), South Haven (47 o loi) a Matthew's Wick (40 o loi).

Rydym yn gwybod, neu'n tybio fod 183 o loi wedi goroesi ar Skomer. Mae tynged naw llo yn anhysbys, sy'n rhoi cyfradd oroesi o 76%. Ar y tir mawr rydym yn gwybod, neu'n tybio fod 168 o loi wedi goroesi, sy'n rhoi cyfradd oroesi o 88%. Y gyfradd oroesi gyffredinol ar gyfer Parth Cadwraeth Morol Skomer i gyd yw 80%.

Yn 2022 cofnodwyd y nifer fwyaf o forloi a ddaeth i'r tir, sef 388 ar 12/11/22. Cafwyd y cyfrifiad uchaf o forloi a ddaeth i'r tir yn North Haven a Driftwood Bay ar 13/11/22 (131 a 67 yn eu trefn), Matthew's Wick ar 9/11/22 (133) a Castle Bay ar 18/10/22 a 4/11/ 22 (148).

Tynnwyd llun 174 o forloi gyda chreithiau neu dagiau yn 2022, ac o'r rhain cafodd 64 (60 buwch, 1 morlo ifanc a 3 tarw) eu hail-adnabod o luniau blaenorol.

Gwyddom am y ddwy fuwch hynaf sy'n dychwelyd ers 2002. Gwyddom am y tarw hynaf sy'n dychwelyd ers 2015. O'r 255 o wartheg a roddodd enedigaeth ar Skomer yn 2022, roedd gan 46 greithiau. Cafodd 21 o'r buchod creithiog eu hadnabod, gan olygu bod 33% o'r buchod adnabyddadwy oedd yn bridio yn fuchod oedd wedi dychwelyd.

Tynnwyd lluniau o 41 o forloi unigol, a oedd ag arwyddion amlwg eu bod wedi cael eu dal mewn rhwydi ar ryw adeg yn eu bywydau. Craith ddofn o amgylch eu gyddfau oedd yr arwydd mwyaf cyffredin, yn aml gyda darnau o'r rhwydi yn dal yn sownd ynddynt.

Executive summary

The Grey Seal (*Halichoerus grypus*) is an Annex ll species for which a Special Area of Conservation (SAC) can be designated and a primary reason for the selection of the Pembrokeshire Marine SAC. They are also recognised as a feature of the Skomer Marine Conservation Zone (MCZ).

In 1983, a systematic approach to seal monitoring on Skomer was established and continued, using the same or at least similar methodology, albeit at varying levels of intensity, until 1996 when Jim Poole standardised the seal monitoring on Skomer further by introducing the Seal Monitoring Handbook (Alexander, 2015). In 2022, as in previous years, the breeding activities of the grey seals on Skomer Island were observed and recorded using this methodology.

255 pups were born on Skomer, which is ten less than in 2021. On the Marloes Peninsula 192 pups were born, giving a total of 447 pups for the Skomer MCZ as a whole, which is one pup more than in the previous year.

The first pup of the season was born at Driftwood Bay on 4/8/22. In total, 28 pups were born in August, 147 in September, 50 in October and 3 in November. The most productive beaches were North Haven (52 pups), South Haven (47 pups) and Matthew's Wick (40 pups).

183 pups are known, or assumed, to have survived on Skomer. The fate of nine pups is unknown, giving a survival rate of 76%. On the mainland 168 pups are known, or assumed to have survived, giving a survival rate of 88%. The overall survival rate for the whole of the Skomer MCZ is 80%.

In 2022 the maximum haul-out of 388 seals was recorded on 12/11/22. North Haven and Driftwood Bay had their peak haul-out counts on 13/11/22 (131 and 67 respectively), Matthew's Wick on 9/11/22 (133) and Castle Bay on 18/10/22 and 4/11/22 (148).

174 seals with scars or tags were photographed in 2022, of which 64 (60 cows, one immature and three bulls) were re-identified from previous photos.

The two oldest returning cows are known from 2002. The oldest returning bull is known from 2015. Of the 255 cows which pupped on Skomer in 2022, 46 had scars. 21 of the scarred cows were identified, hence 33% of identifiable breeding cows were returning cows.

41 individual seals, 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.

1. Introduction

Between 05/08/22 and 18/11/22, 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.

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 (fishing lines and nets, 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

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).

During the main pupping season, the most productive beaches; North Haven, South Haven, Driftwood Bay, Castle Bay, Matthew's Wick and Amy's Reach were checked from the cliff tops, weather permitting, daily. Most of these sites (apart from North Haven and South Haven) are located on an area known as The Neck which is separated from the main island by a narrow isthmus. The main island sites (South Stream, High Cliff Boulders, The Wick, The Basin, Pig Stone Bay and the Garland Stone were also checked regularly, approximately every two to four days.

Beaches with difficult access (e.g., High Cliff Boulders) were only visited after having observed breeding behaviour by females in the vicinity, to avoid unnecessary disturbance.

The caves (The Lantern, Seal Hole and South Castle Beach Cave) and Protheroe's Dock were checked whenever conditions allowed. Entry to these sites 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 usually very accurate. When pups were born in the less frequently visited sites their date of birth was approximated, based on the date of the previous visit and 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. New-born pups were not routinely marked because of concerns that marking may interfere with the parent/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 ≥ size 3 were assumed successful, whereas pups smaller than size 3 were assumed unsuccessful.

4. Census results

4.1 General

262 pups were monitored on Skomer Island in 2022, of which 255 were definitely born on Skomer and seven turned up either just before the start of moult, or moulting (wanderers).

The total of 255 pups born on Skomer Island is ten less than in the previous year. In 2021 the highest total, since monitoring began, was recorded.

The first pup of the season was born on Driftwood Bay on ca. 04/08/22. It was found on 05/08/21, size one.

28 pups were born in August, 174 in September, 50 in October and 3 in November. The busiest month therefore was September.

183 pups are known, or assumed, to have survived on Skomer, the fate of nine pups is unknown, giving a survival rate of 74%.

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

Figure 1 Skomer Island overview

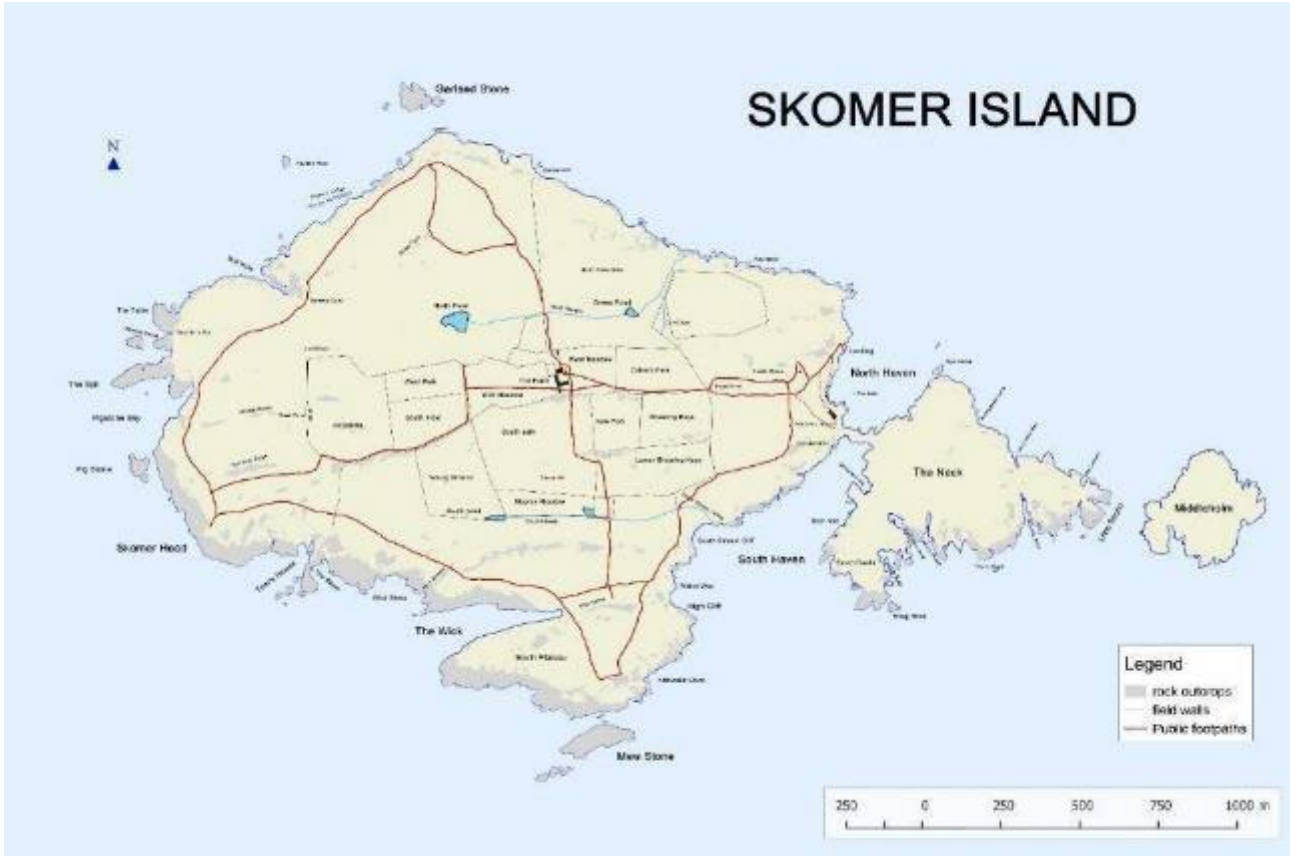


Figure 2 Skomer Island Grey Seal pupping sites east

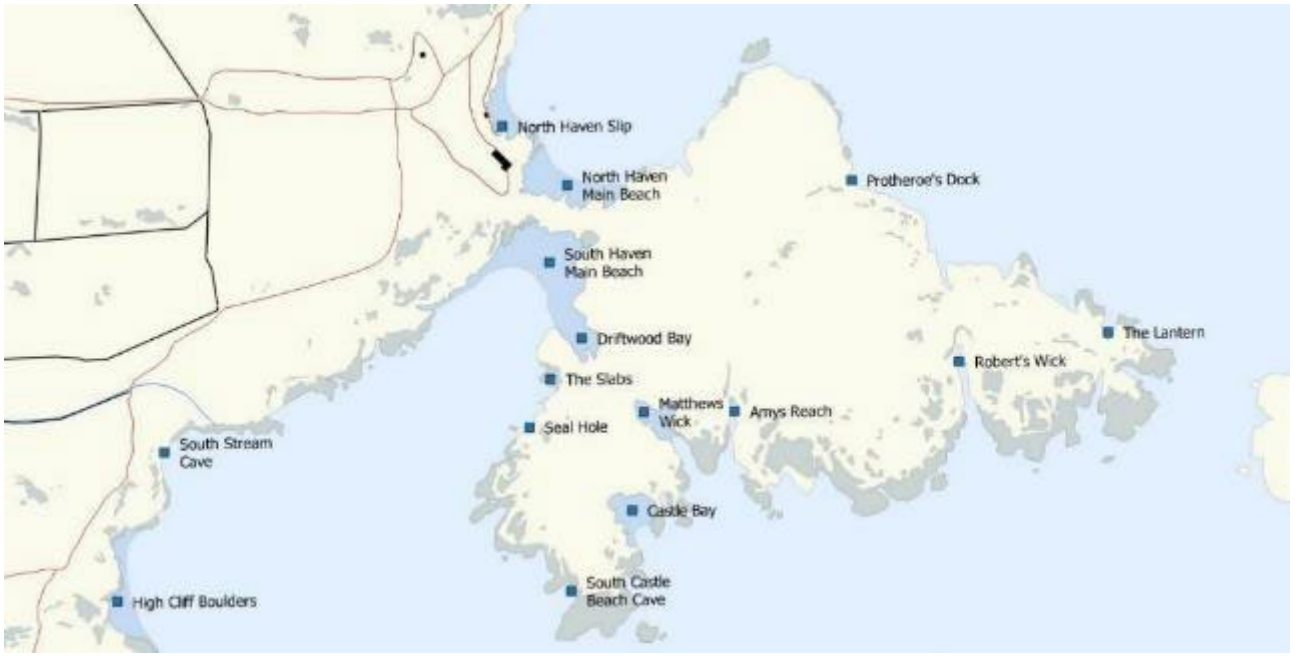


Figure 3 Skomer Island Grey Seal pupping sites west

4.2 Pup numbers

2022 was another good breeding season for the seals within the Skomer MCZ with a total of 447 pups born, one more than in the previous record year of 2021. Of the 447 pups born 192 were born on the Marloes Peninsula.

On Skomer 262 pups were monitored in 2022. 255 of them were definitely born on Skomer and 7 pups (wanderers) turned up either just before the start of moult, or moulting. These pups could have been born within the Skomer MCZ but in a location hidden from view and thus cannot be included in this report. On 31/5/22 the island team observed a pup, size 3, attended by its parent at Amy's reach. As this pup was never observed by the Skomer Seal Project Officer and the date of birth and fate are unknown it was not included in the analysis for this report.

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 241 pups. This increase was not experienced in 2019 but 2020 saw a new record with 243 pups born which was once again topped by the 2021 breeding season (265 pups). In 2022 there were ten pups less born on Skomer than in the previous year, however the mainland experienced more births than ever before so the overall number of seal births was up by one.

Figure 4 Number of seal pups born in Skomer MCZ 1983-2022

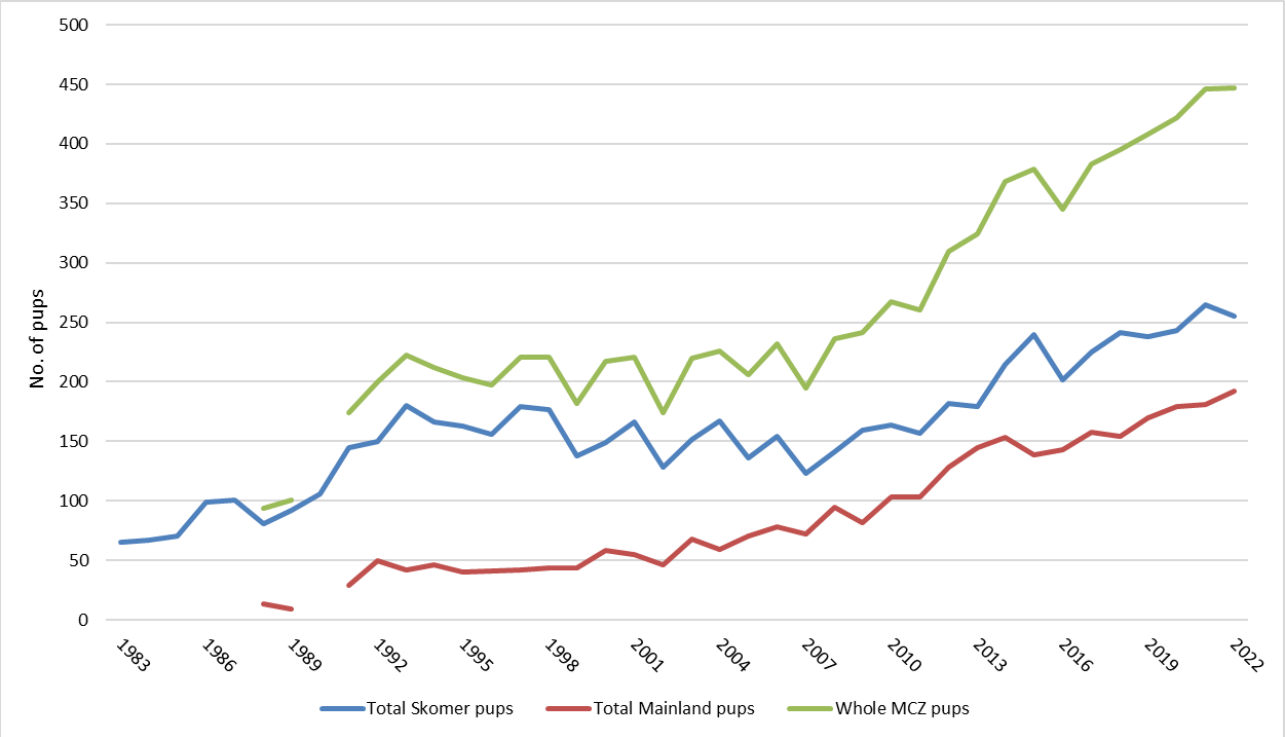


Figure 5 Daily totals of seal pups born on Skomer Island in 2022

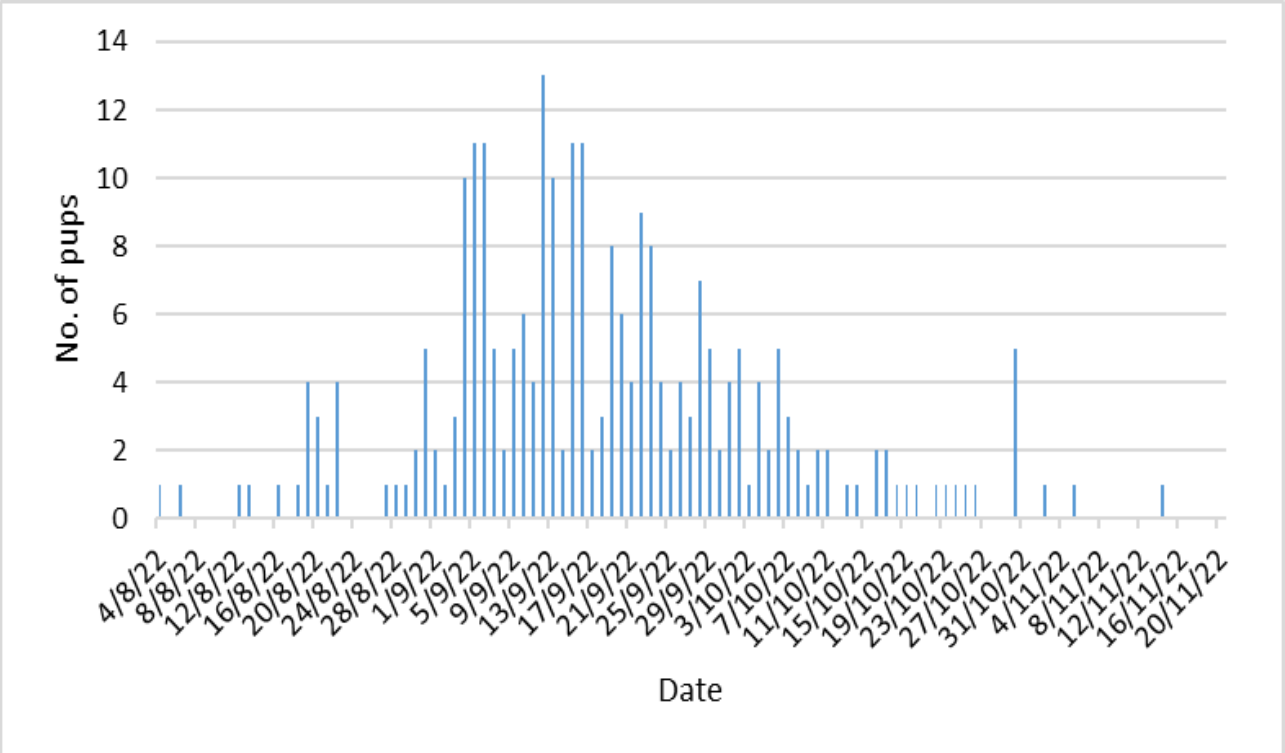


Table 1 Monthly number & percentage of seal pup births on Skomer Island 1983-2022

Year	July	August	September	October	November
2022	0	28 (11%)	174 (68%)	50 (20%)	3 (1%)
2021	0	22 (8.3%)	184 (69.4%)	56 (21.1%)	3 (1.1%)
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%)
2003	1 (1%)	17 (11%)	92 (60%)	38 (25%)	6 (4%)
2002	0	21 (16.5%)	62 (48.5%)	42 (33%)	3 (2%)

Year	July	August	September	October	November
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%)

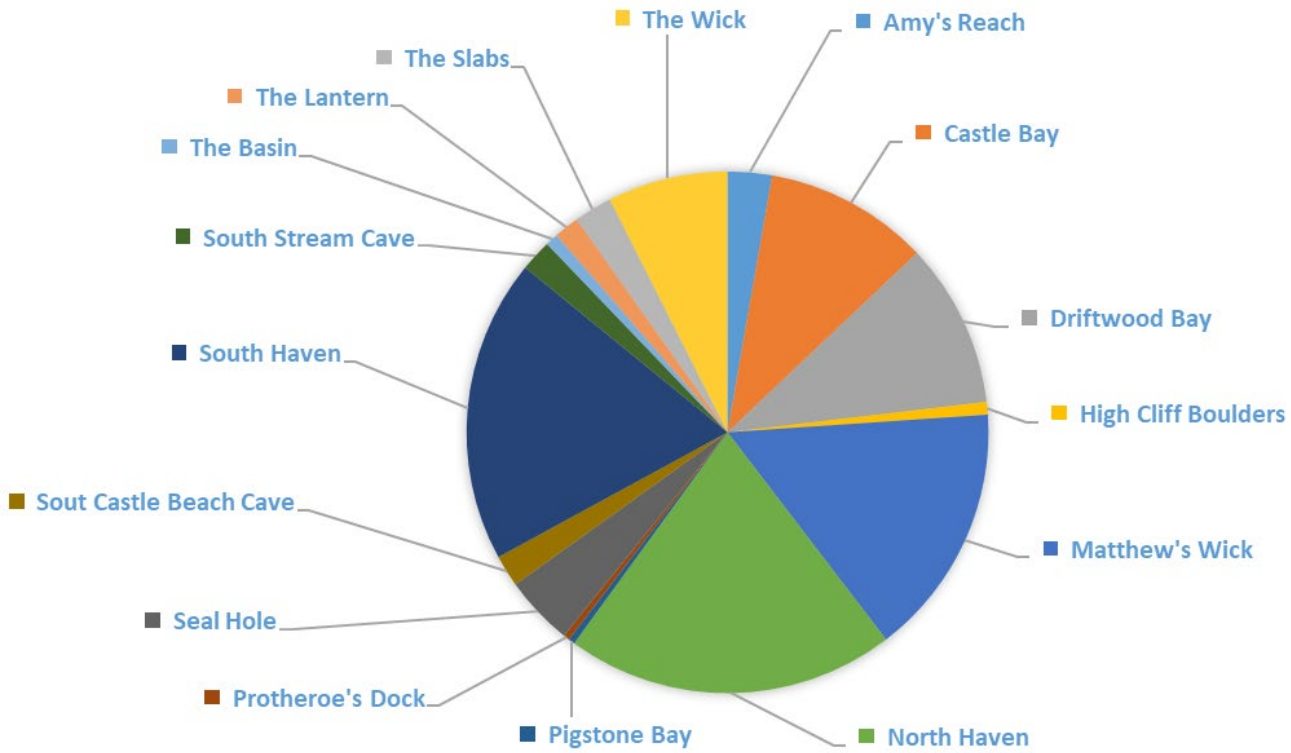
Seal observations continued to mid-December in 1983, 1985 and 1986 and to the end of January in 1984 and 1987. The following data (pups) was recorded in these survey years: 1983 Dec: 3 (4%), 1984 Dec: 6 (9%), Jan: 6 (9%). 1985 Dec: 14 (19%), 1986 Dec: 5 (5%), 1987 Dec: 15 (15%), Jan: 5 (5%). From 1989 onwards the survey has only continued up to the end of November, when the island gets vacated by 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 until August.

