Protecting *Manx Wildlife*
for the future

Calf of Man Seal Surveys

Autumn Report 2017

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1. Introduction

The grey seal (*Halichoerus grypus*) is widely distributed throughout UK waters, with an estimated population size of 97,000–159,000 individuals in this area, equating to 39% of the global population (JNCC, 2007). Within the Irish Sea, where 5,000–7,000 individuals reside, the Isle of Man is an important haul-out site, providing ample coastline for resting and plentiful foraging opportunities (Stone et al., 2013). Important haul-out sites include The Sound, Langness, Maughold Head and the Calf of Man (Stone et al., 2013). The Calf of Man in particular, is a notable haul-out and pupping site (Barne et al., 1996), frequented by seals annually (Crow, 2013).

1.1 Study site

The Calf of Man (hereafter referred to as 'the Calf') is a largely-uninhabited islet off the south coast of the Isle of Man. The Calf boasts a diversity of habitats and species-rich communities, perhaps due to the presence of both exposed and sheltered areas (Barne et al., 1996). Grey seals inhabit both beaches and rocky inlets, that provide ideal conditions for hauling out and parturition (Crow, 2013). Although seals may use haul-out sites year-round, pupping season occurs in the autumn, typically between September and November (Stone et al., 2013).

1.2 Aims and objectives

1. Produce a grey seal pup census for the Calf; recording pup name, date of birth, mother ID and progression through developmental stages. Furthermore, pup location will be recorded in order to map pup distribution and determine relative popularity of sites.

2. Obtain photographic identification profiles of observed individuals to compare with the historical ID database, in order to determine whether individuals sighted previously, return to the Calf and particular sites in 2017.

2. Methods

Calf observation-based seal surveys have been conducted annually since 2009. The present survey was undertaken over a seven-week period from 17/09/2017 to 05/11/2017. The entirety of the Calf was surveyed, including 15 main sites where seals have been known to haul-out in the past (**Figure 1**). The sites were divided into the northern route (Bay Fine to The Cletts and all sites in-between) and the southern route (Ghaw Lang to South Harbour and all sites in-between). The following volunteers/staff were involved in conducting the seal surveys: James Wylor-Owen (six weeks), Hayden Bridgeman (six weeks) and Mike Prior. This year two volunteers (James and Hayden) were responsible for conducting the surveys with supplementary support from Mike. It was hoped that using primary volunteers for six weeks would improve data collection and the seal ID processes, as this was this case in 2016.

2.1 Data collection

Surveys were conducted on a daily basis, with each route surveyed on alternating days in order to minimise disturbance. Observations were non-invasive and disturbance kept to a minimal level, through use of a long lens SLR camera and maintaining a distance of 50m. At each site date, location and numbers of pups, females (juvenile and adult) and males (juvenile and adult) were recorded. Each pup was named using a designated letter for the 2017 cohort, in this instance the letter was 'R'. Pup developmental stage was also noted (**Appendix 1**). The observation of suckling behaviour was used to determine mother-pup pairs. Where possible, two photographs were taken of each individual adult, one of both the left and right side of the head (ideally with a wet pelage), for photographic identification at a later date.

