



Manx Wildlife Trust
Treisht Bea-Feie Vannin 

Calf of Man Seal Surveys

Autumn report 2019



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Protecting *Manx Wildlife* for the Future

Coadey *Bea-Feie Vannin* son y tra a ry-heet



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1. Introduction

1.1 Grey Seals in Manx waters

The Manx Wildlife Trust has been operating the Grey seal (*Halichoerus grypus*) long-term monitoring project on the Calf of Man every autumn since 2009 and employs teams of volunteer fieldworkers to stay on the Calf with the purpose of surveying the Grey Seal population.

Grey seals are endemic to the North Atlantic Ocean and are the most common pinniped species in Manx waters. The Irish Sea - with the Isle of Man located within this - is estimated to be home to 5,198 – 6,976 Grey seals based on breeding censuses from Wales and Ireland (Kierly *et al.*, 2000). Despite telemetry data showing regular long-distance movements within and beyond the Irish Sea in Grey seals, there is a well-established high rate of site-fidelity among breeding adults.

All pinnipeds in the Isle of Man (including vagrant species) are afforded legal protections under Schedule 5 of the Isle of Man Wildlife Act (1990) which decrees any disturbance to pinnipeds as a criminal offence (Isle of Man Government, 1990). All surveyors associated with the project operate under license from the Department of Environment, Food & Agriculture (DEFA).

The project operates in two ways: firstly, seals (including pups at each stage of development) are quantified via daily alternating census (north – south) of the perimeter of the island. Secondly, seal specimens are photographed for photo-identification against a catalogue of archived individuals. The present report has been produced to present, summarise and discuss the findings of the 2019 season.

1.2 Study Site

The Calf of Man is considered the main pupping site within the Isle of Man (Stone *et al.*, 2013). The Calf is a small island located approximately 500 metres off the south-western tip of the Isle of Man (separated by The Sound) and is owned by Manx National Heritage (MNH). The Manx Wildlife Trust (MWT) operates a bird observatory on the Calf, on behalf of MNH, and it is the responsibility of MWT wardens and volunteers to manage the island. Despite members of the public having access to the island year-round by means of boat travel, anthropogenic disturbance to Grey seals appears to be low. This, coupled with a high proportion of habitats suitable for pupping, makes the Calf of Man an ideal environment for Grey seals.

1.3 Aims and Objectives

Over the field season, the aim is to perform a Grey seal pup census including recording of mothers and other adult seals around the Calf of Man. This is done via identification of seal specimens photographed in-situ; it is possible to identify Grey seals in this way because individuals, particularly adult females (Hiby *et al.*, 2007), show unique markings on their pelage (see glossary, Appendix 3) allowing researchers to identify them by comparing the photographs to a catalogue of specimens recorded on the Island in previous surveys (Sayer *et al.*, 2019).

Long-running monitoring projects such as these are needed to answer key questions concerning reproductive ecology; for example site fidelity, spatial use and determining pupping success in the breeding season. Monitoring during the pupping season is an important component in the conservation of pinniped species and can inform management actions and legislation at the local level.

1.4 Grey seal biology – a short introduction

The Grey seal is a sexually-dimorphic, piscivorous marine mammal species belonging to the family Phocidae, the phocid or 'true' seals. The species is the sole member of the genus *Halichoerus*, meaning the Grey seal should be of high priority regarding the conservation of the world's biological diversity.

In pinnipeds and other mammals, the cost of parental investment afforded to a developing pup is high for mothers who are responsible for all aspects of the offspring's welfare, including suckling and



protection. Mother-to-pup energetic transfer during suckling has been calculated at 57%, with 80% of mothers' reserves being depleted by the developing pup over the weaning period (Fedak and Anderson, 1982).