In 2022 the first pup of the season was born at Driftwood Bay on 4/8/22. The busiest period was similar to previous year's where most pups were born in week 36 and 37. In 2022 the busiest week was week 37 (12-18th Sept) with 53 births; in the previous week (36) 46 pups were born and in the following week (38) 40.

The most productive beaches were North Haven (52 pups), South Haven (47 pups) and Matthew's Wick (40 pups).

Figure 6 Percentage of seal pups born at each site on Skomer Island in 2022



4.3 Survival rate

The fate of 246 pups (of 255 born) is known with relative certainty. The fate of nine 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).

183 pups are known, or assumed, to have survived on Skomer, giving a survival rate of 74.3%, which is slightly lower than the average of 77.8% since records began.

On the mainland 168 pups are known, or assumed to have survived, giving a survival rate of 88%.

The overall survival rate for the whole of the Skomer MCZ is 80%.

Figure 7 Percentage of seal pups surviving in Skomer/MCZ from 1983-2022

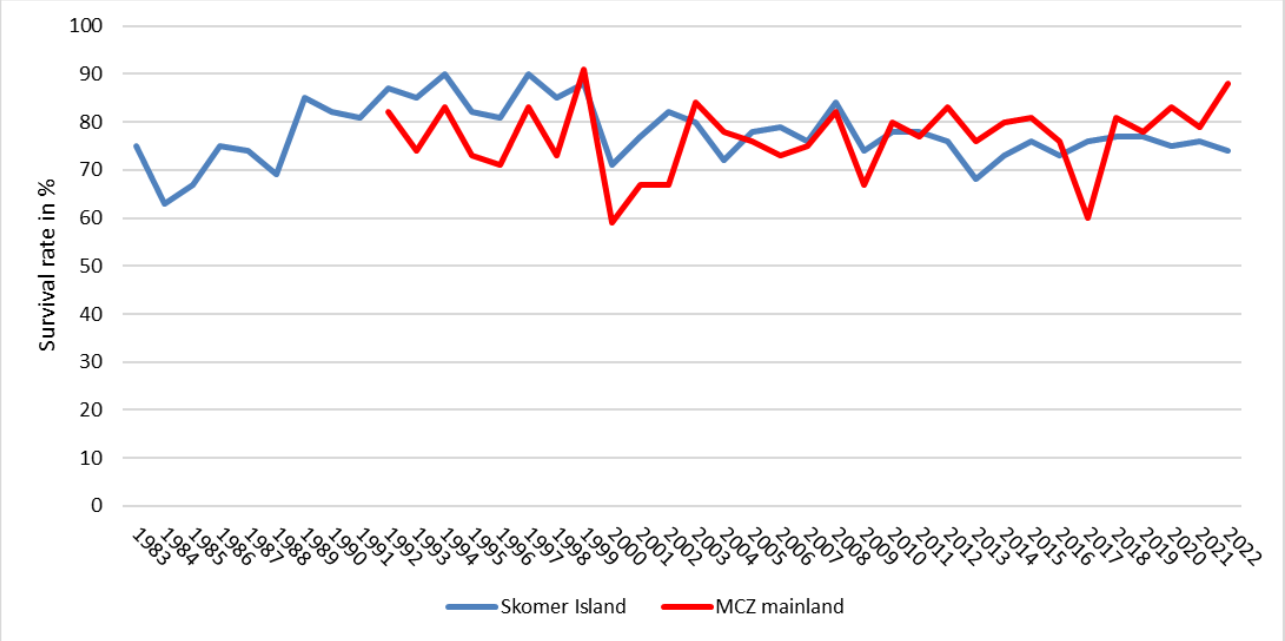


Figure 8 Weekly seal pup births and deaths on Skomer Island in 2021 and 2022

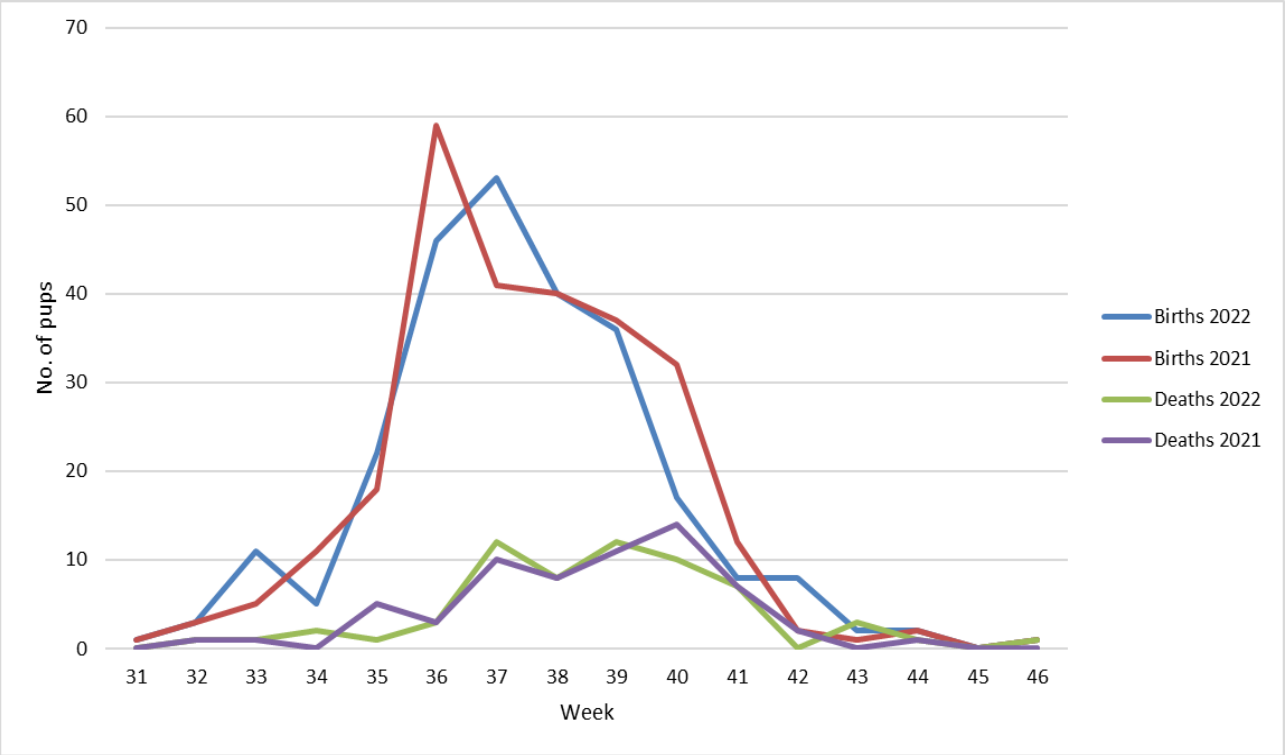


Table 2 Survival rates per site on Skomer Island 2022

Site	Total number of pups raised	Number of pups survived	% Survival
Amy's Reach	7	4	57
Castle Bay	26	16	62
Driftwood Bay	27	18	67
High Cliff Boulders	2	1	50
Matthew's Wick	40	26	65
North Haven	52	41	79
Pigstone Bay	1	1	100
Protheroe's Dock	1	1	100
Seal Hole	11	8	100
South Castle Beach Cave	5	5	100
South Haven	47	37	79
South Stream	5	4	100
The Basin	2	1	100
The Lantern	4	1	100
The Slabs	6	4	67
The Wick	19	15	83

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.

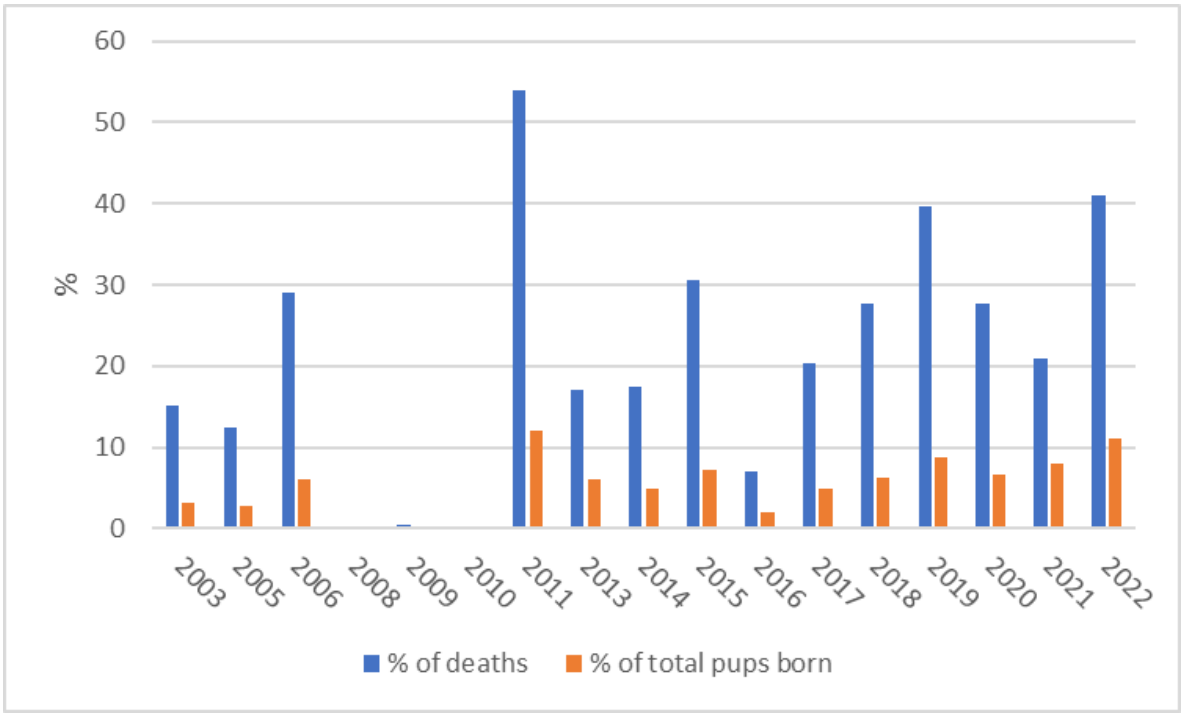
Table 3 Causes of seal pup deaths on Skomer Island in 2022

Cause of death	No. of pups	% of deaths	% of total pups born with fate known
Abandoned/separated/starved	26	41	11.0
Accident/injured/killed	1	1.6	0.4
Disappeared ≤ stage 3	9	14.3	3.7
Diseased	1	1.6	0.4
Drowned	0	0.0	0.0
Stillborn	5	7.9	2.0
Unknown	20	31.7	8.1
Other	1	1.6	0.0
Total	**63**	**100**	**26**

In 2022 26 pups were abandoned which seemed like an increase on previous years. Looking at the available data from 2003 to 2021 it can be seen that on average 20% of deaths go on the account of abandonment, which represents an average of 5% of all pups born. In 2022 41% of all deaths were caused by abandonment, which equals 11% of all pups born, hence the number of abandoned pups is more than double the average.

However, looking at Figure 9 there are notable fluctuations between the years and 2022 is in fact in line with 2011 (in terms of the number of abandoned pups given as a percentage of the total pups born), so it appears that this is not unprecedented. Why in some years more females abandon their pups than in others is unknown and it will be interesting to keep monitoring this phenomenon.

Figure 9 Seal pups abandoned 2003-2022 (percentage of deaths and percentage of total pups born)



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 from view, 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 an abandoned metal mooring ladder.

A total of 52 pups were born in North Haven in 2022, two more than in the previous year. The fate of all pups is known, of which 41 are assumed to have survived, survived to the beginning of moult or were weaned, giving a survival rate of 79%

Figure 10 Number of seal pups born on North Haven 1983–2022

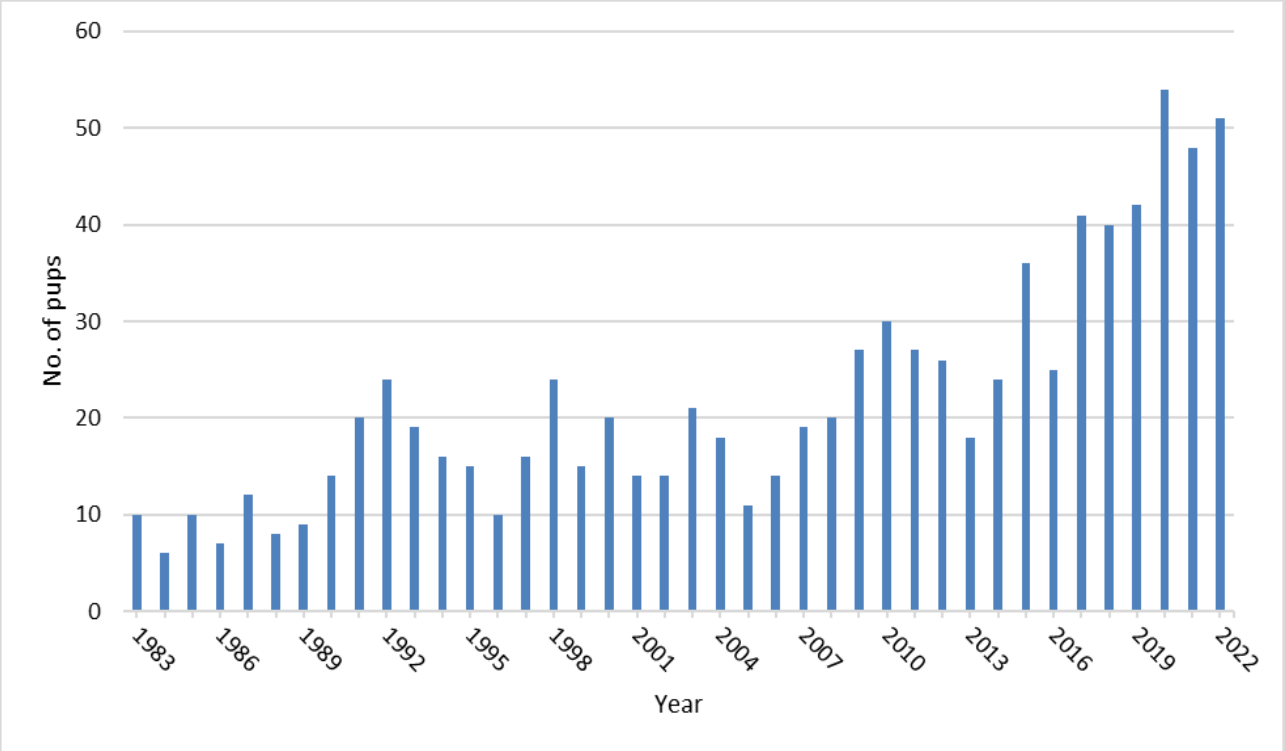


Figure 11 Weekly seal pup births on North Haven in 2022

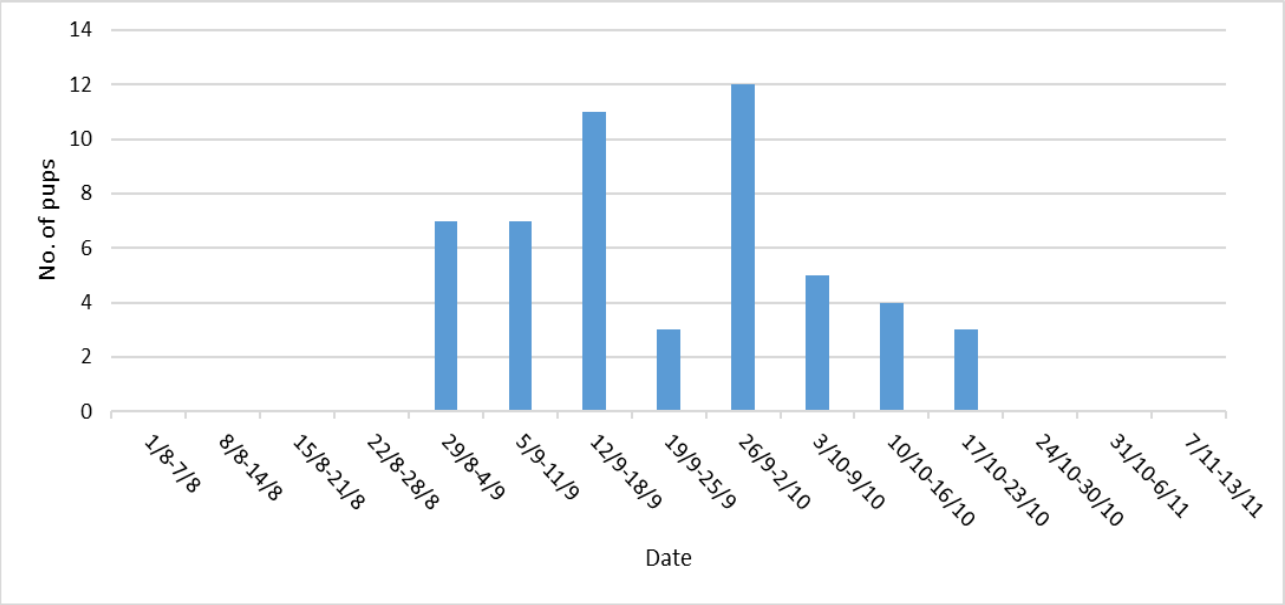


Table 4 Fate of pups on North Haven in 2022

Fate	**No. of pups**
Assumed survived	8
Survived to beginning of moult	6
Survived to weaning	27
Assumed dead	2
Dead	9
Unknown	0
Total	**52**

Table 5 Causes of seal pup deaths on North Haven beach in 2022

Cause of death	**No. of pups**
Abandoned/separated/starved	4
Accident/injured/killed	0
Disappeared ≤ stage 3	1
Diseased	0
Drowned	0
Stillborn	1
Unknown	4
Other	1
Total	**11**

4.4.2 Protheroe's Dock

In 2022 one pup was born on Protheroe's Dock. It survived to the beginning of moult.

Figure 12 Number of seal pups born on Protheroe's Dock 1983-2022

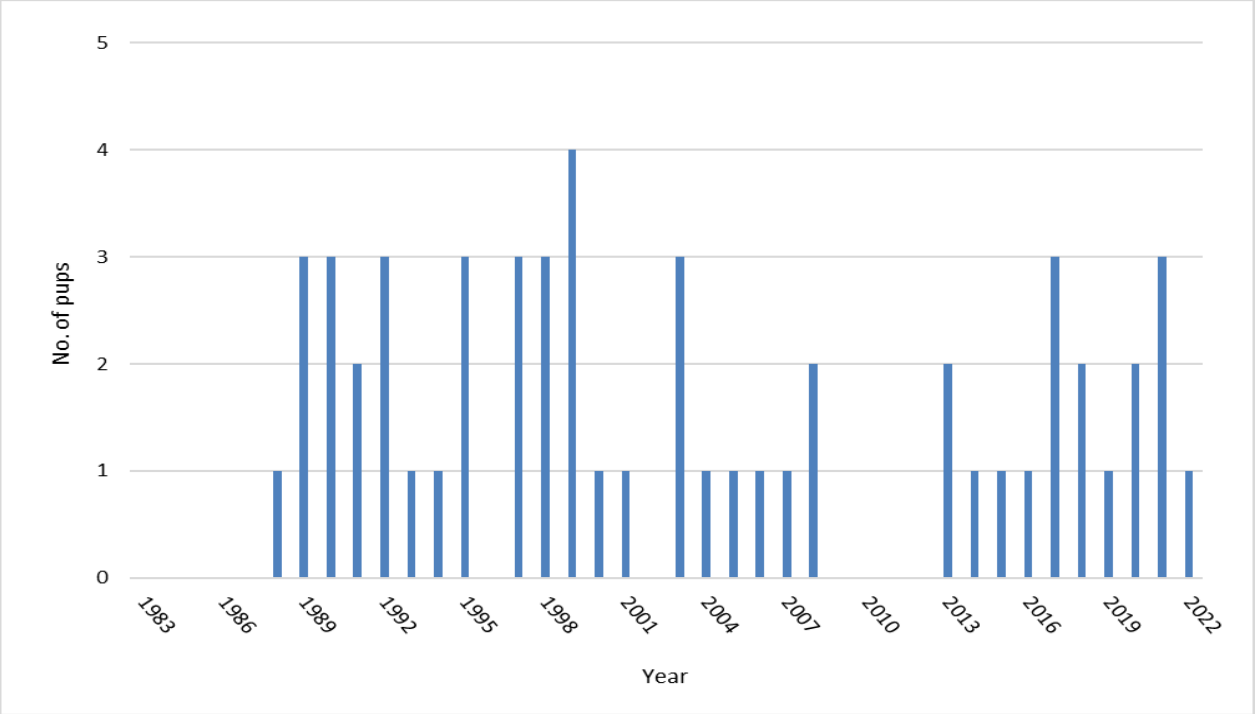
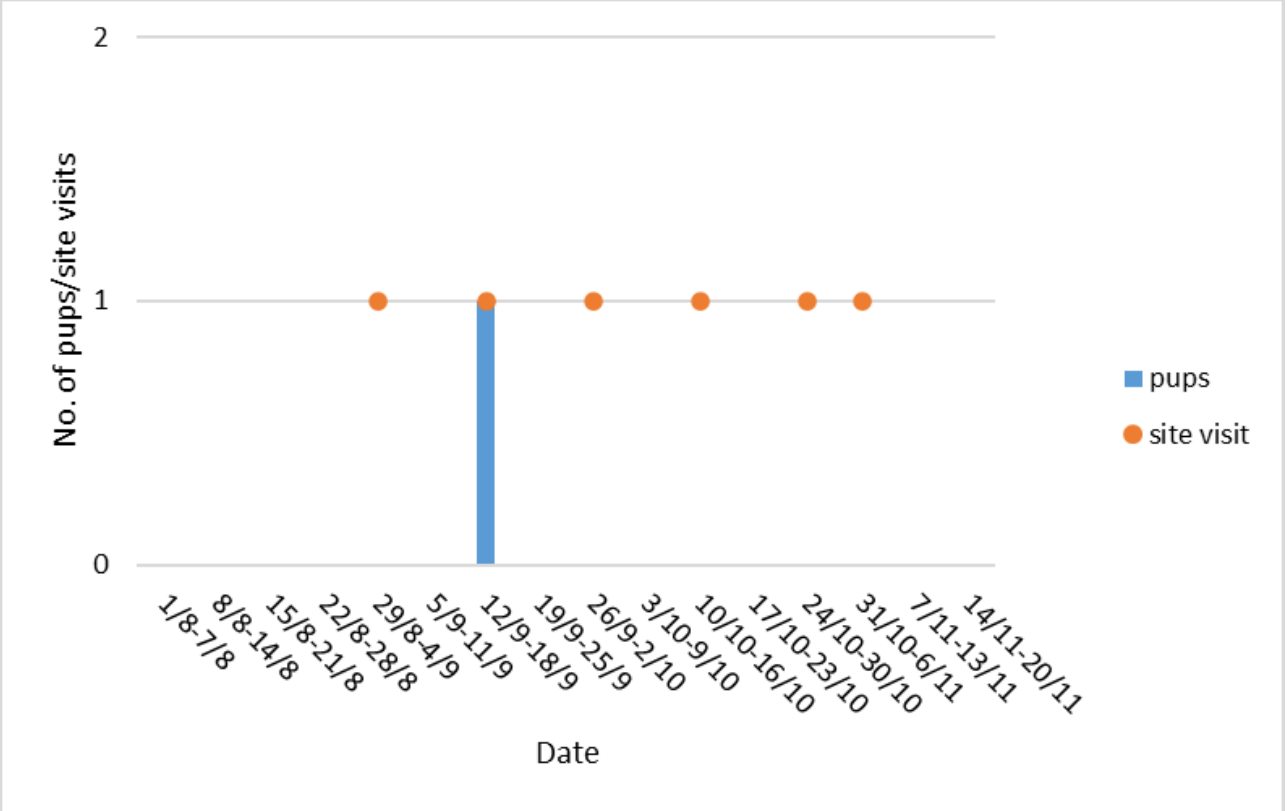


Figure 13 Weekly seal pup births on Protheroe's Dock in 2022



4.4.3 The Lantern

Access to the Lantern is only possible on certain low tides. 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 on low tides of less than 2.0m. In 2015 this route was risk assessed by Leo Nathan (mountain instructor - climbing trainer and site assessment) 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 carabiner; this setup reduces risk and speeds up the site visit.