2.2 Data processing

Each day, data obtained was inputted onto existing Excel spreadsheets; daily log, pup developmental progress and ID catalogue. The ID catalogue contains photographs of each individual (females and males) previously seen on the Calf, labelled by the location at which the individual was first sighted. The left and right profile shots displaying a unique pelage pattern can be used to identify individuals. Once added to the catalogue, obtained photographs were compared to historical images and any females, including those exhibiting nursing behaviour, could be identified. Similarly, males were identified and recorded using the ID catalogue. In some instances it was not possible to obtain both left and right profile shots of individuals, but rather just left or right only. Photos of these individuals were added to the 'left/right nearly' catalogue.
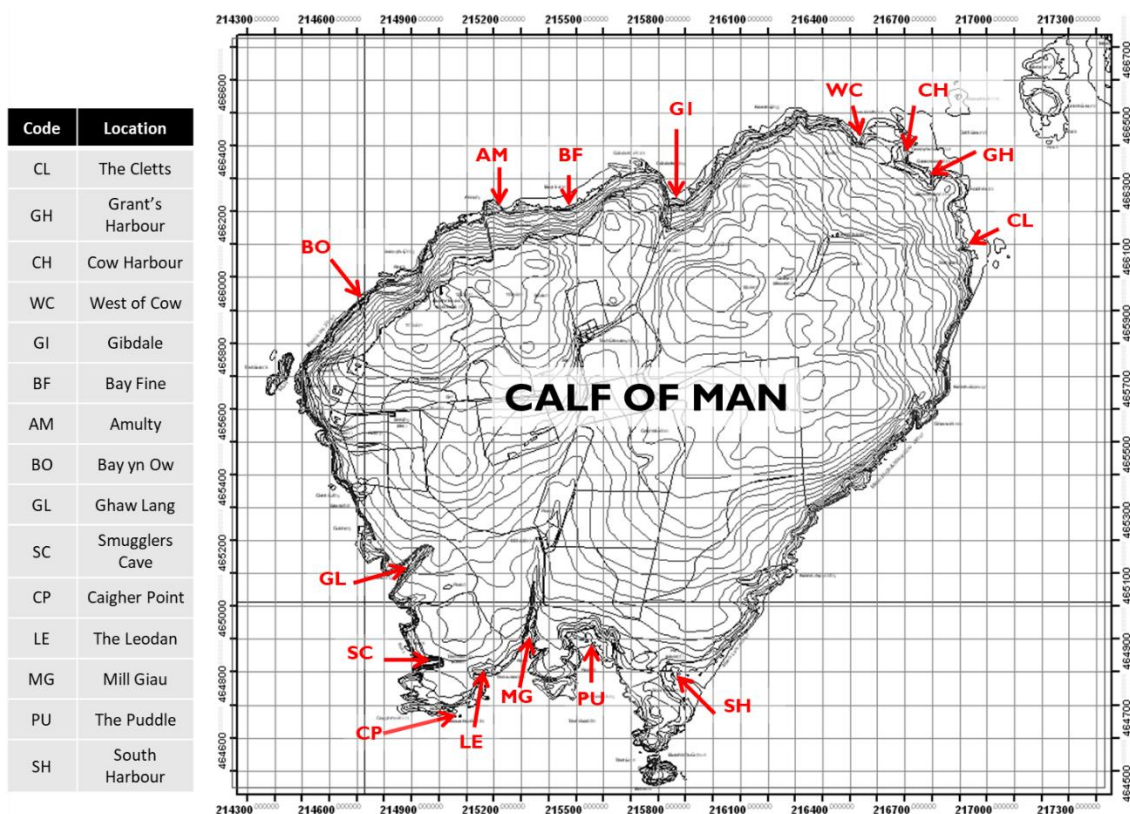

Code	Location
CL	The Cletts
GH	Grant's Harbour
CH	Cow Harbour
WC	West of Cow
GI	Gibdale
BF	Bay Fine
AM	Amulty
BO	Bay yn Ow
GL	Ghaw Lang
SC	Smugglers Cave
CP	Caigher Point
LE	The Leodan
MG	Mill Giau
PU	The Puddle
SH	South Harbour

Figure 1 – 15 of the primary pupping locations upon the Calf of Man.

3. Results

3.1 Pup census

In total, 66 pups were recorded across 11 historic pupping sites. 30.30% (n= 20) of pups were known to survive to stage 5 of development (fully weaned) and 3.03% (n= 2) were confirmed deceased (**Table 1**). A further 24.24% of pups (n= 16) were reported as missing following a period of adverse weather known as Storm's Ophelia and Brian which occurred during week 5 of the survey (around 16/10 and 20/10 respectively) (**Table 1**). These individuals were initially observed and possibly sighted subsequently at later stages but were not observed in a stage 5 state of development. Furthermore, an additional 42.42% (n= 28) were unaccounted for. It is uncertain whether this insufficient data indicates survival or death however it is possible that these individuals were present but not visible to/observed by surveyors. Or alternatively, perhaps surveyors were unable to correctly identify pups during subsequent sightings. If these individuals did indeed survive, survival rate would equate to 72.72%.