When raising offspring Grey seals are central-place foragers (Sharples *et al.*, 2009); during the pupping season, mothers are tethered to the location at which they hauled out to give birth due to the need to provide for their pups. This results in a limited foraging range (and/or depth) which may cause reductions in prey availability over time, especially if foraging ranges overlap between different mothers. These constraints result in the weaning period being characterised as particularly short (~18 days, after an 8 month gestation period) as adaptations are selected towards increased efficiency and a quicker weaning season (e.g. fast pup growth) in Grey seals (Pomeroy *et al.*, 2001).

2. Methods

2.1 Fieldwork

This season's survey was carried out from the 25th of September to the 4th of November 2019. The fieldwork was performed by a pair of volunteers for the entire period of surveying – Rob Andrew and Gemma Haggart- with help for the first week from returning volunteer Mike Prior. The entire perimeter of the island was checked for pups repeatedly, with the majority of the survey effort being focussed on the 13 sites that are known as regular pupping areas (see Fig. 1). The sites were split into a discrete north (including BF-CL) and south route (including GL-SH), which were visited on alternating days in order to minimise disturbance. The eastern and western coasts are composed of sheer cliffs lacking many suitable haul-out platforms, hence the absence of historical pupping sites for these parts of the island in Figure 1.

Each day the survey consisted of visiting sites to photograph and count any present pups and adults- with particular priority for recording photographic evidence of suckling or other parental care that would indicate female-pup filial associations. When possible, photos were taken of both the left and right sides of each individual preferably with a wet pelage. If mothers could not be seen, volunteers would occasionally return to 'stakeout' the site in order to try and match pups to mothers by witnessing suckling.

All photos were taken with a long lens DSLR camera in order to maintain a distance of 50m from the seals whenever possible. All possible measures were taken to limit disturbance including wearing dark clothing and moving low to the ground.