In 2022 four pups were born in the Lantern. As access is very tidal and weather dependant some pups might have been missed. The fate of only one pup is known. It survived until the beginning our moult.

Figure 14 Number of seal pups born in The Lantern 1984-2022

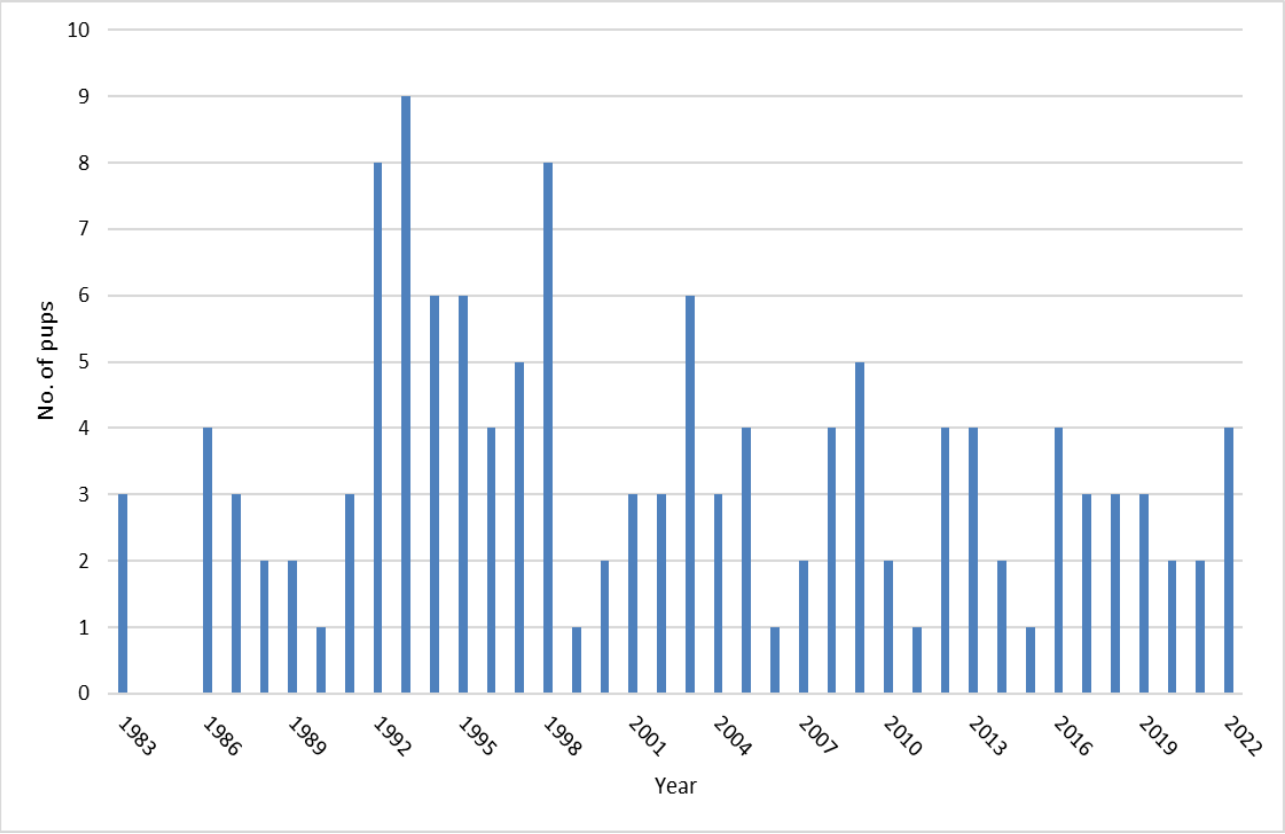
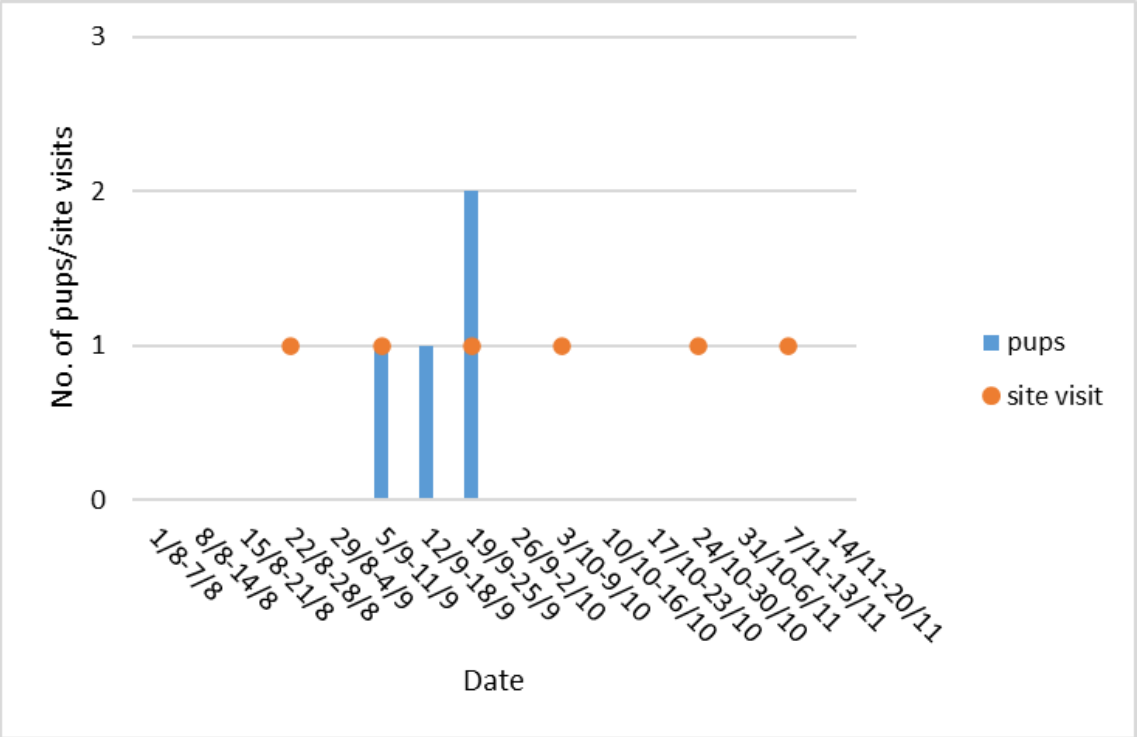


Figure 15 Weekly seal pup births in The Lantern in 2022



4.4.4 Amy's Reach

Seven pups were born on Amy's Reach of which four survived and weaned, survived to the beginning of moult or were assumed to have survived resulting in a survival rate of 57%.

Figure 16 Number of seal pups born on Amy's Reach in 1984-2022

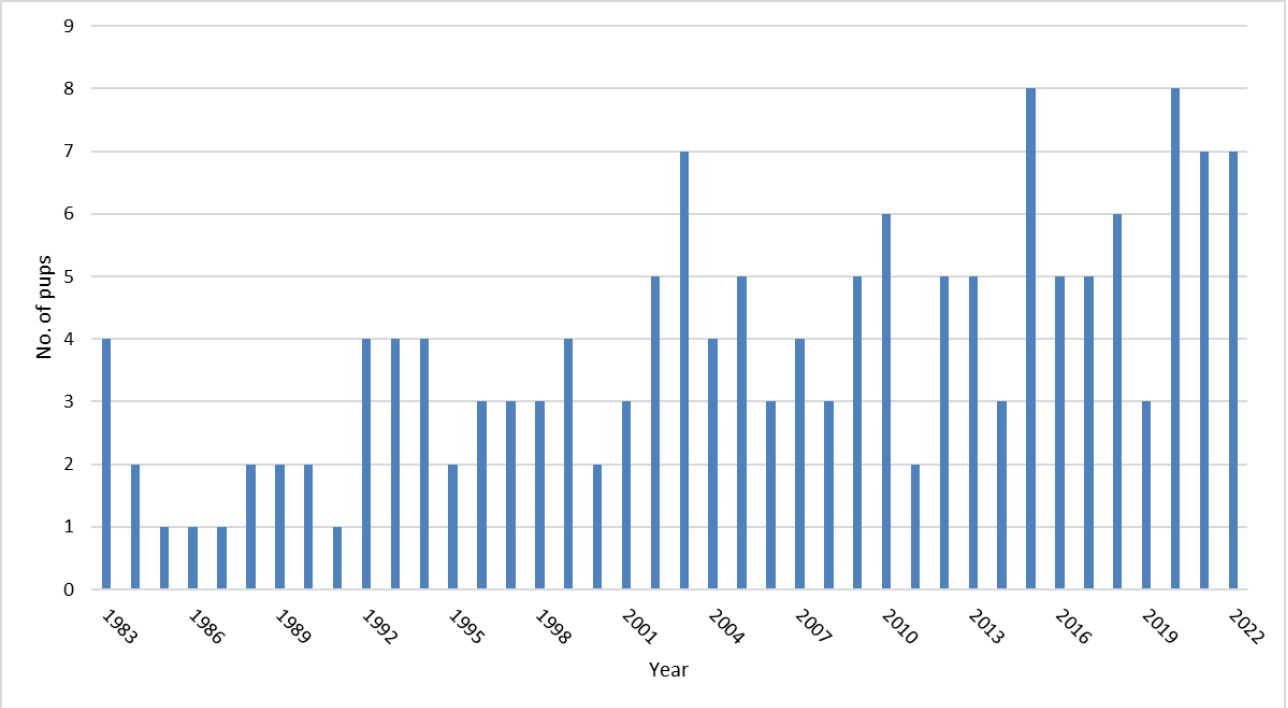


Figure 17 Weekly seal pup births on Amy's Reach in 2022

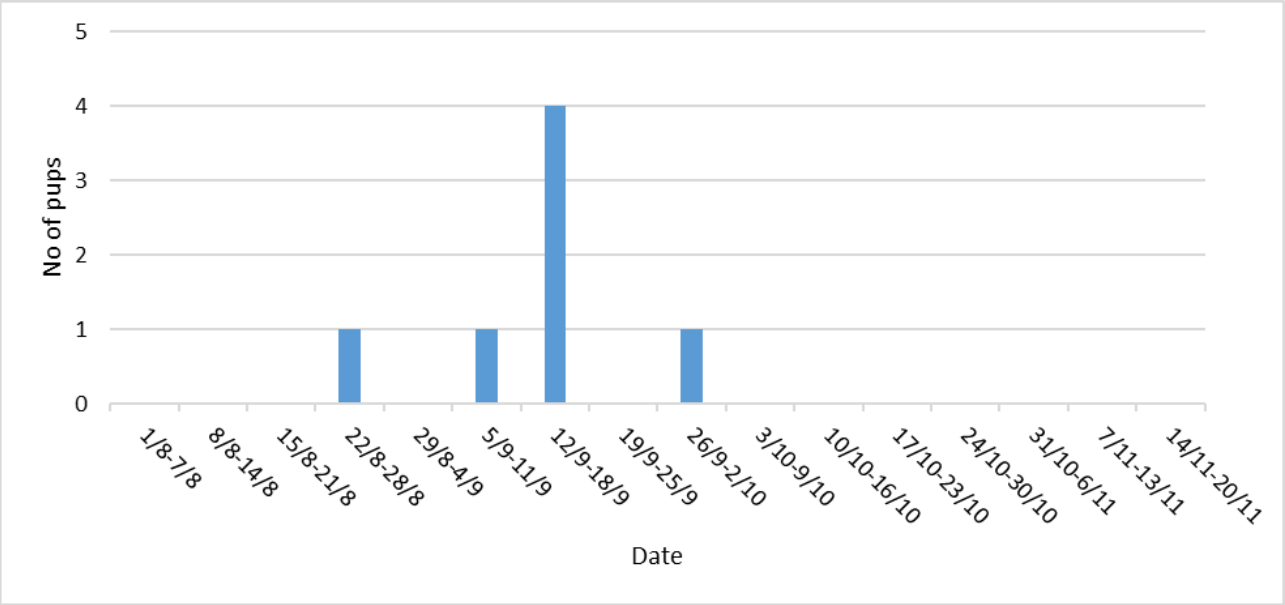


Table 6 Fate of pups on Amy's Reach in 2022

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

4.4.5 Matthew's Wick

In 2022 40 pups were born on Matthew's Wick which is one less than in 2021. 26 pups are assumed to have survived, survived to the beginning of moult or survived and were weaned, giving a survival rate of 65% which is 9% less than the previous year.

Figure 18 Number of seal pups born on Matthew's Wick in 1984-2022

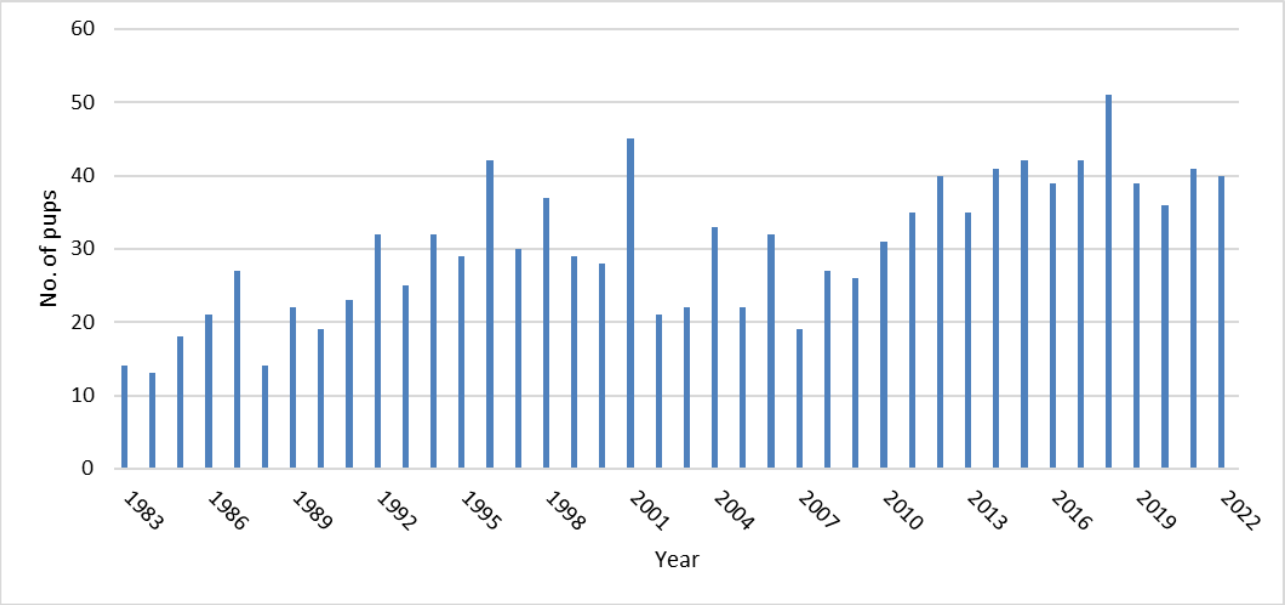


Figure 19 Weekly seal pup births on Matthew's Wick in 2022

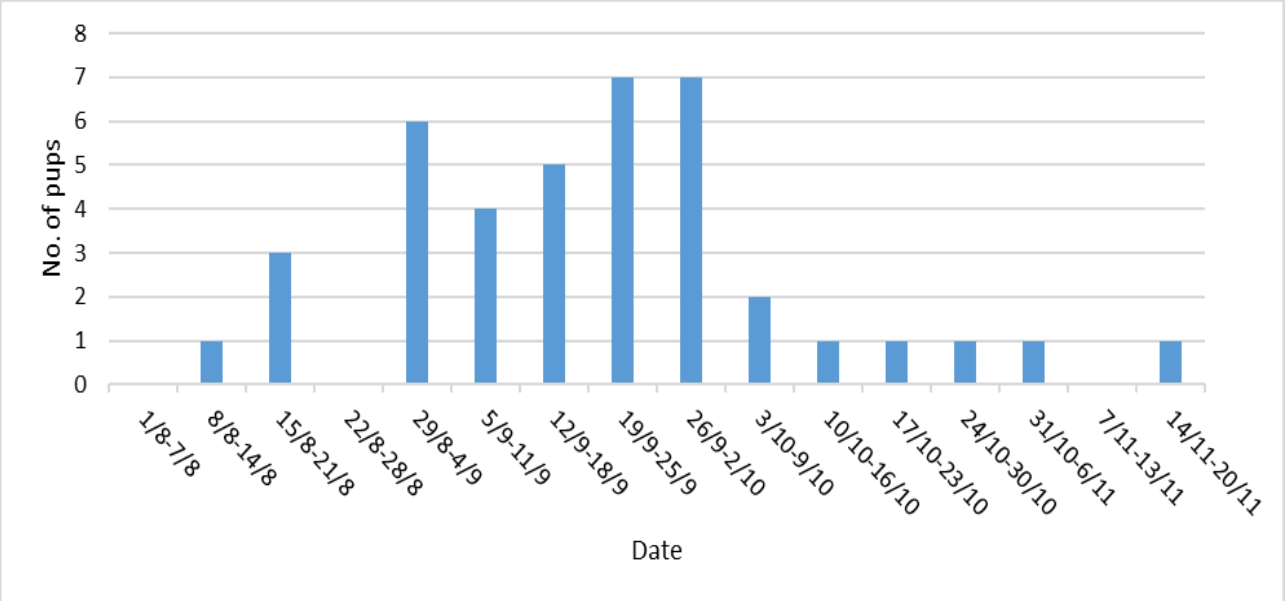


Table 7 Fate of pups on Matthew's Wick in 2022

Fate	**No. of pups**
Assumed survived	1
Survived to beginning of moult	3
Survived to weaning	22
Assumed dead	4
Dead	10
Unknown	0
Total	**40**

Table 8 Causes of seal pup deaths on Matthew's Wick in 2022

Cause of death	**No. of pups**
Abandoned/separated/starved	10
Accident/injured/killed	0
Disappeared ≤ stage 3	0
Diseased	0
Drowned	0
Stillborn	0
Unknown	4
Other	0
Total	**14**

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. 26 pups were born in Castle Bay in 2022. 16 pups are assumed to have survived, survived to the beginning of moult or survived and weaned, giving a survival rate of 62% which is 15% lower than the previous year. Often the survival rate of Castle Bay is lower than the whole island rate as it is directly facing into the prevailing wind direction and gets fully flooded during storm tides. Büche and Stubbings (2015) speculated that as Castle Bay is the beach with the largest and most permanent haul-out, the presence of other seals could unsettle the cows and pups and lead to abandonment of pups, or the site.

Figure 20 Number of sea pups born on Castle Bay in 1984-2022

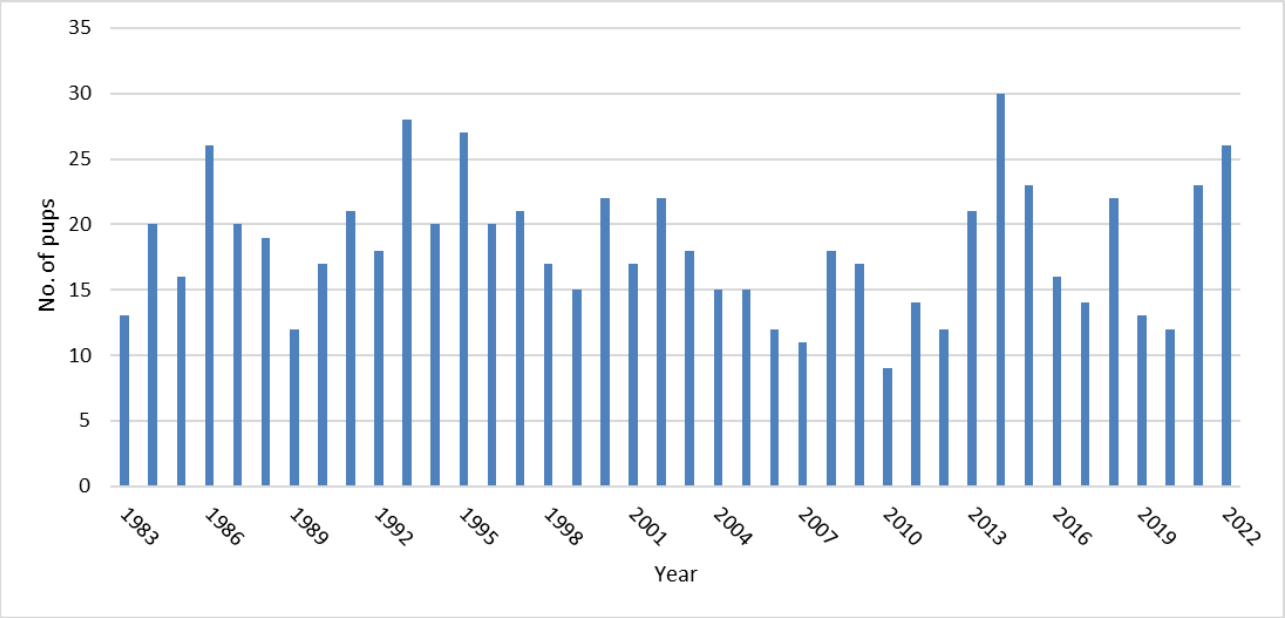


Figure 21 Weekly seal pup births on Castle Bay in 2022

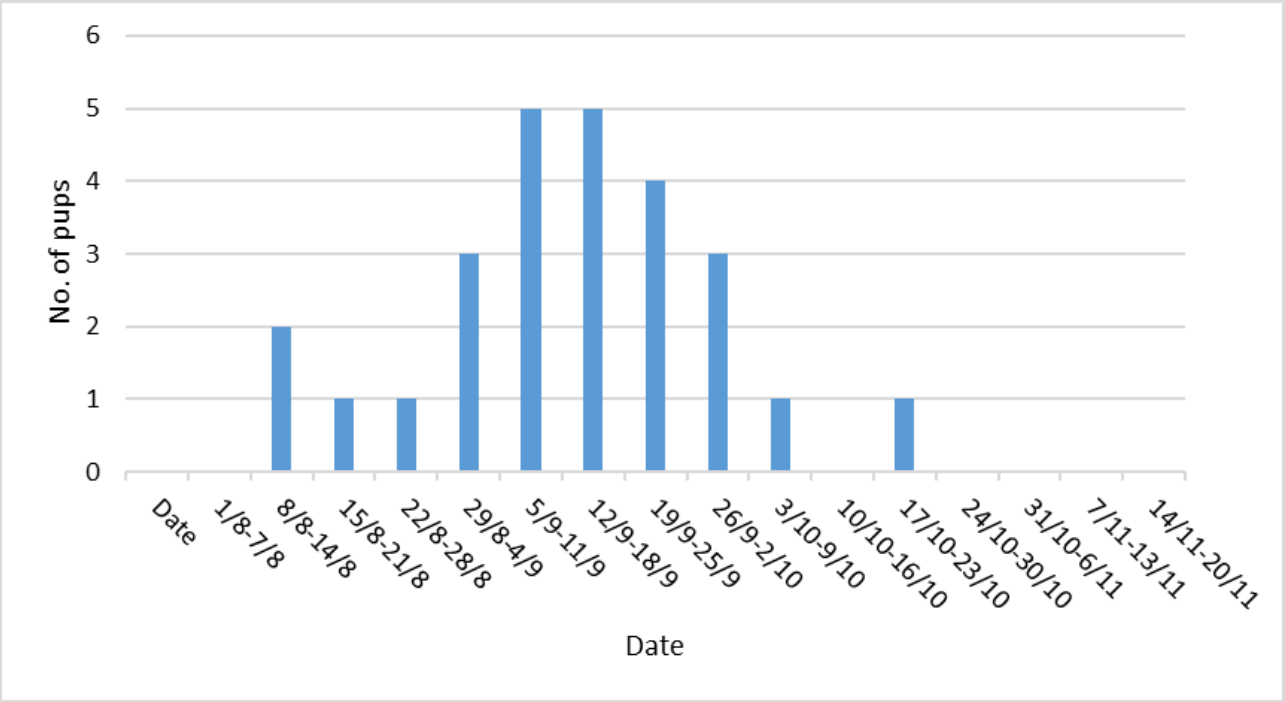


Table 9 Fate of pups on Castle Bay in 2022

Fate	No. of pups
Assumed survived	2
Survived to beginning of moult	5
Survived to weaning	9
Assumed dead	4
Dead	6
Unknown	0
Total	**26**

Table 10 Causes of seal pup deaths on Castle Bay in 2022

Cause of death	No. of pups
Abandoned/separated/starved	1
Accident/injured/killed	0
Disappeared ≤ stage 3	2
Diseased	1
Drowned	0
Stillborn	1
Unknown	5
Other	0
Total	**10**

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, 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.