Table 1 – Total number of pups recorded and relative proportions of surviving, deceased and insufficient data.

Number of pups	Survived/weaned (%)	Deceased (%)	Missing/Insufficient data (%)
66	30.30	3.03	66.67

Figure 2 depicts the trend in total number of pups over an 9-year period from 2009 to 2017. There appears to be an overall positive trend with an increasing number of pups born annually. The greatest number of pups were recorded in 2016 (n= 84) with an increase of 21 pups compared to the 63 individuals reported in 2015. However, **Figure 2** depicts a decline in the total number of pups recorded since 2016 (n= 66). It should be noted that despite this decline, this value is still slightly greater than the 2015 total (n= 63).
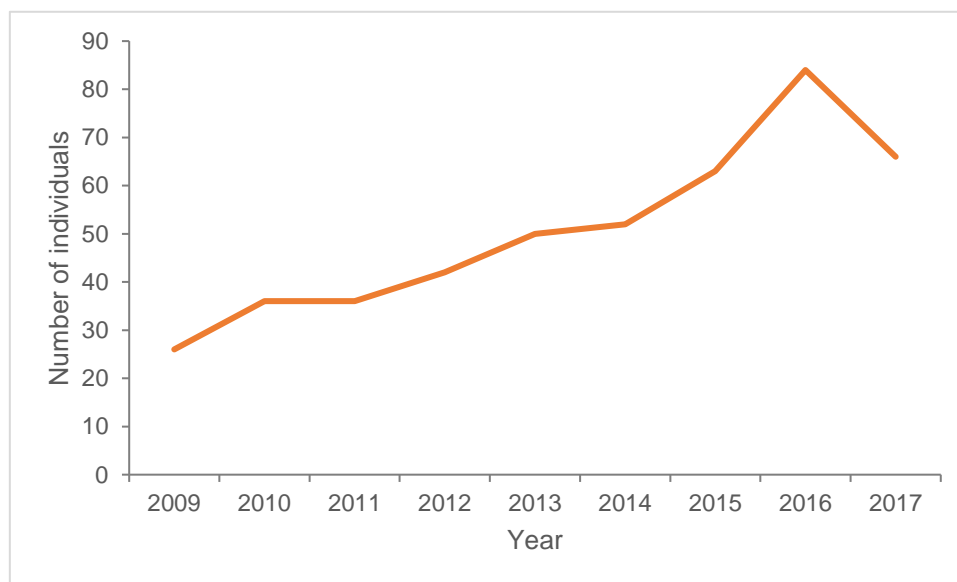

Figure 2 – Total number of pups observed on the Calf each year between 2009-2017.