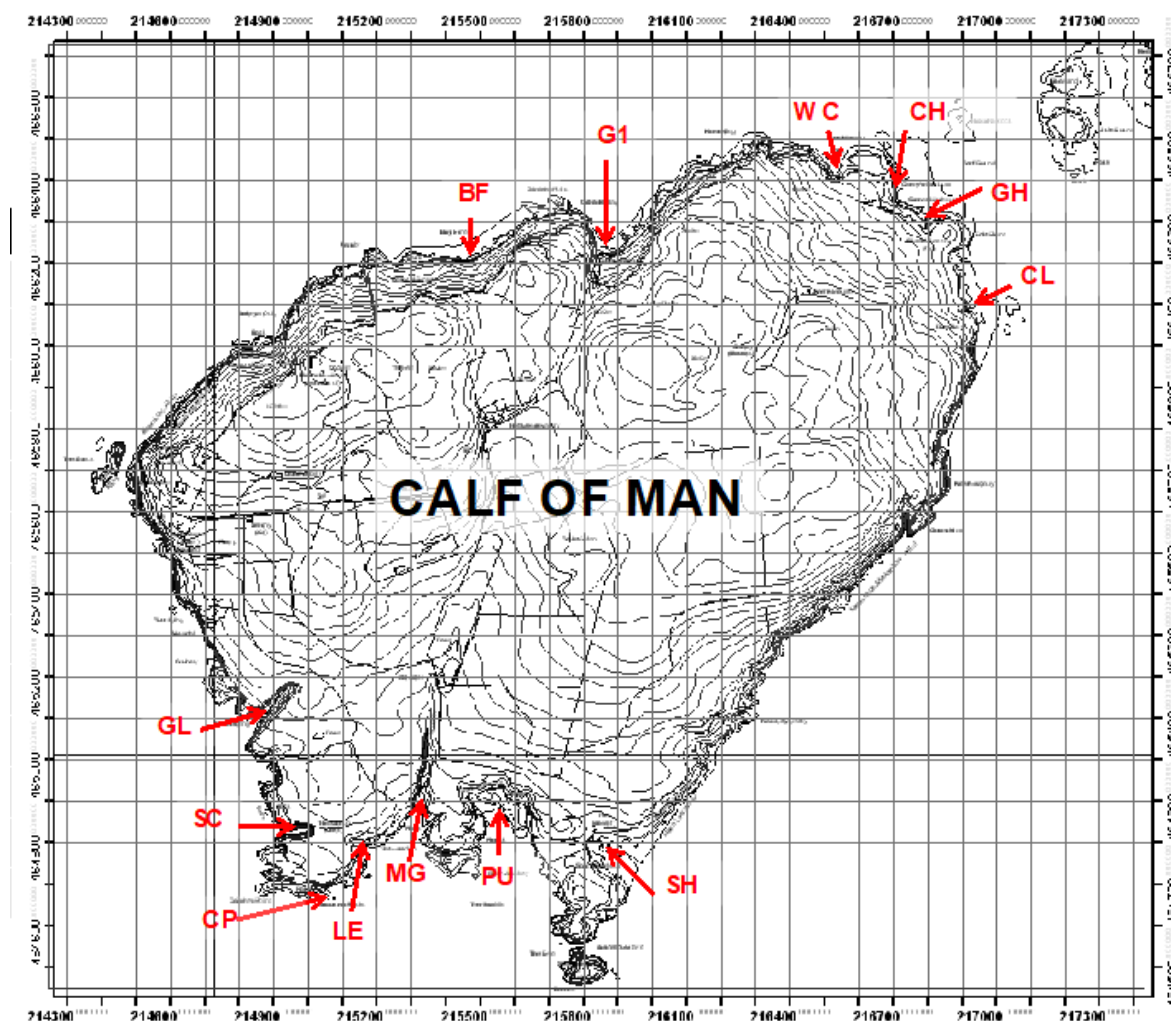


Figure 1 known pupping locations on the Calf of Man. BF = Bay Fine, G1 = Gibdale Bay, WC = West of Cow, CH = Cow Harbour, GH = Grant's Harbour, CL = The Cletts, SH = South Harbour, PU = The Puddle, MG = Mill Giau, LE = Leodan, CP = Caigher Point, SC = Smuggler's Cove, GL = Ghaw Lang,

2.2 Pup aging

Observed pups were allocated to 1 of 5 developmental stages (see Appendix 1), by using their physical appearance and behaviour to determine their age. Each pup was named beginning with the letter T and its development tracked throughout the season.

2.3 Photo-identification

Photographs of adult seals taken from sites were compared – using seals' individualised pelage patterns and/or scarring – systematically with a catalogue of individuals recorded previously on the Calf of Man, consisting of some 280 females and 40 males. There was a particular focus on identifying mothers with present pups. New individuals (those which were not found to match with any catalogued individuals) were added in the master catalogue.

3. Results

3.1 Pup census

In total 69 seal pups were counted on the Calf of Man. Compared to previous years' data, this year's season had the second-highest number of total recorded pups since 2009, which is narrowly more than in 2017 (n = 68). The trend of total pups recorded per year since 2009 has been generally positive.