Five pups were born at South Castle Beach Cave in 2022. All five pups survived to beginning of moult/survived and weaned.

Figure 22 Number of seal pups born in South Castle Beach Cave in 1984-2022

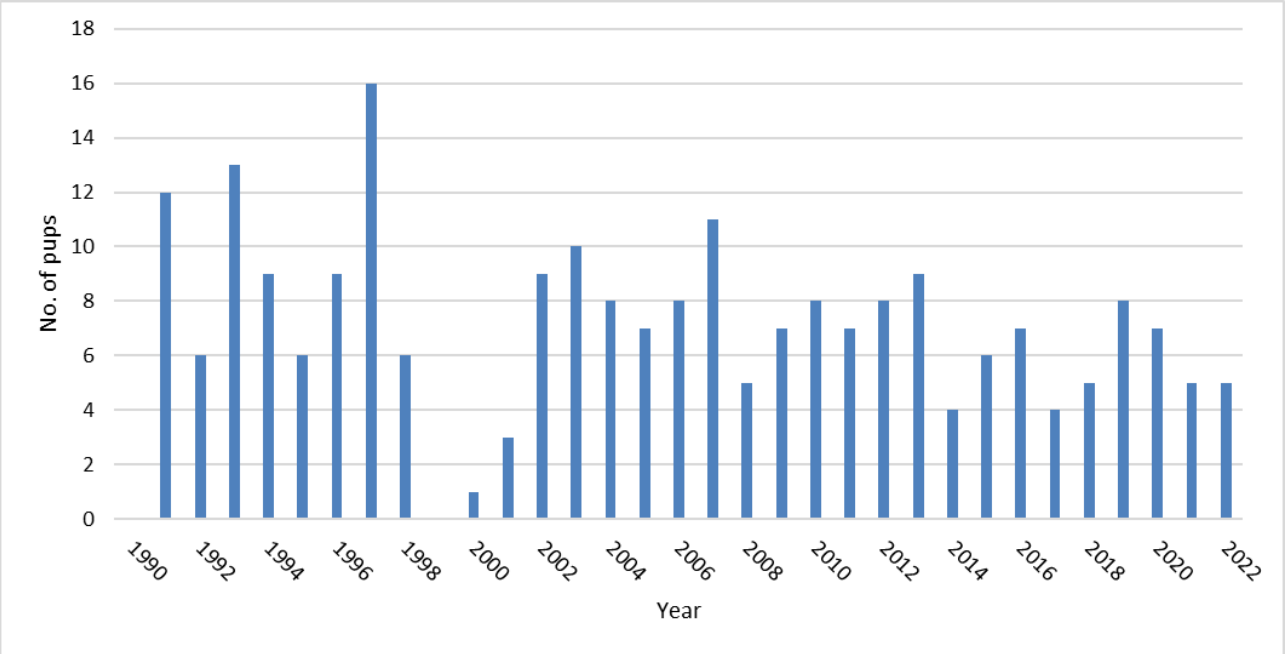


Figure 23 Weekly seal pup births in South Castle Beach Cave in 2022

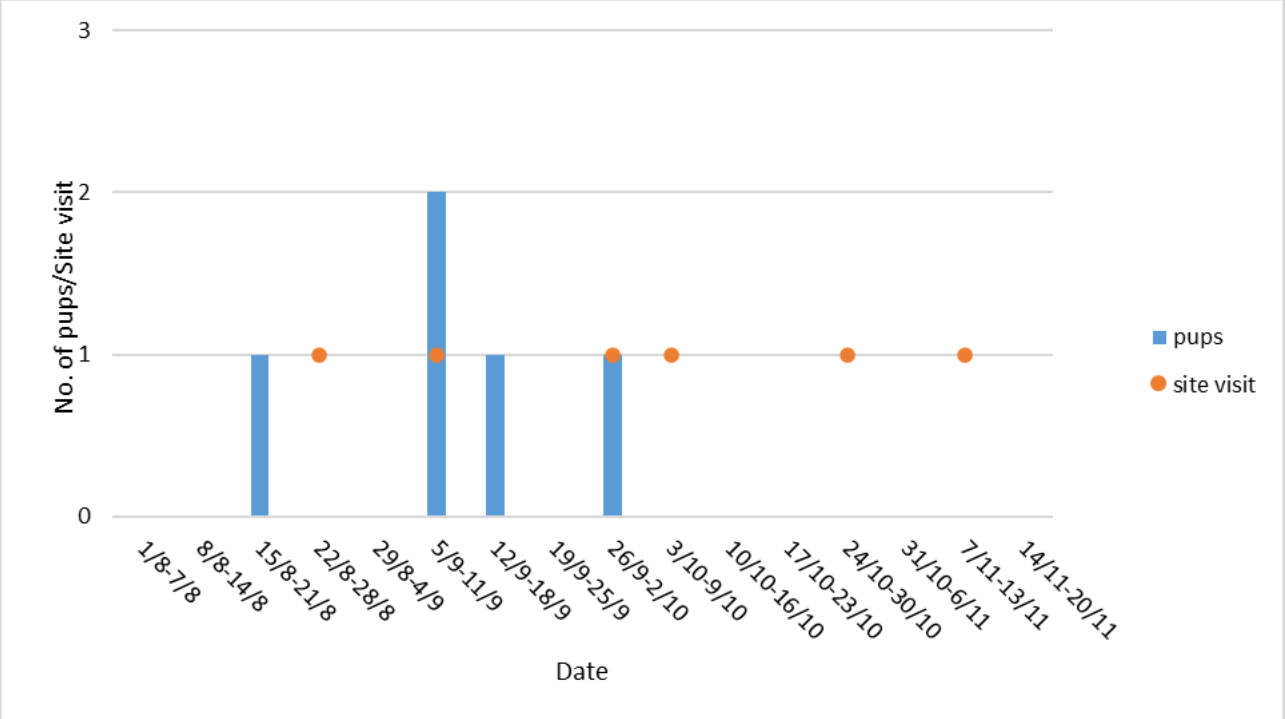


Table 11 Fate of pups on South Castle Beach in 2022

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

4.4.8 Seal Hole

Eleven pups were born in Seal Hole in 2022. Eight pups are assumed to have survived, survived to the beginning of moult or survived and weaned. The fate of three pups is unknown, hence these pups were removed from the survival analysis, giving a survival rate of 100%.

Figure 24 Number of seal pups born in Seal Hole in 1984-2022

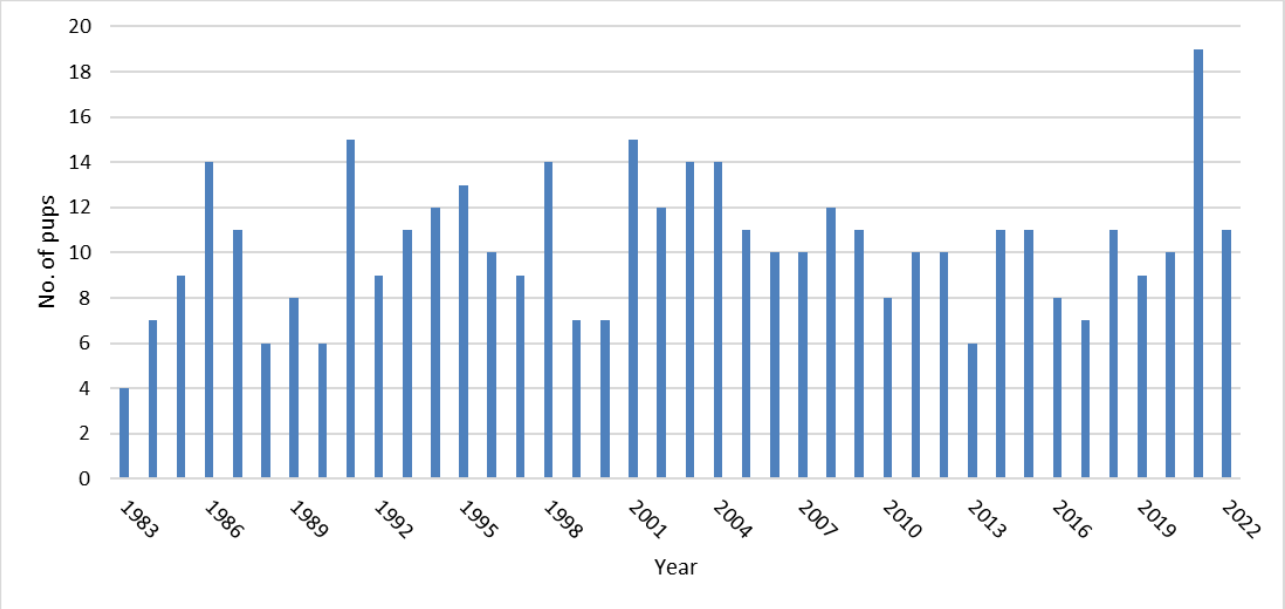


Figure 25 Weekly seal pup births in Seal Hole in 2022

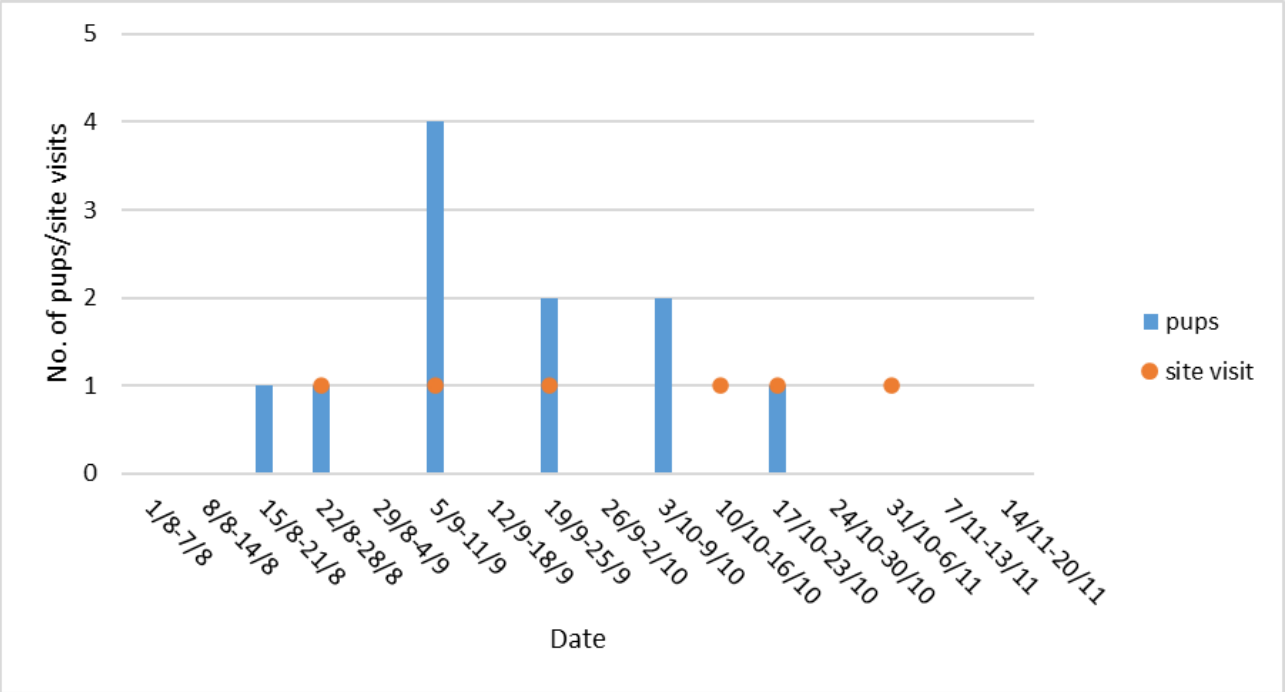


Table 12 Fate of pups in Seal Hole in 2022

Fate	**No. of pups**
Assumed survived	4
Survived to beginning of moult	0
Survived to weaning	3
Assumed dead	0
Dead	0
Unknown	0
Total	**8**

4.4.9 The Slabs

Six pups were born on The Slabs in 2022. Four pups are assumed to have survived/survived and weaned, giving a survival rate of 67%.

Figure 26 Number of seal pups born on The Slabs in 1984-2022

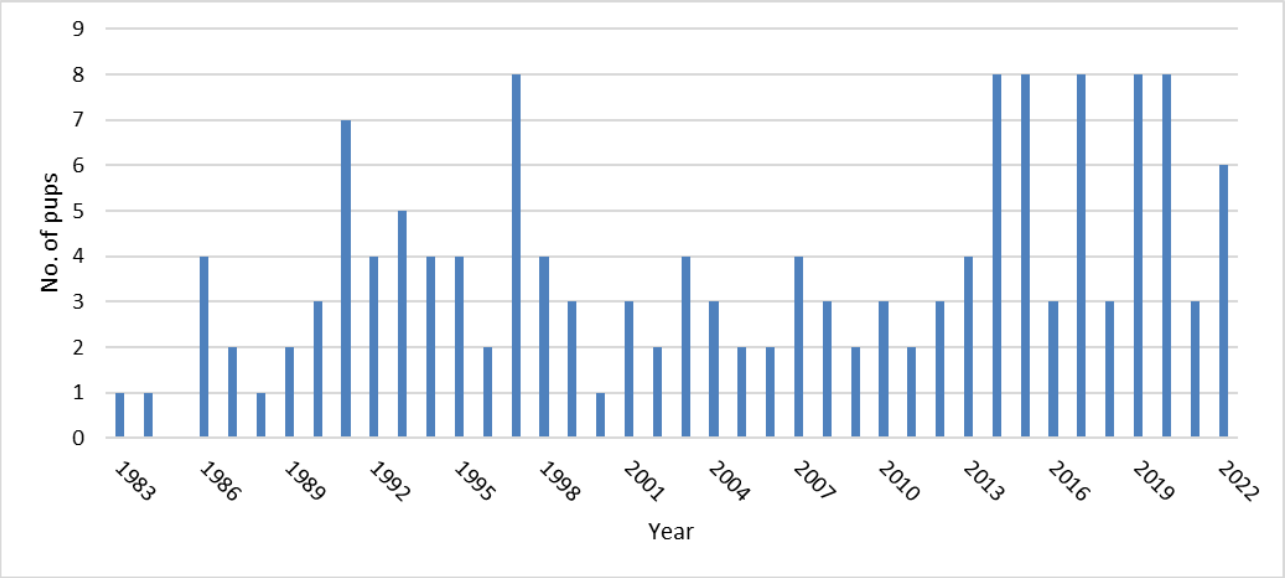


Figure 27 Weekly seal pup births on The Slabs in 2022

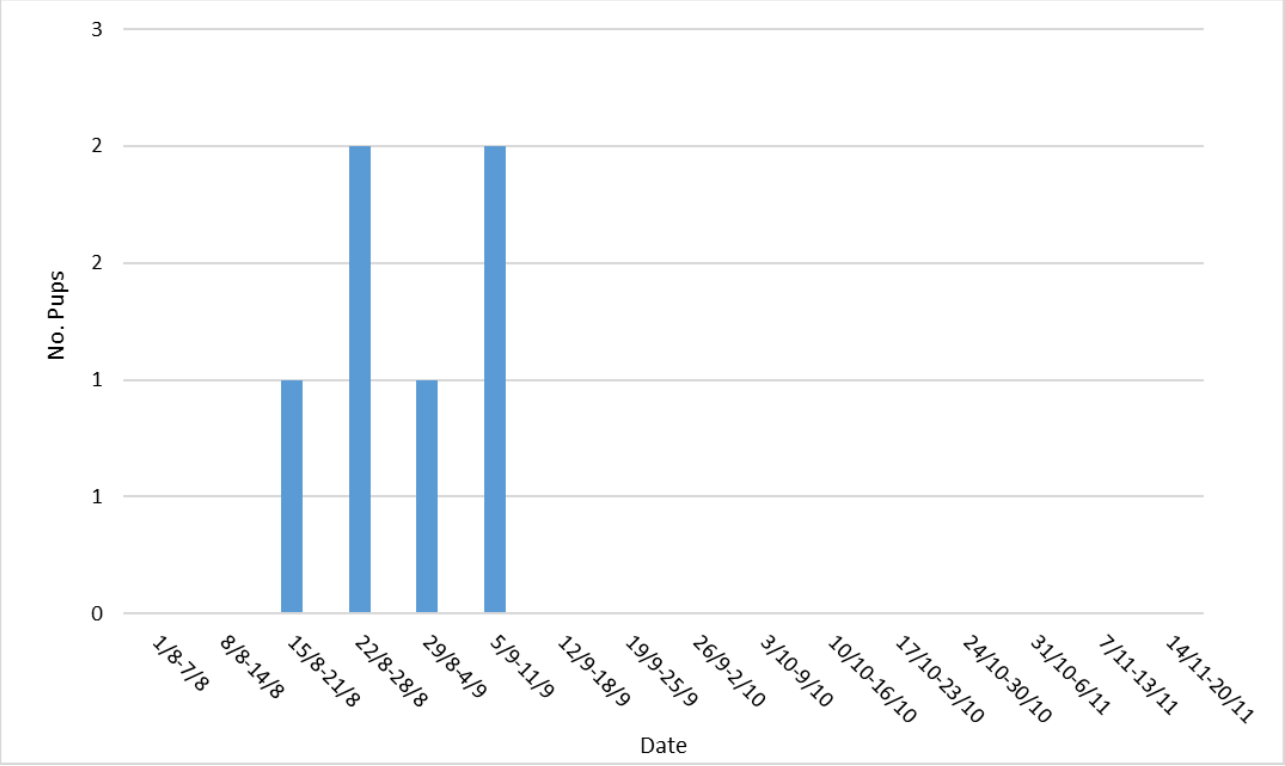


Table 13 Fate of pups on The Slabs in 2022

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	0
Survived to weaning	3
Assumed dead	2
Dead	0
Unknown	0
Total	**6**

Table 14 Causes of seal pup deaths on The Slabs in 2022

Cause of death	No. of pups
Abandoned/separated/starved	0
Accident/injured/killed	0
Disappeared ≤ stage 3	2
Diseased	0
Drowned	0
Stillborn	0
Unknown	0
Other	0
Total	**2**

4.4.10 Driftwood Bay

26 pups were born on Driftwood Bay in 2022 and, one pup moved from South Haven to Driftwood Bay and spent the majority of its life on this beach, hence it was added to the survival rate calculation for Driftwood Bay. 18 pups are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 67%, which is 3% less than the previous year.