3.2 Births per week

The number of pups born appears to peak during week 3 and again in week 6, with nine confirmed births occurring during each of these weeks (**Figure 3**). Contrastingly, the number of pups first seen is greatest in week 2 suggesting most pups were perhaps likely to have been born during this period. However as births were not witnessed and thus the specific date of birth was not known, the number of births appears to be less. No births were recorded in week 1 and only two during week 7 (**Figure 3**).
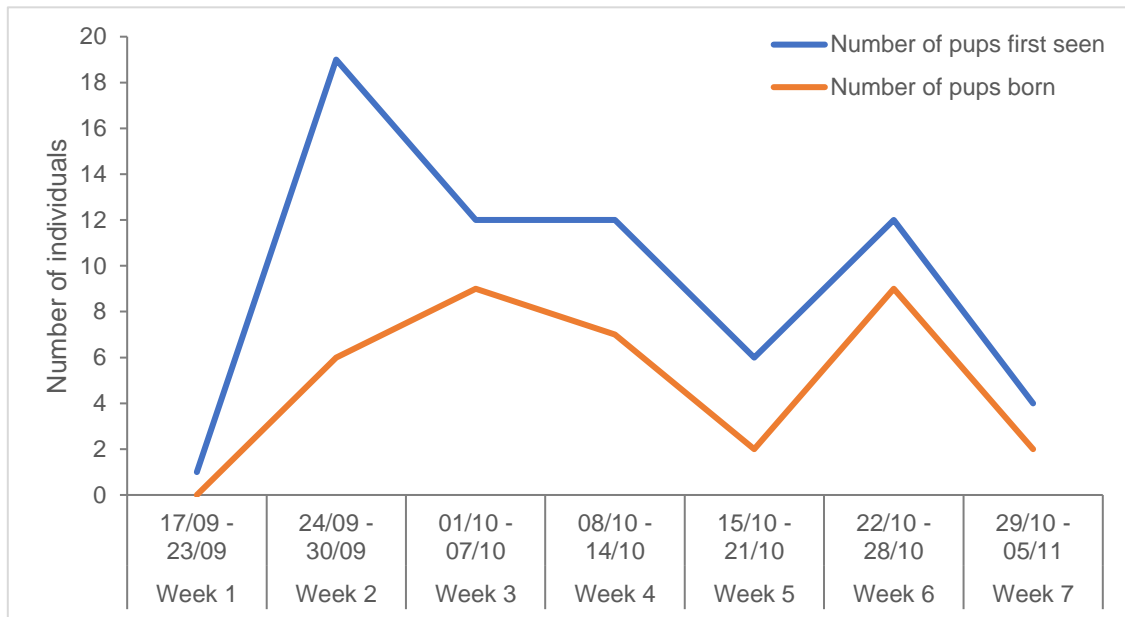
Figure 3 – Rate of pups born/first seen per week during the seven-week survey period. Number of pups born describes pups for which exact birth date was known.

3.3 Pup distribution

In total, 66 pups were distributed across 11 pupping sites as depicted in **Figure 4**. Pup abundance was greatest at The Puddle (PU) (24.24%, n= 16) followed by Grants Harbour (GH) (21.21%, n= 14). Cow Harbour (CH) (13.64%, n= 9) and Mill Giau (MG) (12.12%, n= 8) were also relatively popular pupping sites. Bay Fine (BF) and West Cow (WC) were the least popular of the utilised pupping sites with just one pup (1.52%) recorded at each of these sites. No pups were recorded at The Cletts (CL), Amulty (AM), Bay yn Ow (BO) or Caigher Point (CP). Overall, slightly more pups were recorded at southern sites (53.03%, n= 35) compared to northern sites (46.94%, n= 31).