Figure 28 Number of seal pups born on Driftwood Bay in 1984-2022

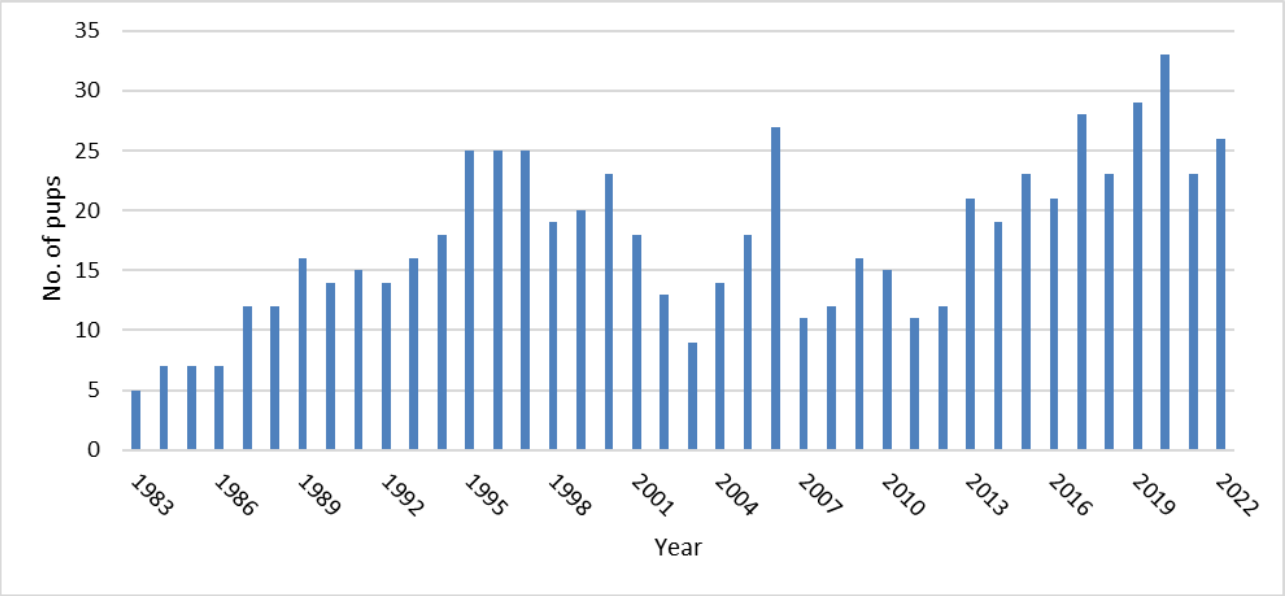


Figure 29 Weekly seal pup births on Driftwood Bay in 2022

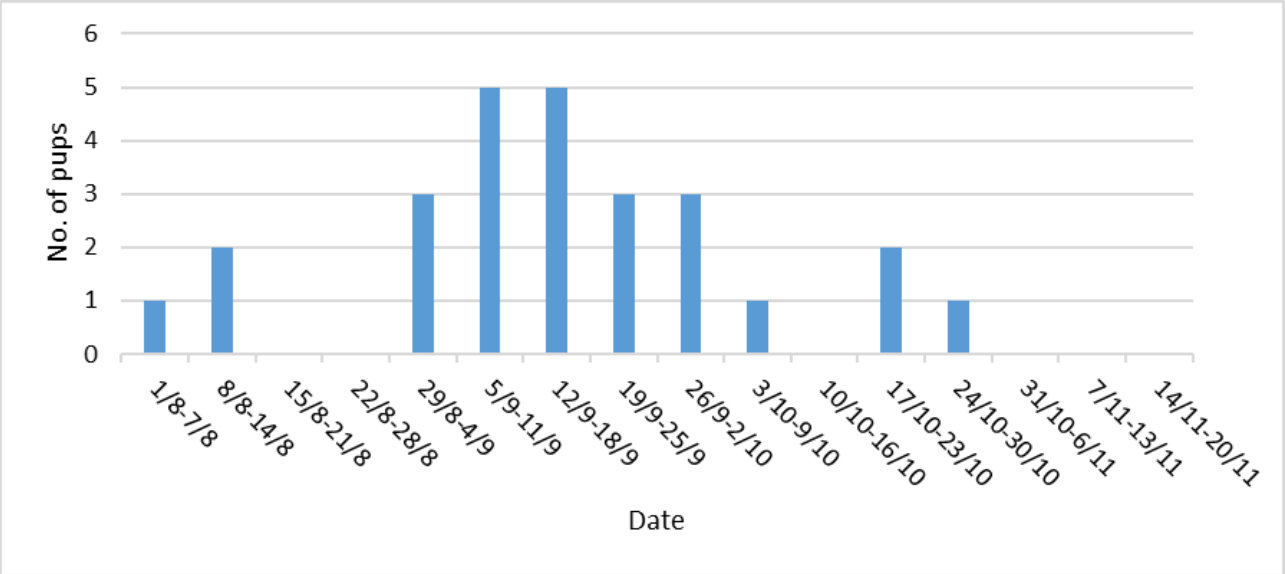


Table 15 Fate of pups on Driftwood Bay in 2022

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	1
Survived to weaning	16
Assumed dead	1
Dead	8
Unknown	0
Total	**27**

Table 16 Causes of seal pup deaths on Driftwood Bay in 2022

Cause of death	No. of pups
Abandoned/separated/starved	5
Accident/injured/killed	0
Disappeared ≤ stage 3	0
Diseased	0
Drowned	0
Stillborn	2
Unknown	2
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 2022 47 pups were born in South Haven, five less than in the previous year. The fate of all pups is known, 37 are assumed to have survived, survived to beginning of moult or survived and were weaned, giving a survival rate of 79%.

Figure 30 Number of seal pups born on South Haven in 1984-2022

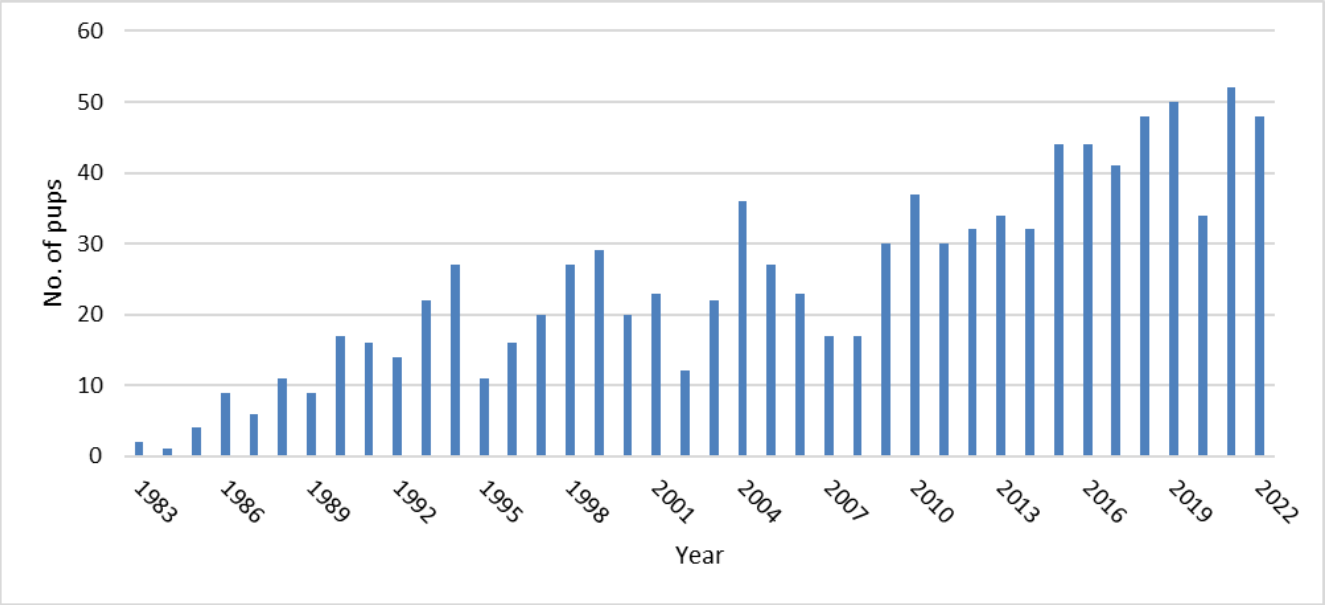


Figure 31 Weekly seal pup births on South Haven in 2022

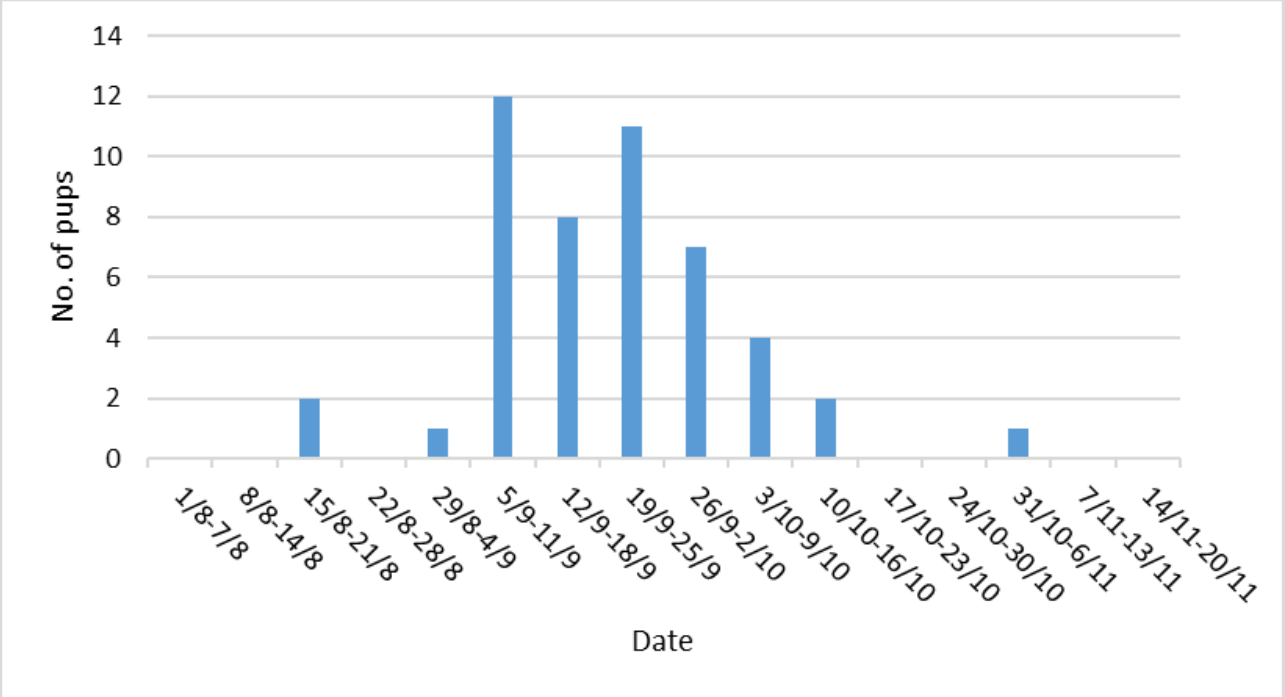


Table 17 Fate of pups on South Haven in 2022

Fate	No. of pups
Assumed survived	7
Survived to beginning of moult	7
Survived to weaning	23
Assumed dead	2
Dead	8
Unknown	0
Total	**47**

Table 18 Causes of seal pup deaths on South Haven in 2022

Cause of death	No. of pups
Abandoned/separated/starved	3
Accident/injured/killed	0
Disappeared ≤ stage 3	2
Diseased	0
Drowned	0
Stillborn	0
Unknown	5
Other	0
Total	**10**

4.4.12 South Stream Cave

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 or coming ashore at low tide. 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 deemed that pups could easily be missed when inspecting from such a distance. South Stream was monitored approximately every two to four days, when the weather allowed, during the main pupping time. Five pups were born at South Stream in 2022, of which four are assumed to have survived, survived to the beginning of moult or survived and were weaned, one pup's fate is unknown.

Figure 32 Number of seal pups born in South Stream Cave in 1984-2022

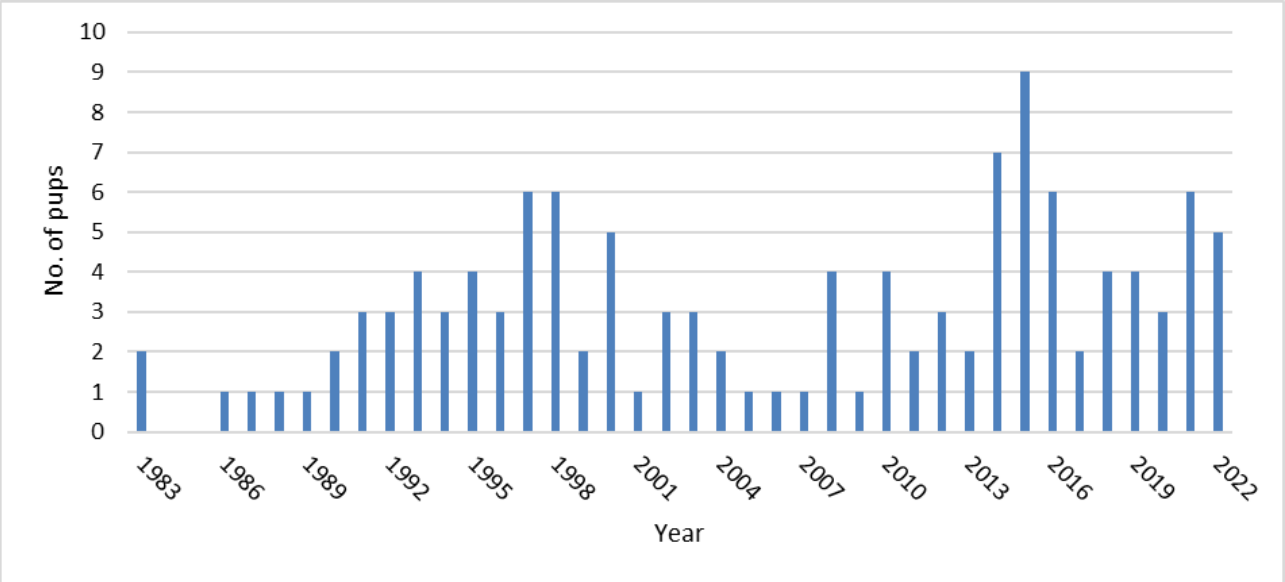


Figure 33 Weekly seal pup births in South Stream Cave in 2022

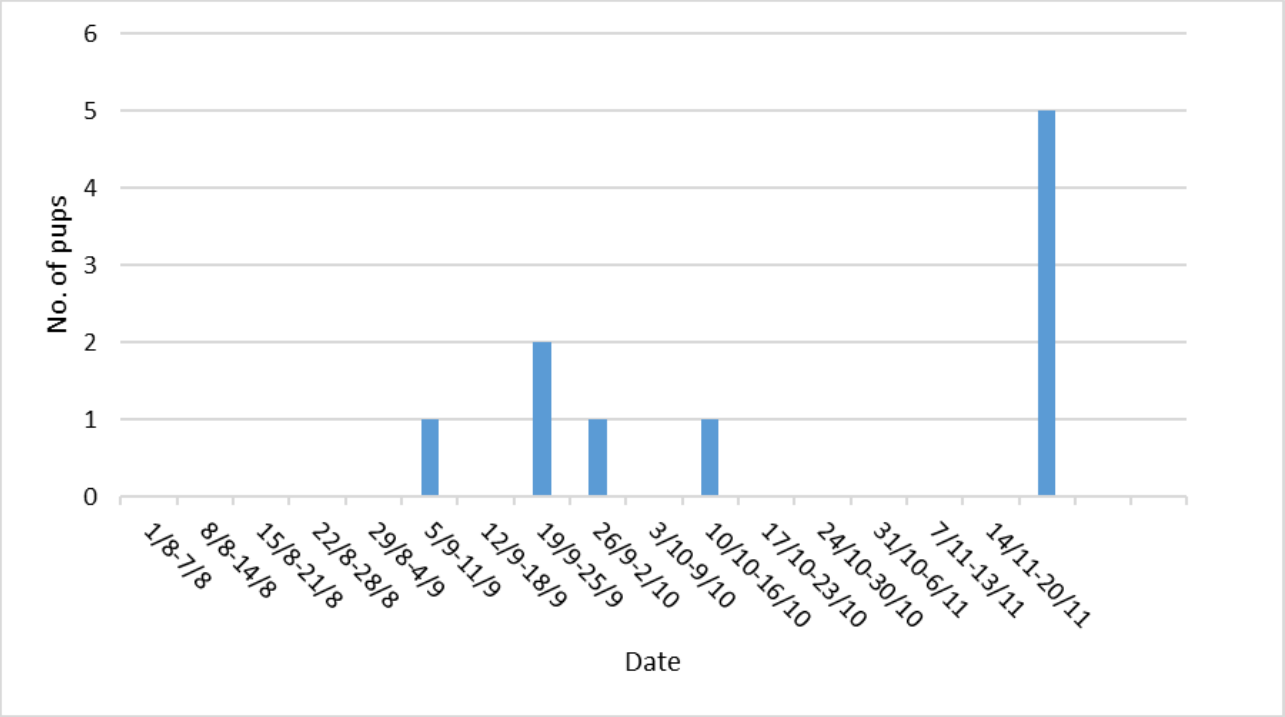


Table 19 Fate of pups in South Stream Cave in 2022

Fate	No. of pups
Assumed survived	1
Survived to beginning of moult	1
Survived to weaning	2
Assumed dead	0
Dead	0
Unknown	1
Total	**5**

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 monitored from Welsh Way approximately every two to four days, when the weather allowed, during the main pupping time. Two pups were found, of which one pup survived to the beginning of moult, the other pup was abandoned and died.

Figure 34 Number of seal pups born at High Cliff Boulders in 1984-2022

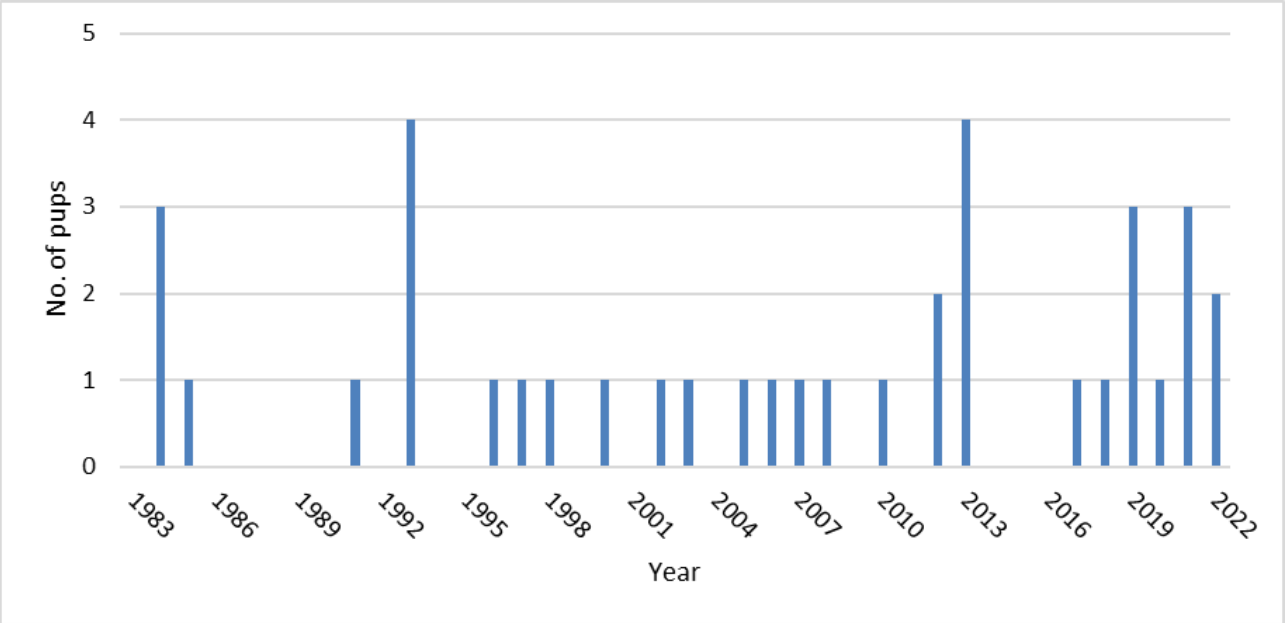
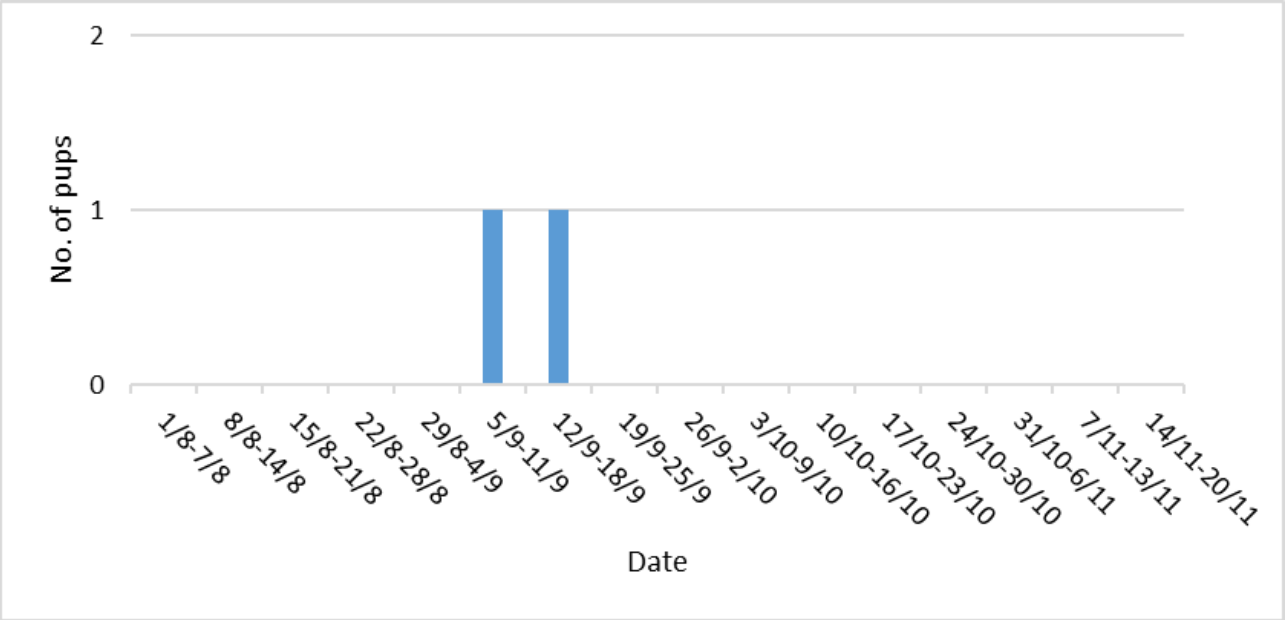


Figure 35 Weekly seal pup births at High Cliff Boulders in 2022



4.4.14 The Wick

After a record year in 2020 pup numbers dropped again in 2022 to 19 which is more in line with the years 2012 to 2019. 15 pups are assumed to have survived, survived to the beginning of moult or survived and were weaned, one pup's fate is unknown resulting in a survival rate of 83% which is 3% lower than the previous year.

Figure 36 Number of seal pups born on The Wick in 1984-2022

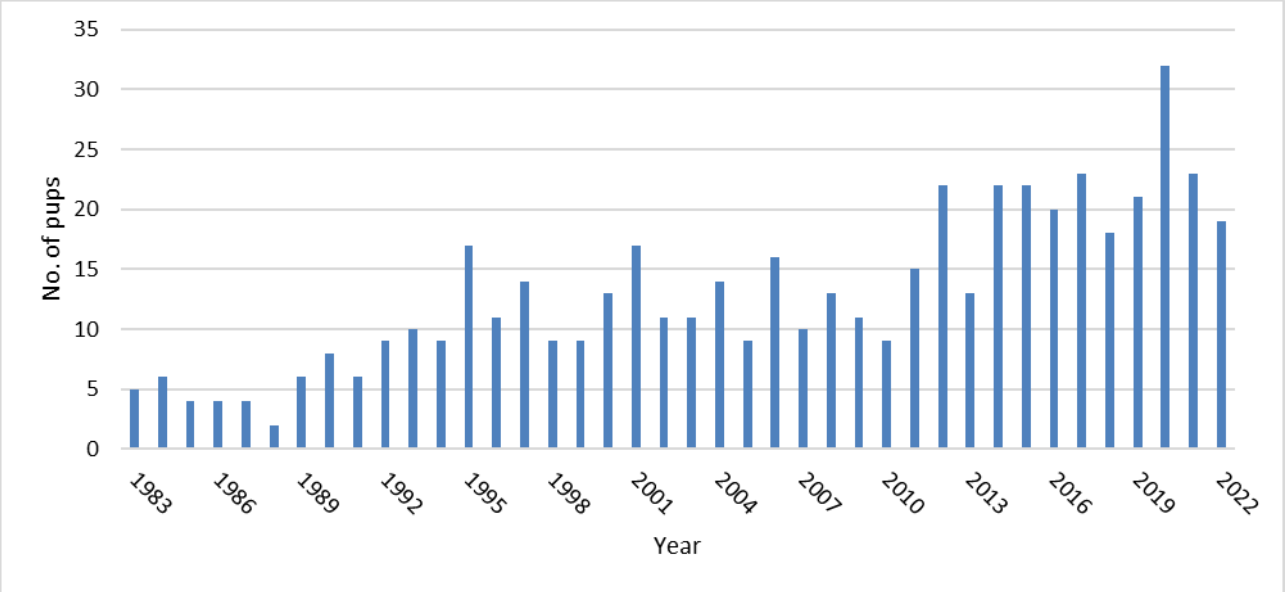


Figure 37 Weekly seal pup births on The Wick in 2022

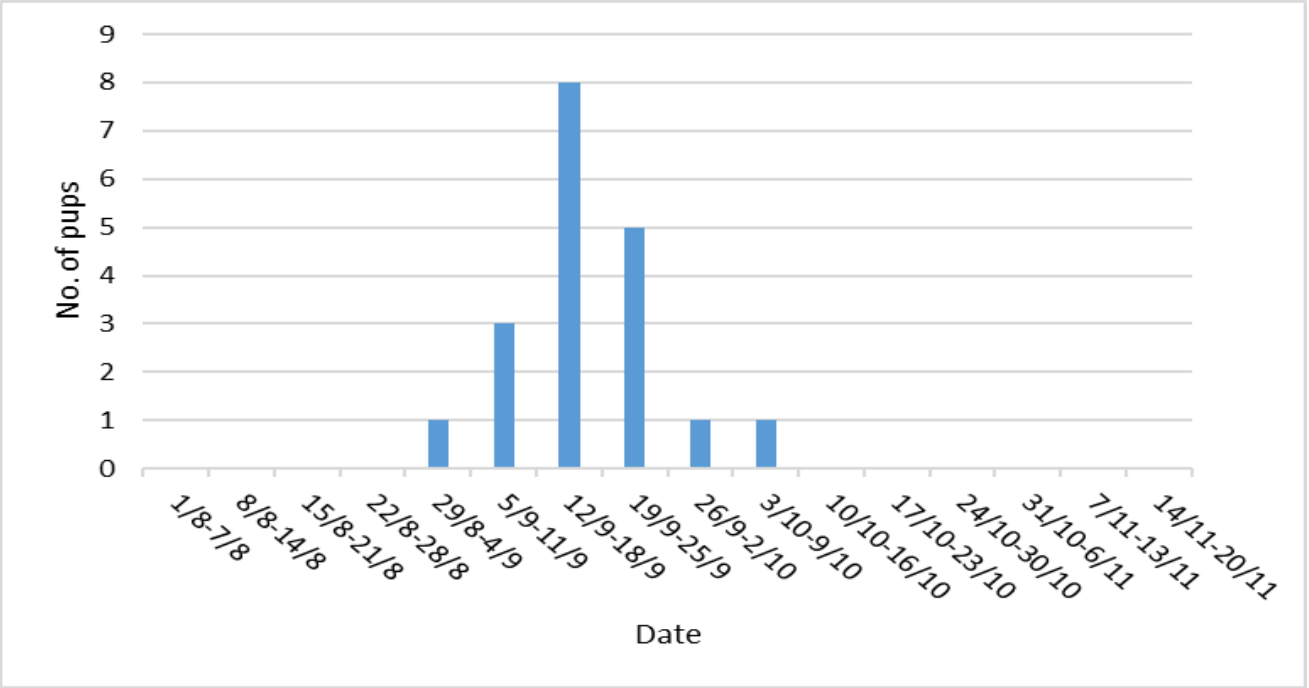


Table 20 Fate of pups on The Wick in 2022

Fate	**No. of pups**
Assumed survived	1
Survived to beginning of moult	5
Survived to weaning	9
Assumed dead	0
Dead	0
Unknown	0
Total	**15**

Table 21 Causes of seal pup deaths on The Wick in 2022

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

4.4.15 The Basin

In 2022 two pups were born at the Basin. One pup survived to the beginning of moult and one pup's fate is unknown.

Figure 38 Number of seal pups born at The Basin in 1984-2022

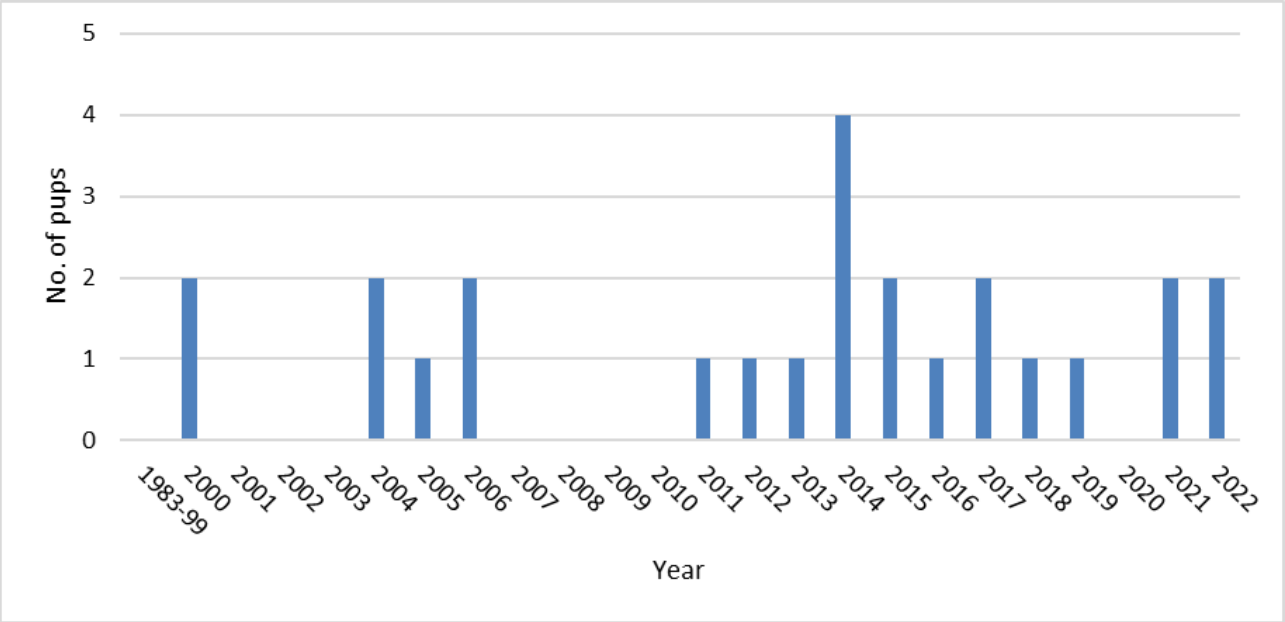
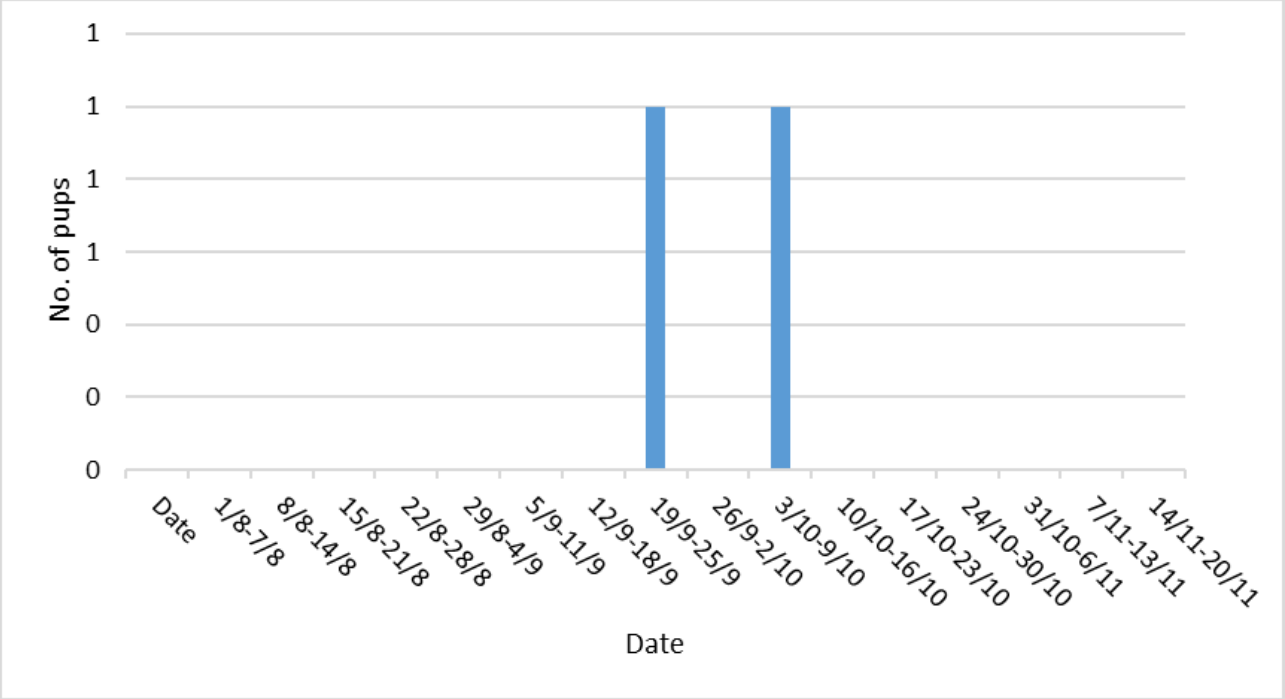


Figure 39 Weekly seal pup births at The Basin in 2022



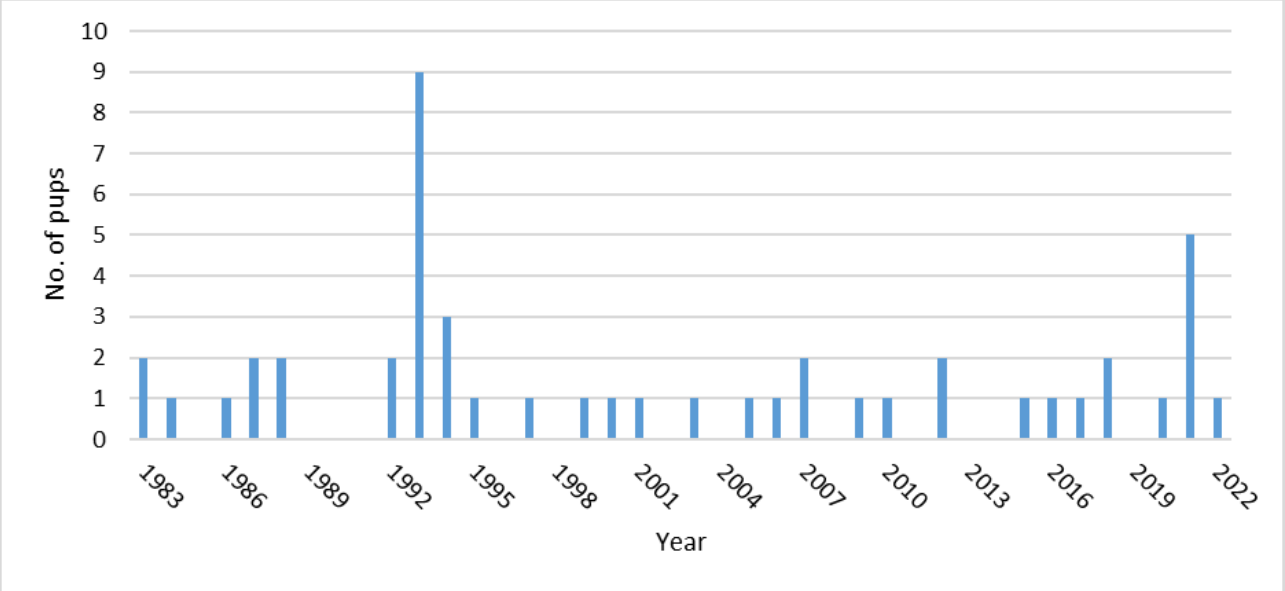
4.4.16 Pigstone Bay

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 by following the edge of the bay and making one's way along a grassy slope to the start of the rocky slabs.

In 2022 one pup was born at Pigstone Bay in week 37 which survived to weaning.

Figure 40 Number of seal pups born at Pigstone Bay in 1984-2022



4.4.17 Garland Stone

No pups were born at the Garland Stone in 2022. Single pups were born at this site in 2015, 2007 and in 2001.

4.4.18 Mew Stone

No pups were born at the Mew Stone in 2022. This site was possibly 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 born at the Robert's Wick in 2022. Robert's Wick was possibly used once as a pupping site in 2001 and one pup was born on rocks behind Thorn Rock, west of Robert's Wick in 2021.

4.4.20 Tom's House

No pups were observed at Tom's House in 2022. 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 2022. The last time the site was used was in 2018.

4.5 Movements

During 2022 there were few movements of pups, possibly due to the early pupping peak which coincided with generally more settled weather. 18 pups were observed moving between adjacent beaches, for example from North Haven main beach to North Haven slip beach or from Matthew's Wick to Amy's Reach. Only one pup spent the majority of its time before weaning on a different, albeit close by, beach. It moved from South Haven to Driftwood Bay. In a lot of cases pups move back to their original beach after a few days.

The longest movement was done by a white coated wanderer. It appeared on North Haven slip beach on 4/10/22, spent three days there, and then moved to The Wick.

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.

4.6 Wanderers

Seven pups were recorded as wanderers. Wanderers are pups which turn up unaccompanied by a cow, 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.

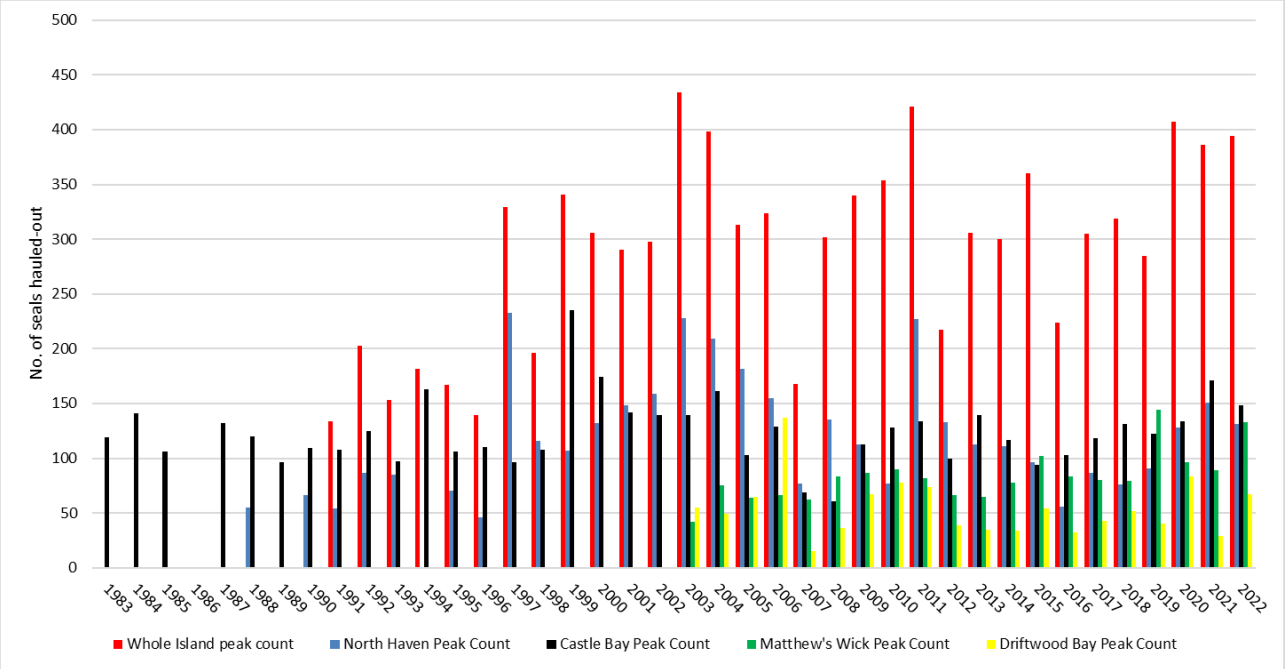
4.7 Haul-outs

In 2022 the maximum haul-out (on the main haul-out sites of North Haven, Driftwood Bay, Castle Bay and Matthew's Wick) of 388 seals (ten more than in 2021) was recorded on 12/11/22; one day earlier than in the previous year.

The average maximum haul-out for the previous ten years (2012-2021) is 311, therefore the peak number of seals using Skomer to haul-out in 2022 was above the ten-year average.

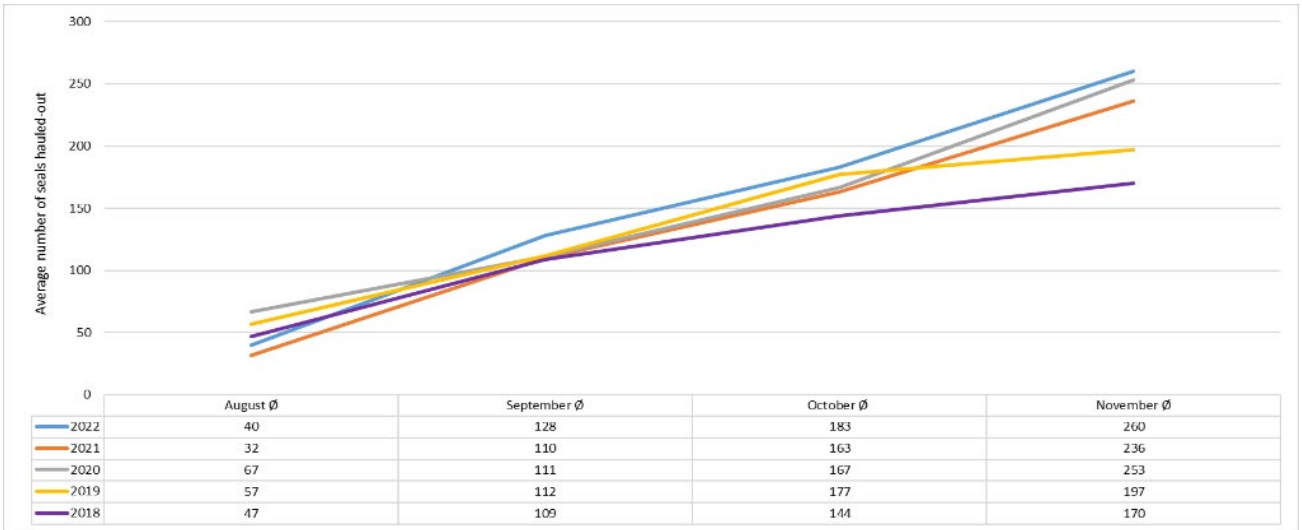
In 2022 North Haven and Driftwood Bay had their peak haul-out counts on 13/11/22 (131 and 67 respectively), Matthew's Wick on 9/11/22 (133) and Castle Bay on 18/10/22 and 4/11/22 (148).

Figure 41 Peak haul-out counts on Skomer Island 1983-2022



As in previous years attempts were 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.

Figure 42 Average number of seals using Skomer per month 2018-2022



	August Ø	September Ø	October Ø	November Ø
2022	40	128	183	260
2021	32	110	163	236
2020	67	111	167	253
2019	57	112	177	197
2018	47	109	144	170

The number of hauled-out animals during the entire observation period was similar to that of 2021. The trend line 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 2022, Castle Bay was again the most popular haul-out site with an average daily haul-out of 66 seals. Also, as with the previous year, the second most popular beach was North Haven (including Rye Rocks and North Haven Slip) with an average daily haul-out of 36 individuals. Matthew's Wick was the third most important haul-out site with a daily average of 29 seals and Driftwood Bay the next most important with an average of 13 seals.

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 conditions impact the haul-outs was especially visible when looking at the numbers at the Garland Stone and Rye Rocks (which are very exposed) throughout the monitoring period with many consecutive days of no seals due to strong winds and big swells.