Pup distribution recorded in the present survey is relatively similar to the pattern of distribution in previous years (**Figure 5**). **Figure 5** shows the southeast and northeast corners of the Calf appear to be consistently the most popular areas. The Puddle (PU) and Grants Harbour (GH) have been the most highly frequented sites over the four-year period. It is interesting to note the use of The Leodan (LE) this year for the first time over the four-year period, with three individuals recorded at this site. This site was last utilised for pupping in 2012 in which just one individual was sighted. Furthermore, The Cletts (CL) was not utilised during the present year (or either 2014 and 2015), despite its apparent popularity during 2016.
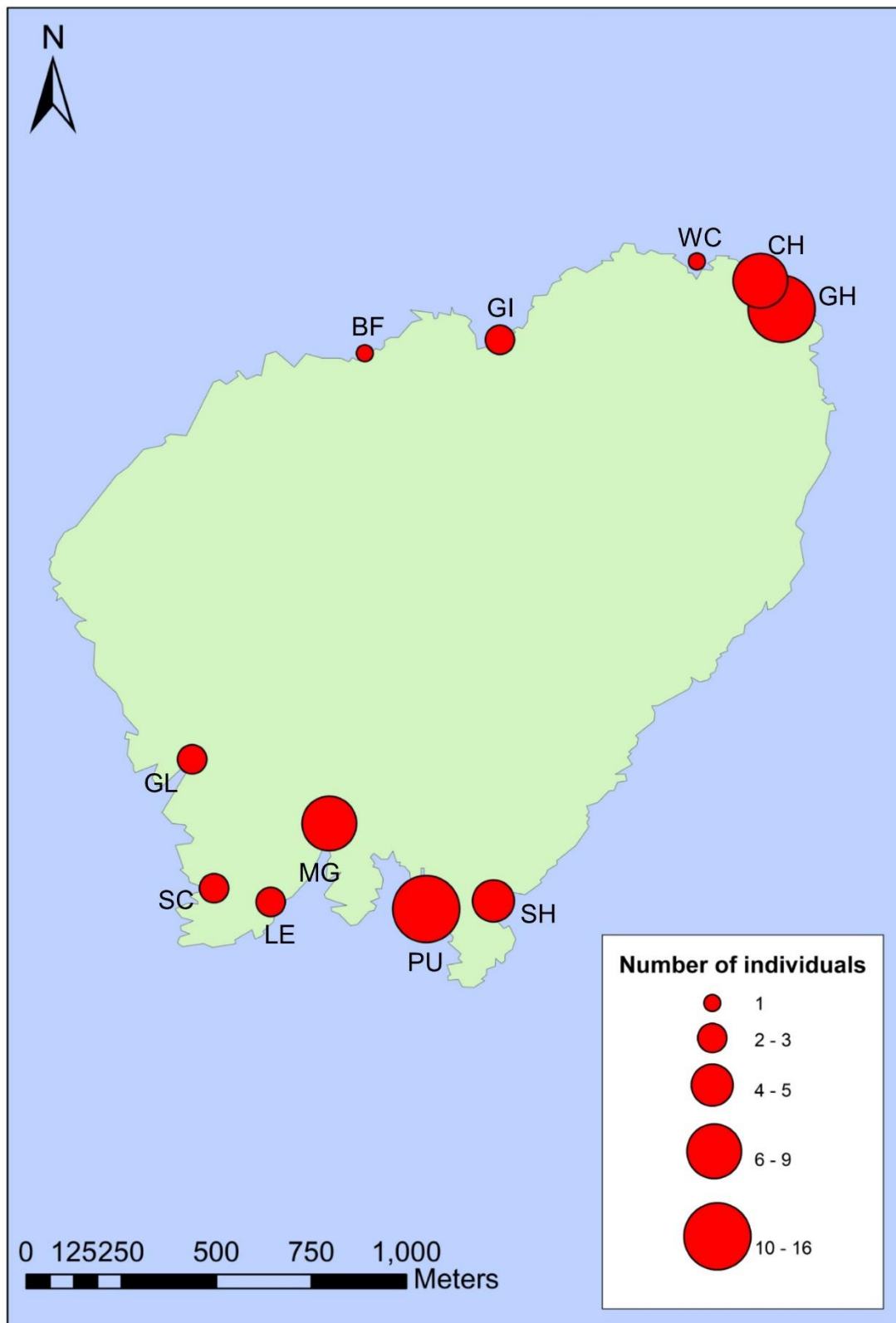
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Figure 4 – The distribution of pups across 11 pupping sites on the Calf. Symbol size equates to number of individuals present/abundance. BF= Bay Fine, GI= Gibdale, WC= West of Cow, CH= Cow Harbour, GH= Grants Harbour, SH= South Harbour, PU= The Puddle, MG= Mill Giau, LE= The Leodan, SC= Smugglers Cave, GL= Ghaw Lang.
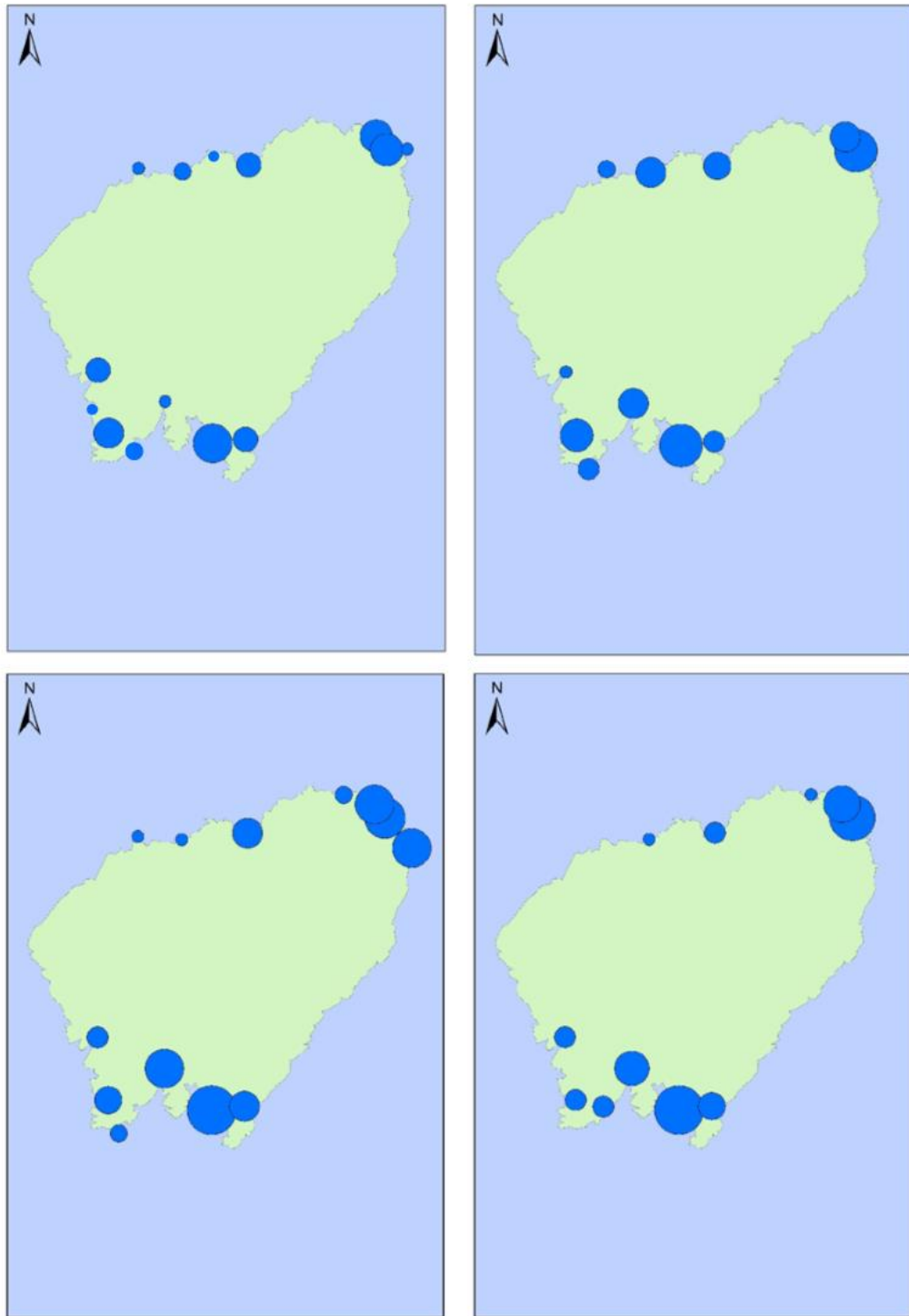
Figure 5 - Pup distribution across pupping sites in 2014 (top L), 2015 (top R), 2016 (bottom L) and 2017 (bottom R). Symbol size is representative of proportion (%) of pups.