Figure 43 Average haul-out at the main haul-out sites per week in 2022

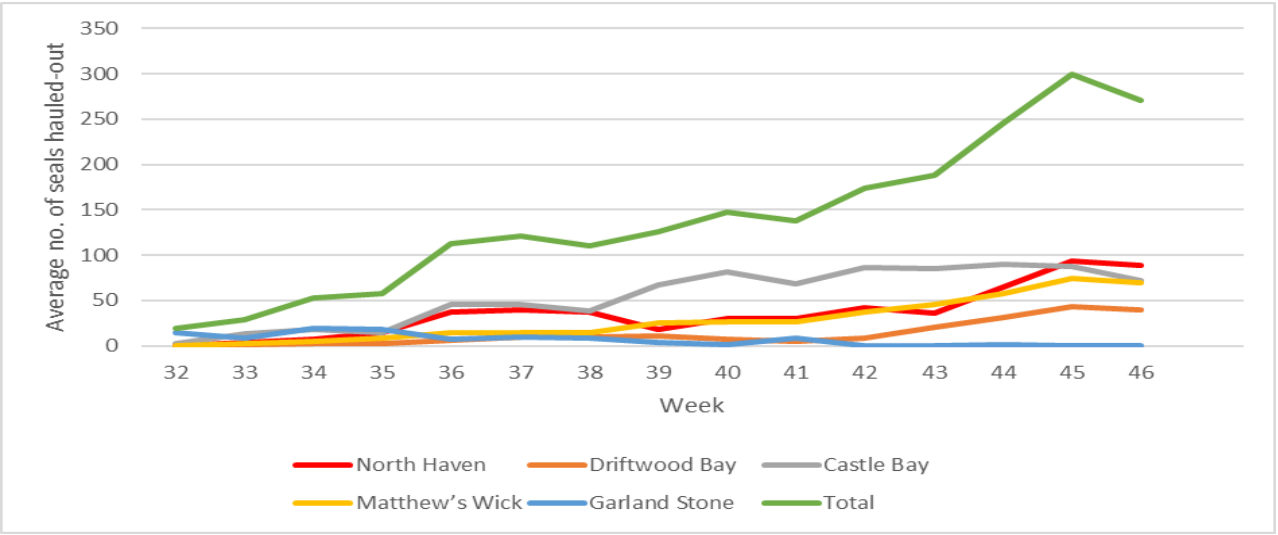


Figure 44 North Haven haul-out in 2022

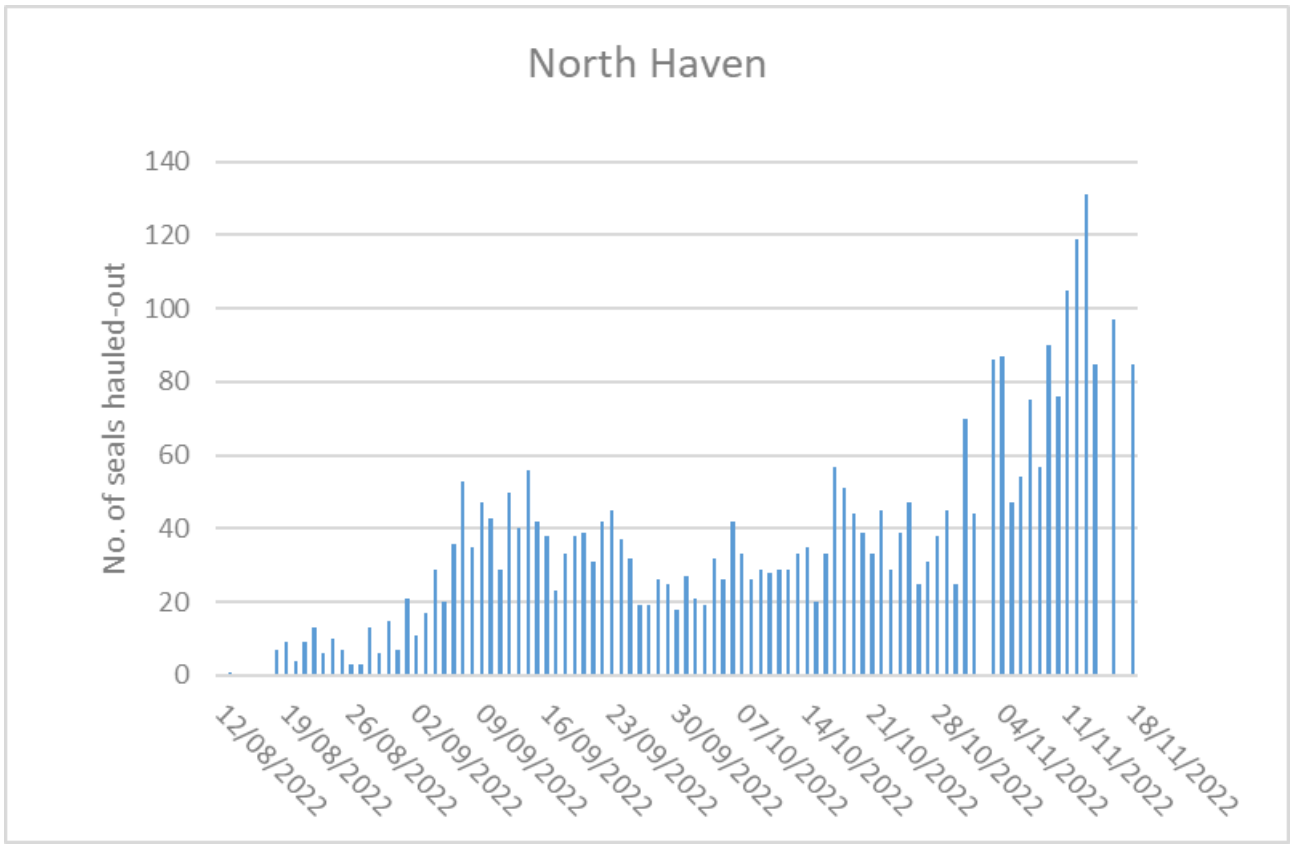


Figure 45 Castle Bay haul-out in 2022

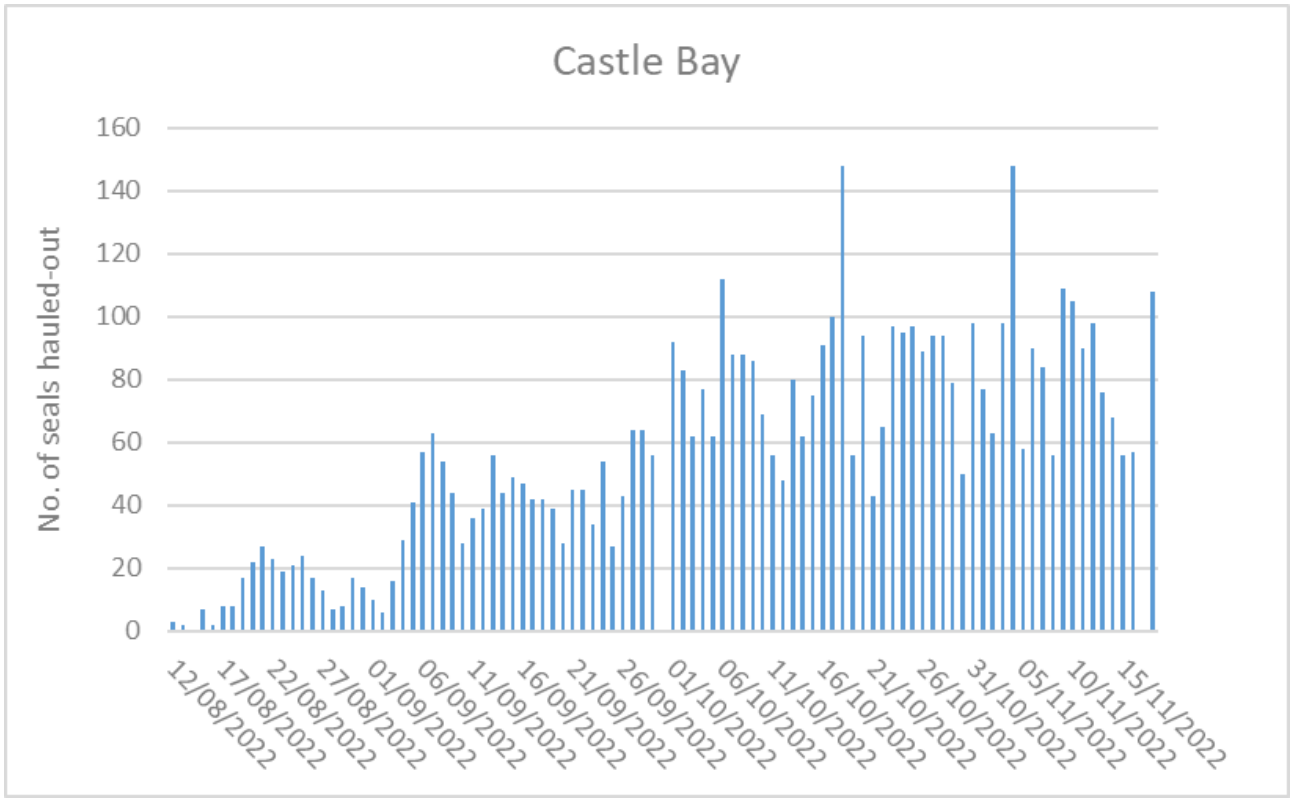


Figure 46 Driftwood Bay haul-out in 2022

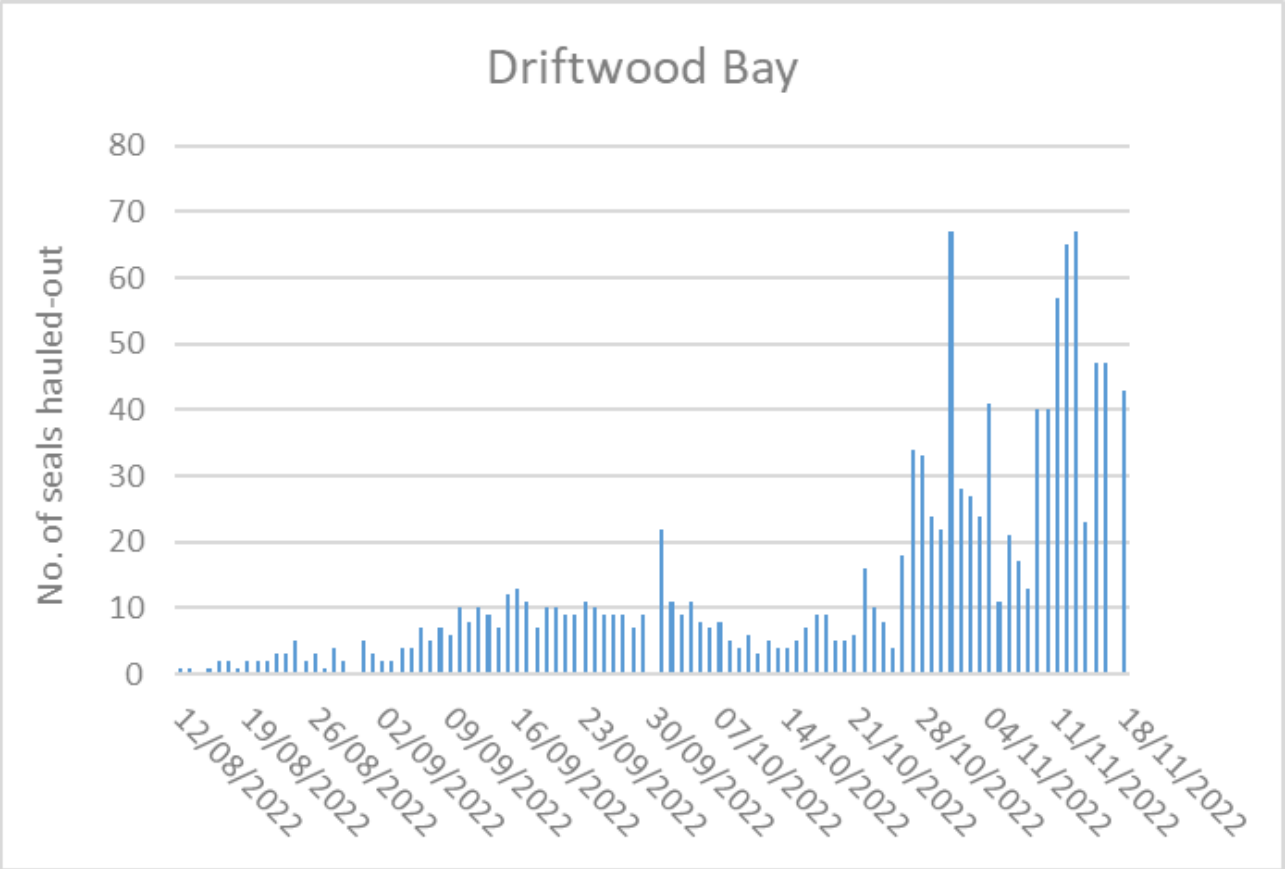


Figure 47 Matthew's Wick haul-out in 2022

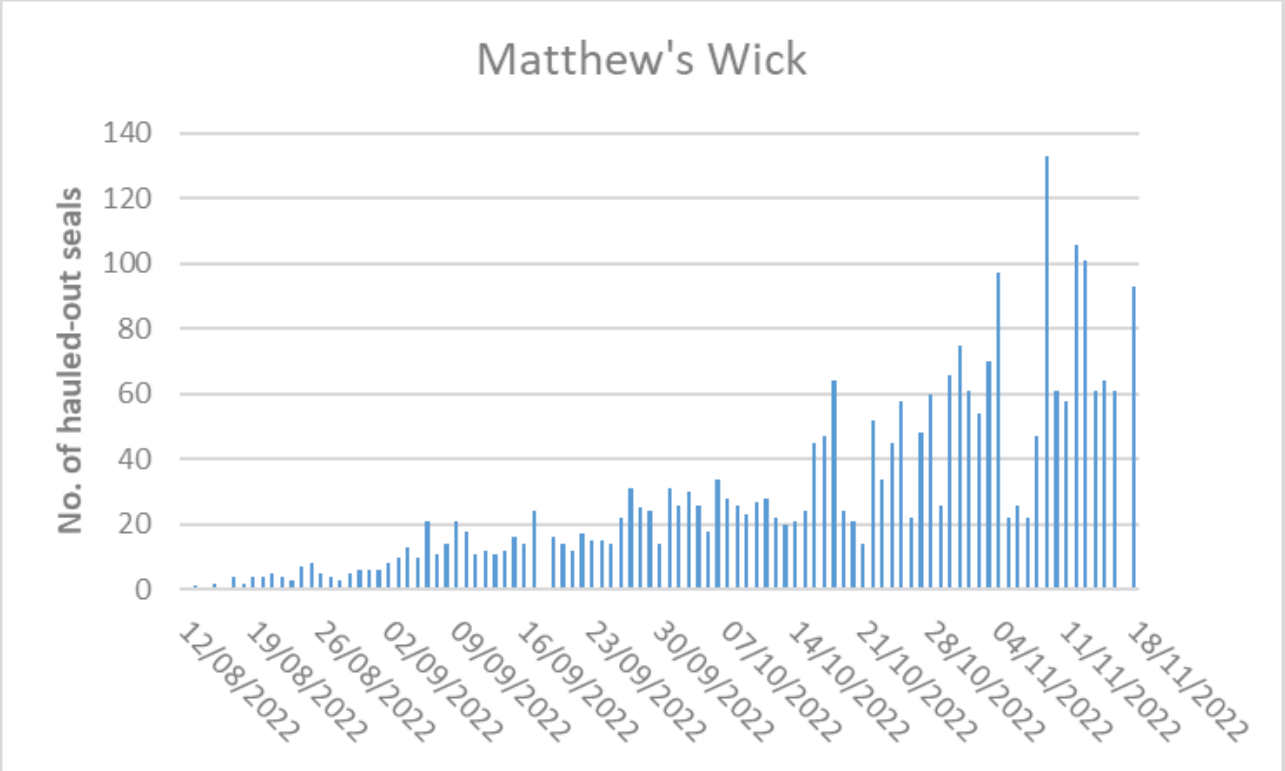


Figure 48 Garland Stone haul-out in 2022

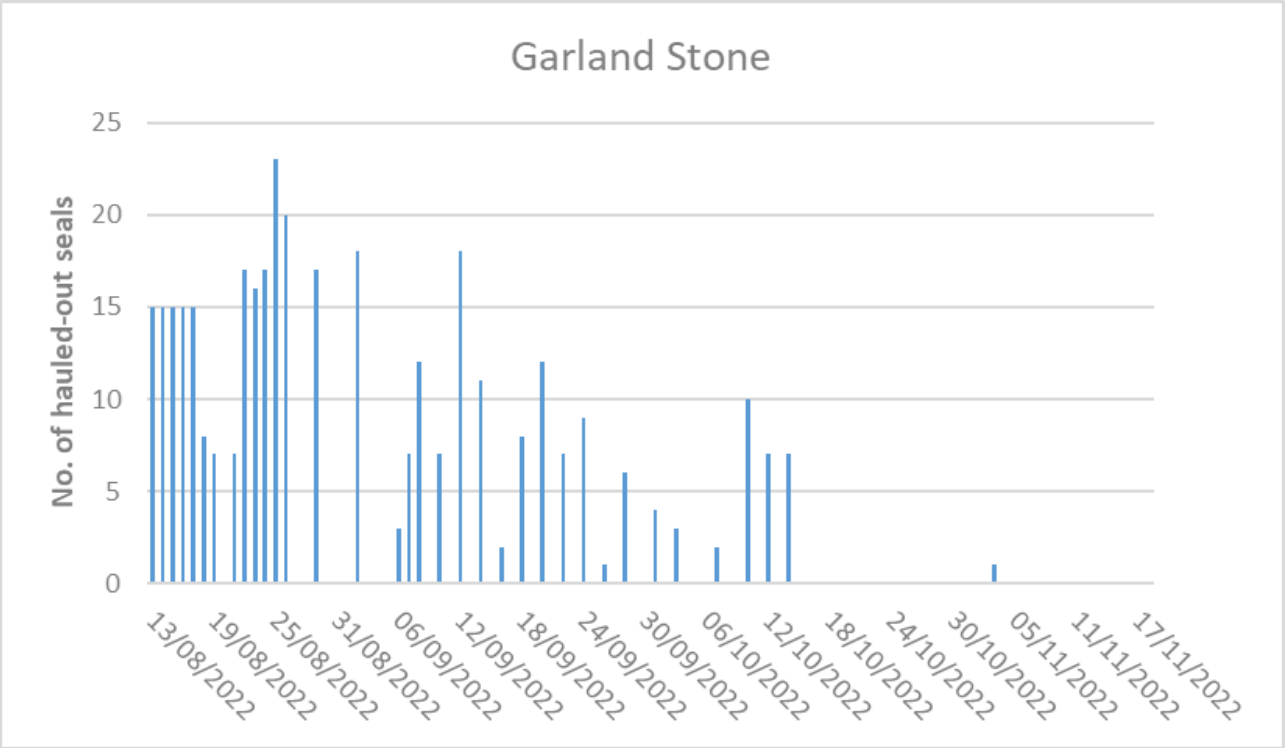
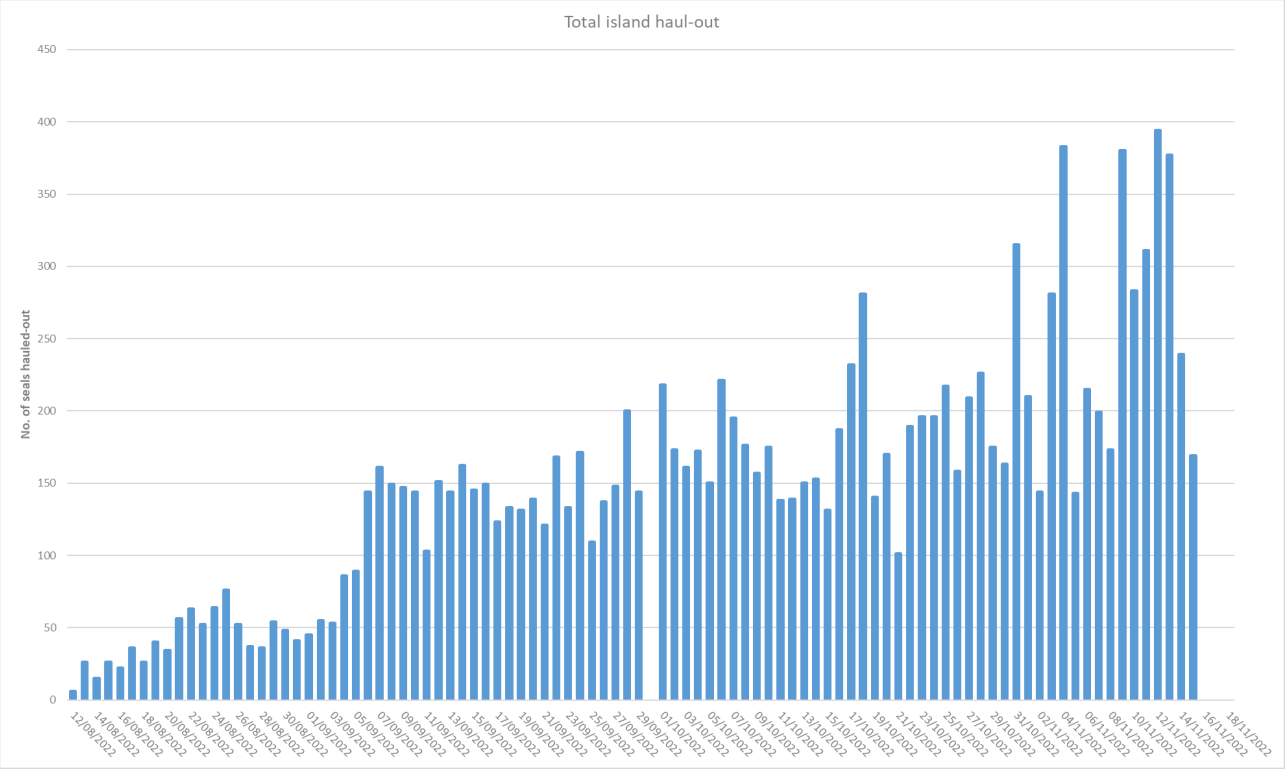


Figure 49 Total island haul-out counts in 2022



4.8 Pollution

4.8.1 Netting

Monofilament line and netting were the most obvious pollutants affecting seals in 2022. 41 individual seals, (34 cows, two males and five immatures) 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 2021 a similar number of seals (40) with scars from netting were observed, in contrast to only 16 in 2020.

It is believed that the accuracy of monitoring and identifying netted seals depends heavily on observer effort and experience – the observers in 2021 and 2022 were the same which might explain the similar numbers of netted seals observed. Photographing netted seals also relies very much on good weather so will vary from year to year. Some seals might get counted twice as it is not always possible to photograph both sides of a seal during one session. If the same seal gets photographed the next day from the other side it might not be possible to match the animal, hence the seal will be counted again.

In 2022 all netted seals were photographed and identified to establish how many individuals showed signs of entanglement. Additionally, to increase accuracy and comparability a more systematic approach to monitoring netted seals, was applied. When time allowed all seals hauled-out on North Haven beach and Castle Bay, which were fully visible, were counted and a second count done for netted animals. This way a percentage of netted seals was calculated which does not rely on identifying individual animals.

This figure together with the results of the photographic survey can now be used as a base-line in coming years.

Between August and November 2023 an average of 3% of the hauled out seals were observed with signs of entanglement. The percentage of entangled seals fluctuated from day to day reaching a maximum of 7%.

The authors suggest to abandon the photographic monitoring of netted seals due to its restrictions and instead conduct the “netted seals’-count”. However, photographing seals with scars from entanglement and comparing/adding them to the seal identification catalogue should continue.

In 2022 the ‘netted’ bull NK-068 was known from 2012, three ‘netted’ immatures and 16 cows were known from previous years, the oldest being BK-054 which was first seen in 2009.

4.8.2 Oil/Tar

Skomer’s beaches remain relatively clean, no pollution by oil or tar was observed in 2022.

4.8.3 Plastic

A beach clean was conducted on South Haven beach, Drifwood Bay and the Wick by NRW’s Skomer MCZ team and The Wildlife Trust’s Skomer Island Wardens and volunteers in August 2022.

Figure 50 Beach clean on South Haven beach (R) and The Wick (L)

Photos Skomer MCZ staff

The beach clean was a complete success and a large amount of litter was removed from the beaches including over 20 intact buoys, numerous damaged boys, 2 lobster pots, 3 plastic fishing crates, 3m^3 of rope and line, over 20 bags of of insulating foam, a metal sheet, 10 bags of plastic bottles and hard plastics.

4.9 Disturbance

In 2022 one significant disturbance, which involved a large number of seals, and six smaller incidents were recorded and boats were regularly observed within the voluntary no access zone. For more information about boats entering the voluntary no access zone see Appendix 3.

On 18/09/22 a dinghy was launched from a yacht anchoring in South Haven and two people made their way around South Castle. The dinghy was seen going with speed into Amy's Reach with seals splashing out of the way, then the boat entered Matthew's Wick, blocking the narrow exit and panicking the seals which were hauled-out on the beach. The seal fieldworker finally managed to get the boater's attention after which they returned to their yacht.

Table 22 Seal disturbance (records made internally) on Skomer Island in 2022

Date	Time	Location	Type	Severity	Comment
16/08/22	12:00	SHV	yacht	2	went with dinghy up to the SBS where newly born pup was calling, cow went into water
16/08/22	13:18	SHV	yacht	1	anchor noise made cow look up
24/08/22	13:00	NHV	RIB	2	dropping off/collecting divers close to RR, seals entering the water
28/08/22	13:00	NHV	motorboat	1	seals on RR lift heads due to PA system
12/09/22	14:20	NHV	fishing boat	2	went past RR, seals entering water
18/09/22	17:30	MWK	dinghy	2	went into AMR and MWK, seals entering water
20/10/22	08:58	NHV	helicopter	1-2	flew 4 times past NHV between 8:58 and 10:13h, some seals rushing towards water but not entering

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

4.10 Behaviour

In 2022, as in most years, allo-suckling (females nursing others' young) was observed. Arso Civil *et al*. states that this is widespread in pinnipeds, particularly among true seals. Given the high costs of lactation in pinnipeds, allo-suckling is a puzzling behaviour. Females were observed fighting over pups and suckling not only their own pups but others at the same time.

The cow 16.SC-US-117.SHV, which is unable to lactate due to a large scar on the belly and whose own pup had died, tried to abduct pup 214 from cow 15.SC-LS-189.SHV. 16.SC-US-117.SHV defended the pup ferociously against what was assumed to be its biological parent and the pup tried to suckle unsuccessfully. However, after two days the pup was back with 15.SC-LS-189.SHV.

Figure 51 16.SC-US-117.SHV (right) and 15.SC-LS-189.SHV (left) fighting over a pup

Figure 52 Pup 214 trying to suckle on 16.SC-US-117.SHV

4.11 Disease

In 2022, 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 number of young seals die within weeks of being weaned.

Some eye infections were noted in 2022. It seems to mostly affect pups on Matthew's Wick and also some at the Wick. A possible explanation for this is the fact that Matthew's Wick only gets flooded during spring tides and 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. 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.

Highly Pathogenic Avian Influenza (HPAI) H5N1 was a great concern in 2022, especially as infected Gannets from the nearby island of Grassholm were washing up dead on Skomer's beaches. Avian Influenza Viruses (AIVs) have long been recognised in Europe, where there is longstanding annual surveillance for poultry and wild bird infections. Whilst there is no routine surveillance for diseases, including AIV, specifically in marine mammals in the UK, sporadic findings of AIV jumping in to seals has been reported (UK Health Security Agency, 2022). Furthermore, in July 2022 seal strandings were recorded along the coasts of Maine, USA and samples from both Harbour and Grey Seals tested positive for HPAI (NOOA, 2022). Fortunately there was no indication of an HPAI outbreak among the seals pupping or hauling-out on Skomer in 2022.

4.12 Identification of individual seals

For the 17th consecutive year photographic monitoring of adult seals was conducted in 2022. The old method of making 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 consequently developed the Wales Seal Photo ID database called EIRPHOT. Photos of seals were entered using head and neck profiles and standardised patches of pelage patterns were extracted and matched within the database. In 2014 NRW workers and trained volunteers were contracted to enter seal photos into this database and by March 2015 all existing Pembrokeshire photos (2007 to 2014) had been uploaded. Photos in the following years were stored ready for entering, but in 2019 the decision was made not to continue with the Wales Seal Photo ID database.

Identifying scarred male and female seals continued in 2022 and distinctively marked/scarred seals were photographed and checked against the Skomer seal catalogue.174 seals with scars or tags were photographed in 2022, of which 64 (60 cows, one immature and three bulls) were re-identified from previous photos.

The oldest returning cows were HD-014 and LBK-007. HD-014 was rescued from Penberth, Cornwall and treated for an ulcerated left eye in February 2002. From 2010 until 2012 she was seen annually, once pregnant, but she was never observed actually pupping on Skomer. She was observed in 2021 and again in 2022. Like last year she was hauled-out on Matthew's Wick but did not pup on Skomer.

LBK-007 was seen for the first time on Castle Bay in 2002. In 2005 and 2006 she was seen on Castle Bay again and in 2007 she pupped for the first time on Skomer. Since then, she has been observed several times more, hauled-out and with a pup. She was observed again in 2017 and then in 2022.

The oldest bull to have returned to Skomer in 2022 was 15.SB-LBK-002.NHV. He was seen for the first time on North Haven and on Castle Bay beach in 2015, then again in North Haven in 2019 and 2020. In 2022 he was hauled-out on North Haven beach on 24/9/22.

Table 23 Year of first sighting of seals seen on Skomer Island in 2022

Year first observed	No. of seals seen in 2022 known from previous years
2002	2
2006	1
2008	2
2009	1
2010	1
2011	1
2012	3
2013	4
2014	10
2015	4
2016	4
2017	5
2018	2
2019	2
2020	5
2021	17
TOTAL	64

4.12.1 Seals from elsewhere seen on Skomer

Every year some tagged seals, usually around three to four, are recorded on Skomer. Last year seven different individuals were seen and in 2022 eight seals with flipper tags were observed. The cause of this increase in sightings of tagged seals is unknown, but is possibly a combination of more seals getting rehabilitated and tagged and observer effort. In 2022 three tagged seals were known from previous years. Oregano (red tag 80494) was found at Perranporth and admitted to West Hatch, via BDMLR on 2/12/20. He was

underweighti with minor wounds, weighing only 16.33kg on admission. He was released at Combe Martin on 6/4/21 weighing 40kg. On 22/10/21 he was spotted on Amy's Reach and on 2/11 and on 3/11/22 he hauled-out on Matthews Wick.

Figure 53 Oregano on Matthew's Wick on 2/11/22

The second seal (20.SC.BK.001.CBY) which is known from previous years has a red tag but so far it has not been possible to read the number, hence detailed information of its origin is lacking. It was seen hauled-out on Castle Bay on 26/9/20 and throughout September and October 2022

The third tagged seal BK-066 alias Bagshot, is a regular on Skomer's beaches. This cow has a blue flipper tag which is very worn and the number is not visible any more. However, the seal's scars from netting are so distinctive that this cow can easily be identified. On 11/2/10, as a yearling, she was she was taken in to care by the National Seal Sanctuary, Gweek, due to entanglement in netting. Since then, she has been observed around Skomer in most years and in 2017 she had a pup on North Haven beach. In 2022 she was seen in October and November on Castle Bay, Matthew's Wick and North Haven beach. Unfortunately, the injuries from entanglement are still not fully healed and the cow is often seen with gaping raw gashes where the scars have burst open again.

Figure 54 Bagshot at the National Seal Sanctuary February 2010

Figure 55 Bagshot on Castle Bay on 23/10/22

Two tagged seals remain unidentified as it was not possible to read the writing.Another seal with a white flipper tag with the number 57 also remains a mystery as none of the seal rescue centres were able to trace this animal. It seems that the seal tagging projects would profit from an international platform similar to the bird colour ringing page https://cr-birding.org to coordinate colour schemes and to allow observers to trace animals.

Table 24 Tagged seals on Skomer in 2022

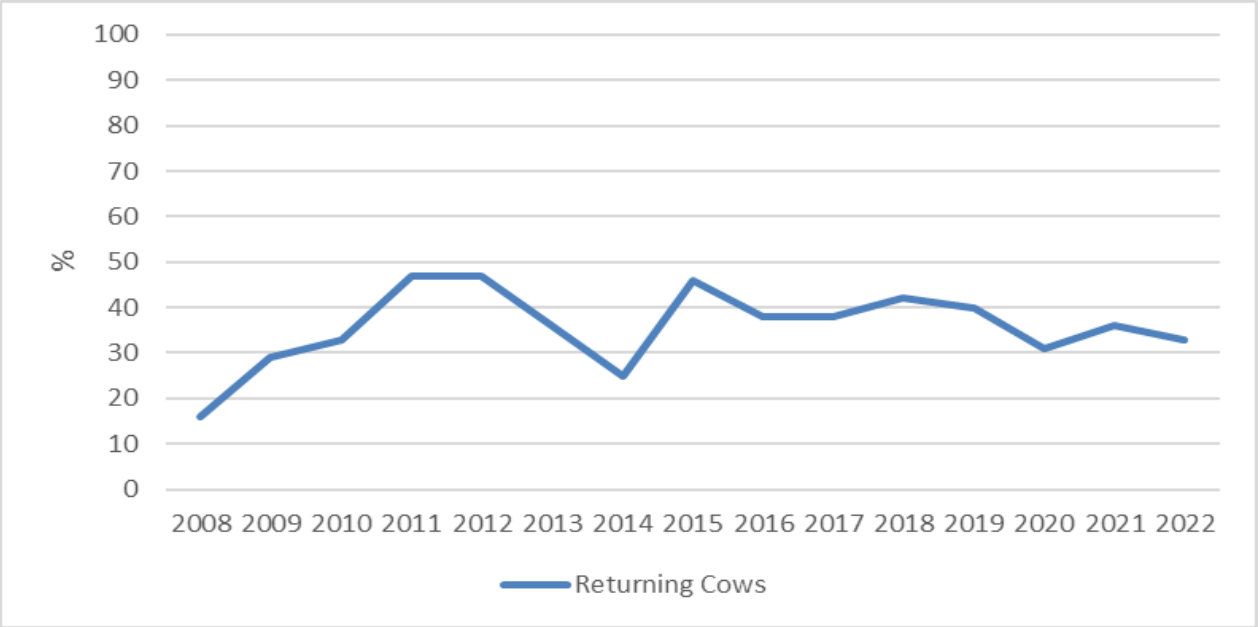
Skomer name	Tag	Name	Sex	Beach
BK-066	blue 39	Bagshot	female	CBY
20.SC.BK.001.CBY	orange?	?	female	CBY
22.SB.TAG.001.MWK	blue?	?	male	MWK
22.SC.TAG.SL142.CBY	green SL142	Falafel	female	CBY
21.SI.TAG.80494.AMR	red 80494	Oregano	male	AMR
22.SI.TAG.001.NHV	blue?	?	?	NHV(S)
22.SI.TAG.75.DWB	white 75	?	?	DWB
22.SI.TAG.SL140.NHV	white SL140	Moon Jelly	female	NHV

4.12.2 Breeding Cows Returning in 2022

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 a 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 255 cows which pupped on Skomer in 2022, 46 had scars. 21 of the scarred cows were identified, hence 33% of identifiable breeding cows were returning cows. The average percentage of returning cows from the previous ten years (2012-2021) is 38% and annual variation is possibly the result of a combination of factors such as unknown dynamics in the seal population, different photographic equipment, observer skill, time availability and weather conditions.

Figure 56 Percentage of returning and new pupping cows on Skomer Island 2008-2022



Note: Change in methodology, only scarred seals identified by eye since 2014

The oldest breeding female was LBK-017 who pupped for the fourth time on Skomer in 2022. The first time she was recorded she had a pup on Matthew's Wick in 2006. Since then, she has been seen every three to four years.

4.12.3 Site fidelity

Seven cows bred in 2022 and in 2021. Of these, four bred on the same beaches as in the previous year. One cow, 16.SC-US-117.SHV, has pupped on North Haven beach every year since 2020. As this female is not able to feed her pups due to a large scar on her belly, her pups always die.

13.SC-BK-037.MWK bred between 2013 and 2022 six times on Matthew's Wick. LBK-074 was observed with a pup on Matthew's Wick for the first time in 2012. Since then, she bred another three times on Matthew's Wick.

14.SC-LBK-033.SHV(c) has been site faithful since 2014, when she started pupping on Skomer. She bred on South Haven not only in 2022 but also in 2014 and 2016.

14.SC.BK.160.DWB chooses to raise her pup on Driftwood Bay and has bred on this site four times since 2014.

17.SC-LBK-301.MWK and 18.SC-NK-060.SHV both bred twice on Skomer, on Matthew's Wick and South Haven respectively.

Matthew's Wick seems to be a popular site and females choose to breed on there repeatedly. There are some cows which show preferences for certain beaches whereas some animals are less site faithful and switch between sites, possibly influenced by weather conditions and competition. Cows use different sites on Skomer but also migrate to other beaches within the Skomer MCZ or travel even further afield.

4.12.4 Pupping Date

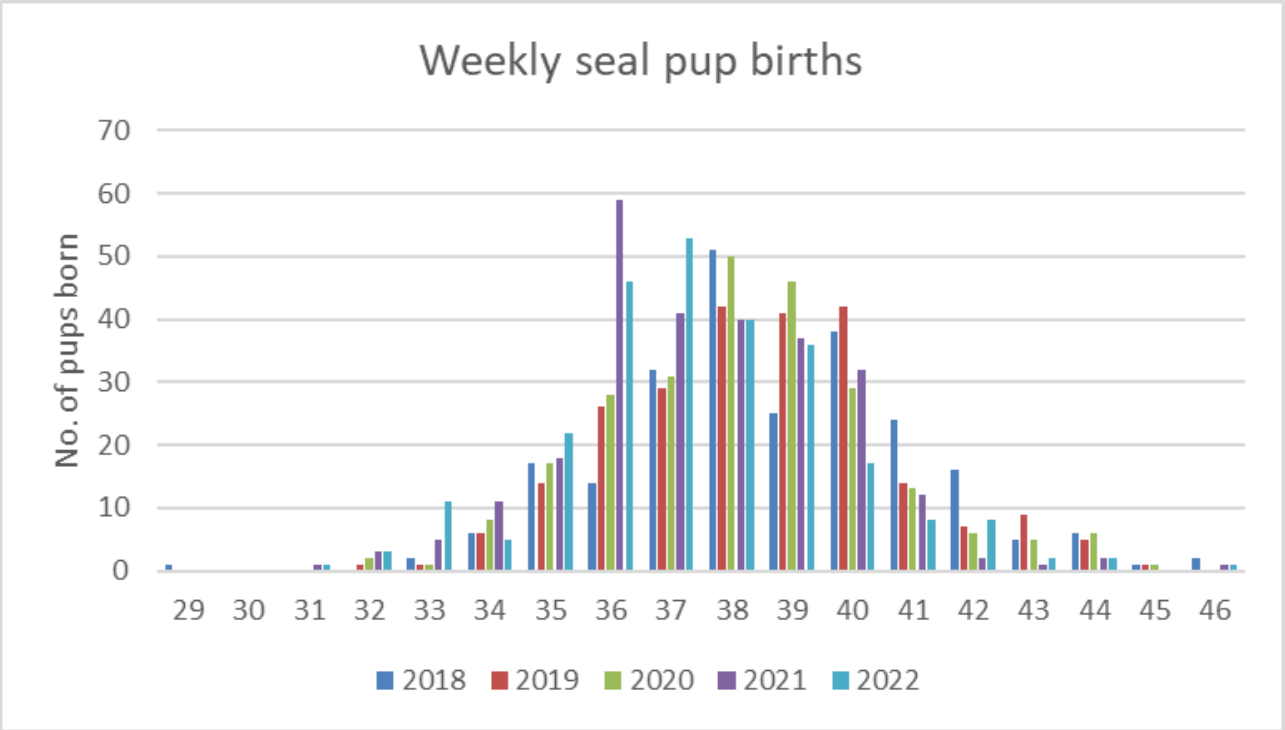
Due to the small sample size and the fact that only seven returning cows pupped in consecutive years it is difficult to make an accurate statement about the general timing of breeding just by looking at the pupping data of these seven seals. Furthermore, recording the exact day of birth for each pup becomes more and more difficult the busier the pupping season gets, hence some of the dates are estimates.

However, when looking at all pupping seals and not at the individual it is clear that 2022 was an early pupping season, albeit not as early as in 2021, see figure 57.

Table 25 Pupping date of returning cows which were seen in the years 2019-2022

Cow	**2019**	**2020**	**2021**	**2022**	**pupping date change 2020/2021**	**pupping date change 2021/2022**
13.SC-BK-037.MWK	not seen	23/8/20	not seen	18/8/22	n/a	n/a
14.SC-LS-058.NHV	19/9/19	not seen	not seen	12/9/22	n/a	n/a
16.SC-BK-177.MWK	4/10/18	not seen	29/9/20	11/10/22	n/a	+12
16.SC-RS-193.SHV	12/10/19	not seen	4/10/21	3/10/22	n/a	-1
16.SC-US-117.SHV	not seen	29/9/20	11/10/21	2/10/22	+12	-9
21.SC.LS.301.NHV	not seen	not seen	25/8/21	30/8/22	n/a	+5
21.SC.NK.009.CBY	not seen	not seen	24/8/21	29/8/22	n/a	+5
21.SC.RS.202.DWB	not seen	not seen	30/9/21	30/9/22	n/a	0
21.SC.RS.208.MWK	not seen	not seen	2/10/21	1/10/22	n/a	-1
LBK-074	25/9/19	not seen	25/9/21	25/9/22	n/a	0

Figure 57 Weekly seal births 2018-2022



4.13 Further Research

There was no additional research conducted on the island in 2022.

Acknowledgements

Many thanks to Natural Resources Wales who funded this project in 2022.

A big thank you goes the Skomer team: Leighton Newman, Beth Thompson, Ceris Aston, Anna Weir and Lira Valencia for helping with the seal monitoring. Lisa Morgan, Kate Lock and Mark Burton for project support and advice; Eddie Stubbings for proof-reading the report and assisting. Also everyone from the 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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Appendices

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
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

Appendix 3 Boats and kayaks in voluntary no access zone

Date	Time	Location	Type of boat	notes
12/8/02	14:00:00	SHV	kayak	close to SBS
12/8/02	14:00:00	SHV	kayak	close to SBS
12/8/02	14:00:00	SHV	yacht	
12/8/02	14:00:00	SHV	motorboat	
12/8/02	14:00:00	SHV	motorboat	
12/8/02	14:00:00	SHV	RIB	
12/8/02	14:00:00	SHV	RIB	
12/8/02	15:00:00	CBY	kayak	close to CBY
12/8/02	15:00:00	CBY	kayak	close to CBY
15/8/22	15:47:00	SHV	yacht	
15/8/22	17:00:00	SHV	yacht	
16/8/22	9:00:00	SHV	yacht	
16/8/22	12:00:00	SHV	yacht	went with dinghy up to the SBS where newly born pup was calling, cow went into water
16/8/22	13:18:00	SHV	yacht	anchor noise made cow look up
21/8/22	7:30:00	NHV	yacht	anchored overnight
22/8/22	8:00:00	NHV	yacht	anchored overnight
24/8/22	11:00:00	NHV	yacht	on buoy
24/8/22	13:00:00	NHV	motorboat	on buoy
24/8/22	13:00:00	NHV	RIB	dropping off/collecting divers close to Rye Rocks, disturbed haul-out
25/8/22	8:40:00	SHV	yacht	anchored
25/8/22	8:40:00	SHV	yacht	anchored
25/8/22	8:40:00	NHV	yacht	on buoy
26/8/22	8:00:00	NHV	yacht	on buoy
26/8/22	8:00:00	NHV	yacht	on buoy
26/8/22	8:00:00	NHV	yacht	on buoy
26/8/22	9:30:00	NHV	lobster potter	retrieving pots
26/8/22	9:30:00	North Castle	lobster potter	retrieving pots
26/8/22	12:20:00	SHV	motorboat	dropping off snorkelers

Date	Time	Location	Type of boat	notes
26/8/22	12:20:00	SHV	snorkelers	snorkelling very close to SBS where two pups are
27/8/22	11:40:00	SHV	yacht	anchored in front of SBS
27/8/22	11:40:00	SHV	yacht	anchored in front of SBS
28/8/22	8:00:00	SHV	yacht	anchored overnight
28/8/22	8:00:00	SHV	yacht	anchored overnight
28/8/22	8:00:00	SHV	motorboat	anchored overnight
28/8/22	8:00:00	NHV	yacht	on buoy overnight
28/8/22	13:00:00	NHV	RIB	diving
28/8/22	13:00:00	NHV	yacht	on buoy
28/8/22	13:00:00	NHV	motorboat	on buoy
28/8/22	13:00:00	NHV	motorboat	
28/8/22	13:00:00	NHV	motorboat	seals on RR lifted heads due to PA
28/8/22	13:30:00	NHV	motorboat	
28/8/22	13:30:00	SHV	RIB	very close to SHV beach
28/8/22	13:30:00	SHV	RIB	very close to SHV beach
29/8/22	14:30:00	CBY	RIB	
29/8/22	14:30:00	CBY	motorboat	diving
30/8/22	14:30:00	SHV	yacht	
30/8/22	14:30:00	SHV	yacht	
30/8/22	14:30:00	SHV	yacht	
30/8/22	14:30:00	SHV	yacht	very close to SBS
30/8/22	16:00:00	SHV	dinghy	from one of the yachts, paddling around SHV
31/8/22	15:30:00	SHV	motorboat	very close to SHV beach, watching seals
1/9/22	14:00:00	NHV	motorboat	diving around Rye Rocks
1/9/22	15:30:00	SHV	yacht	
1/9/22	17:30:00	SHV	yacht	
1/9/22	17:30:00	SHV	motorboat	
10/9/22	12:20:00	SHV	motorboat	
10/9/22	12:20:00	NHV	yacht	on buoy
11/9/22	7:00:00	NHV	yacht	on buoy
12/9/22	14:20:00	NHV	fishing boat	went past RR too close and put seals in water
13/9/22	14:50:00	SHV	yacht	
14/9/22	9:10:00	SHV	yacht	
14/9/22	11:00:00	NHV	fishing boat	potting in NHV
14/9/22	14:00:00	SHV	yacht	
17/9/22	15:00:00	SHV	yacht	
17/9/22	15:00:00	SHV	yacht	
17/9/22	16:00:00	SHV	motorboat	very close to SHV beach, no disturbance observed
18/9/22	8:38:00	SHV	fishing boat	retrieving pots

Date	Time	Location	Type of boat	notes
18/9/22	11:40:00	NHV	fishing boat	retrieving pots
18/9/22	11:43:00	NHV	motorboat	
18/9/22	17:00:00	SHV	yacht	anchored
18/9/22	17:00:00	SHV	yacht	anchored
18/9/22	17:00:00	SHV	yacht	anchored
18/9/22	17:30:00	MWK	dinghy	went into AMR and MWK, pos also entered into CBY as seals in water, disturbed all seals at MWK and nearly ran one over as it swam out
19/9/22	7:00:00	SHV	yacht	anchored
19/9/22	7:00:00	SHV	yacht	anchored
19/9/22	7:00:00	SHV	yacht	anchored
19/9/22	10:30:00	NHV	motorboat	on mooring
20/9/22	8:40:00	SHV	yacht	anchored
20/9/22	8:40:00	SHV	yacht	anchored
20/9/22	8:40:00	NHV	yacht	on mooring
21/9/22	9:00:00	NHV	yacht	on mooring
21/9/22	11:10:00	NHV	yacht	on mooring
24/9/22	13:00:00	SHV	yacht	anchored
24/9/22	13:00:00	SHV	yacht	anchored
24/9/22	13:00:00	SHV	yacht	anchored
24/9/22	13:15:00	SHV	yacht	anchored
28/9/22	15:00:00	SHV	yacht	close to SHV, watching seals
3/10/22	8:48:00	NHV	motorboat	lobster potting
3/10/22	9:24:00	NHV	motorboat	lobster potting
8/10/22	9:30:00	NHV	motorboat	lobster potting
9/10/22	7:00:00	NHV	yacht	on mooring

Data Archive Appendix

Data outputs associated with this project are archived in [NRW to enter relevant corporate store and / or reference numbers] on server–based storage at Natural Resources Wales.

Or

No data outputs were produced as part of this project.

The data archive contains: [Delete and / or add to A-E as appropriate. A full list of data layers can be documented if required]

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] A full set of maps produced in JPEG format.

[C] A series of GIS layers on which the maps in the report are based with a series of word documents detailing the data processing and structure of the GIS layers

[D] A set of raster files in ESRI and ASCII grid formats.

[E] A database named [name] in Microsoft Access 2000 format with metadata described in a Microsoft Word document [name.doc].

[F] A full set of images produced in [jpg/tiff] format.

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue https://libcat.naturalresources.wales (English Version) and https://catllyfr.cyfoethnaturiol.cymru (Welsh Version) by searching 'Dataset Titles'. The metadata is held as record no [NRW to insert this number]

Further copies of this report are available from library@cyfoethnaturiolcymru.gov.uk