3.4 Mother ID

Of the 66 pups recorded, 84.85% (n= 56) of corresponding mothers were identifiable (viable left and right profile shots were obtained and added/compared to previous catalogue photographs) (**Table 2**). Of these identified females, 67.86% (n= 38) had previously given birth on the Calf and 10.71% (n= 6) had been sighted previously but without pups and thus are presumed to have given birth for the first time on the Calf this year. A further 21.43% (n= 12) were new to the Calf. Mother identification was unsuccessful for 15.15% (n= 10) of pups. It is possible that it was unclear which pup belonged to which mother, resulting in some mothers being unidentified.

Table 2 - Relative proportions (%) of identified and unidentified mothers, based on photographic identification methods.

Number of pups/mothers	Identified mothers (%)	Unidentified mothers (%)
66	84.85	15.15

3.5 Catalogue

As of 2017, there are 206 females and 42 males in the ID catalogue (for which left and right profile shots have been acquired). Of these, 12 females but no males were newly added this year. There are also 71 'L/R nearly' records which describe individuals that have been observed but at present photographs of both the left and right profile are unavailable. No new L/R nearly entries were recorded this year.

4. Discussion

4.1 Pup census

This year, less pups were born on the Calf compared to 2016. However, it is possible that 2016 was a particularly productive year as the number of pups born appears as a peak, distinct from the trend of a gradual increase in pup births since 2009. This year, mortality rate was relatively low and similar to previous years (with the exception of 2014), however it should be considered that a relatively large proportion of individuals were recorded as 'missing' following Storm's Ophelia and Brian. It is perhaps likely that these individuals were washed off and unable to haul-out again (Anderson et al., 1979) and therefore died. In this instance, mortality rate would be much higher than the rate recorded in any of the previous years. The proportion of pups known to survive to stage 5 of development was lower than in either 2016 (47.65%) or 2015 (39.68%), but slightly greater than 2014 (25.00%). Furthermore, the number of individuals for which insufficient data was obtained was also relatively high and it is uncertain whether these individuals survived to stage 5 of development or died. Even if these individuals for which insufficient data was obtained are presumed to have survived, overall survival rate would equate to 72.72% which is lower than 2014 (84.62%), 2015 (95.24%) and 2016 (92.86%). Overall, this year seems to have been quite productive in the view of total number of pups born. However, this productivity is decreased when considering the proportion of pups recorded as 'missing' and presumed dead.

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4.2 Births per week

It can be presumed with some confidence that the full duration of pupping season was observed due to the low number of sightings/births recorded at both the beginning and end of the survey period (weeks 1 and 7). However it is possible that additional undetected births occurred on the Calf during the 2017 pupping season. As aforementioned, the low productivity recorded during week 5 (15/10 – 21/10) coincided with a period of adverse weather (Storm's Ophelia and Brian). However, as birth rate per week was measured, rather than survival rate (pup developmental success), it is unclear why this pattern has arisen. As some seal species are able to delay post-copulatory fertilisation (Orr & Zuk, 2014), it has been hypothesised that females may also be able to delay parturition following detection of adverse weather conditions, though there is no definitive evidence that proves this hypothesis. Perhaps it is more likely that the apparent decrease in pup births during this time was a result of conditions influencing survey effort or surveyor's ability to observe pups.

4.3 Pup distribution

This year, pup abundance was greatest at The Puddle (PU), followed by Grants Harbour (GH). This is consistent with results obtained from previous years (including 2014, 2015 and 2016) in which these sites were the most popular pupping sites. The present findings further support the hypothesis that these sites in particular, possess desirable features suitable for parturition and supporting pups. These sites are easily accessible, possess gentle slopes/shelving with ample haul-out space at a variety of levels and provide shelter from north-westerly prevailing winds (Barne et al., 1996). It is these features which may explain the consistent popularity of The Puddle (PU) and Grants Harbour (GH) (Pomeroy et al., 1994; Pomeroy et al., 2000a).

The Cletts (CL) was not utilised for pupping this year, despite its popularity in 2016. This perhaps suggests the popularity of this site last year may have been a result of the greater abundance of seals utilising the Calf, including several new mothers. It is perhaps interesting to note, that of the six identifiable mothers that gave birth at The Cletts (CL) in 2016, one female (no. 223) gave birth at South Harbour (SH) this year and five did not return. This may suggest that the Calf is utilised by transient individuals in addition to 'residents'.

4.4 Mother ID

The majority of identified mothers had previously given birth on the Calf. However, 12 mothers were observed for the first time this year. This suggests the Calf may be an important pupping site for transient individuals/those that migrated to the area specifically for the purpose of parturition. In some instances grey seals have been shown to express natal philopatry, whereby they return to the site at which they were born (Pomeroy, 2000b), and thus it is possible that these 'new' individuals are not transient but rather, may have been born on the Calf and have returned to give birth once reaching sexual maturity.

Of the 32 females that were added to the catalogue in 2016, seven gave birth in 2017 and three returned but did not give birth. It is unclear why the remaining 22 did not return to the Calf in 2017. If these individuals can be considered transient, perhaps alternative pupping locations around the Irish Sea, or elsewhere, were utilised to give birth in 2017. Although it is also possible that these individuals were present, but unobserved by surveyors or misidentified.

4.5 Limitations and future recommendations

The Calf autumn seal survey methodology has had only minor changes in the last four years and therefore similar limitations apply consistently. For example, the abundance and distribution of pups recorded may not be a fully accurate reflection of true values, as pups may have been miscounted at various locations. Furthermore, decreased visibility/variable weather conditions, topography (e.g. large rocky outcrops and steep cliffs) and the 50m distance between the observer and the seals may have reduced the likelihood of sightings. Similarly, the number of pups may have been underestimated or overestimated (duplicate counts of a single individual) on occasions when a high number of seals were hauled-out at any one time. At crowded pupping sites there is also a possibility of misidentification of pups between survey days resulting in incorrect dates for developmental stages. This may have been more likely at later development stages when pups become more mobile and thus are able to move positions. An additional constraint is the extensive time and effort require to conduct the identification process (comparing photographs with the large collection already existing in the catalogue), which continues to increase each year as the catalogue of individuals grows. Similarly to 2016, using two key surveyors was thought to improve the data collection and seal ID processes, compared to several different volunteers surveying for 1-2 weeks with brief change-over periods. This approach will be utilised again next year.

This year, the total number of pups born is consistent with a general trend of an increase in births on the Calf since 2009. However, the 2017 cohort appears to have been somewhat hindered by the adverse weather conditions experienced around the Isle of Man during pupping season, and thus it is likely that a substantial proportion of pups born did not survive. Similarly to previous years, The Puddle (PU), and to a lesser extent, Grants Harbour (GH), were the two most popular pupping sites. This consistent popularity each year suggests features that these sites possess are optimal for parturition.

Next year (2018) will signify ten years of Calf autumn seal surveys and it will be of interest to look at temporal patterns in pup census data, site usage and ID logs. The extensive data collected over this ten-year period will hopefully provide great insight into the pupping behaviour of Calf grey seals.

The Manx Wildlife Trust was granted a licence by the Isle of Man Department of Environment, Food and Agriculture (DEFA) in order to carry out this research.

5. References

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6. Appendices

Appendix 1: The 5 stages of pup development.

Stage	Age	Characteristics	
Stage 1	0-2 days	Thin baggy-skinned body Yellow stained or white natal fur Conspicuous umbilical cord Docile & poorly coordinated	
Stage 2	3-7 days	Smoother bodyline, few loose folds Neck still distinguishable Umbilical cord atrophied Aware & coordinated	
Stage 3	7-15 days	Rounded or barrel shaped body Neck thickened/indistinguishable Partial moulting from head or flippers May be aggressive on approach	
Stage 4	16-20 days	Rounded body Partial moulting from torso Head & flippers moulted May be aggressive on approach	
Stage 5	18-25+ days	Fully moulted to short fur coat ($< 100cm^2$ natal coat remaining) May be aggressive on approach	