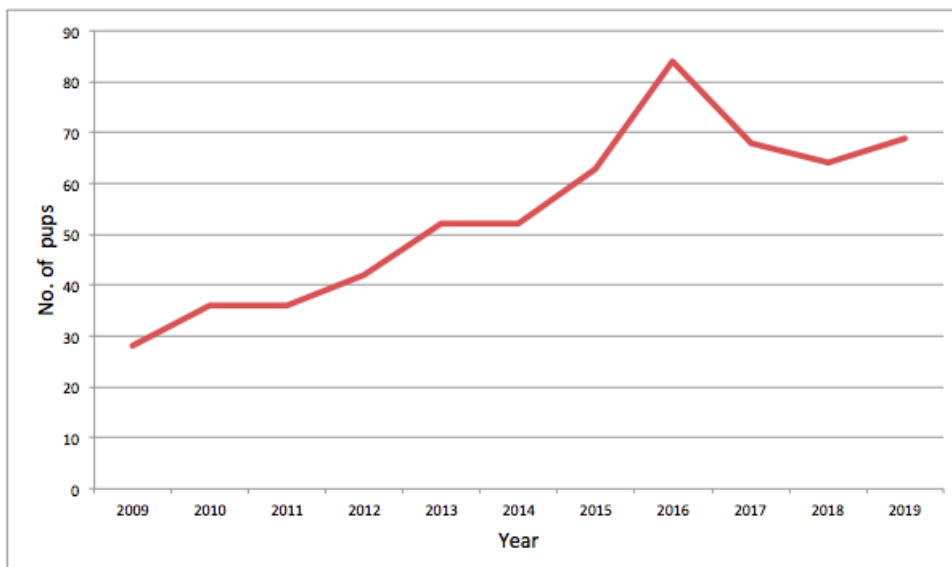


Figure 2 - Total number of pups counted in the pup census from 2009-2019

The peak pupping period (that is, when the most pups were initially observed) was in the first week between the 25th of September to the 1st October (see Fig.3). Following this, the rate of new pups observed per week shows a consistent decrease until week 5 where the rate appears to plateau.

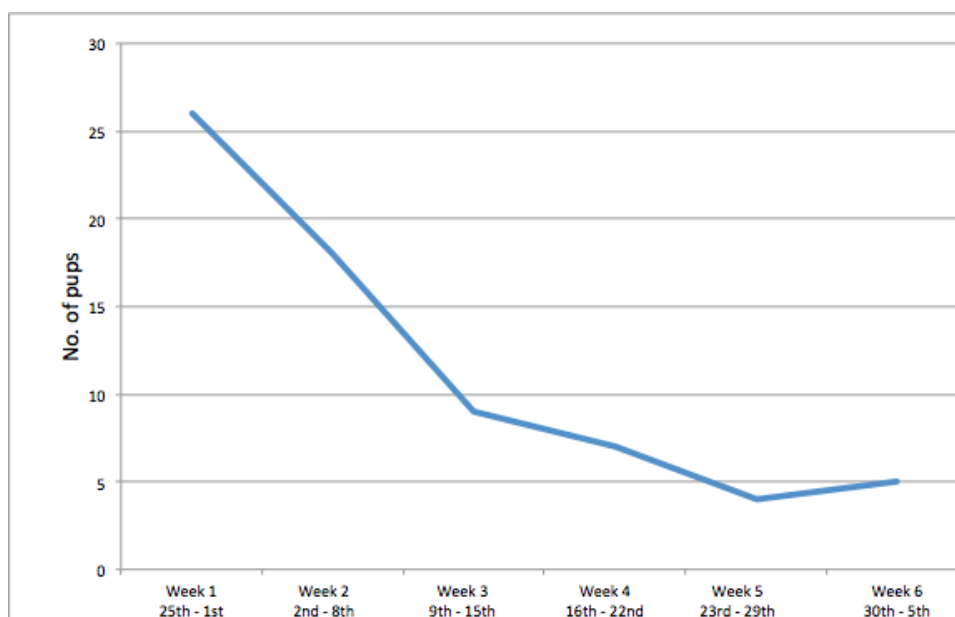


Figure 3 - Trend of pupping numbers per week throughout the 2019 survey

Table 1 shows the survival rate of our 69 pups this year. 3 pups were seen deceased, and 4 were confirmed missing. 8 pups were classified as data insufficient as they were only seen once or twice at

sites where re-sighting was challenging; therefore, their survival/mortality was unknown. If we assume that these 8 did in fact survive our survival rate would be 89.9%.

Table 1 relative proportions of deceased, missing and survived/weaned pups, and for those with insufficient data.

Number of pups	Survived/weaned (%)	Deceased (%)	Missing (%)	Data insufficient (%)
69	78.3	4.4	5.8	11.6

3.2 Pup distribution

Pups were seen in 11 of the 12 main pupping sites, with only West of Cow (WC) being the exception. Of these Cow Harbour (CH) was the single most populous site, contributing to 20% (n = 14) of the total pup productivity for this year. The two next most populous sites were Grants Harbour (GH) and The Puddle (PU). Leodan (LE) was the least productive site, contributing 3% (n = 2) of total productivity.

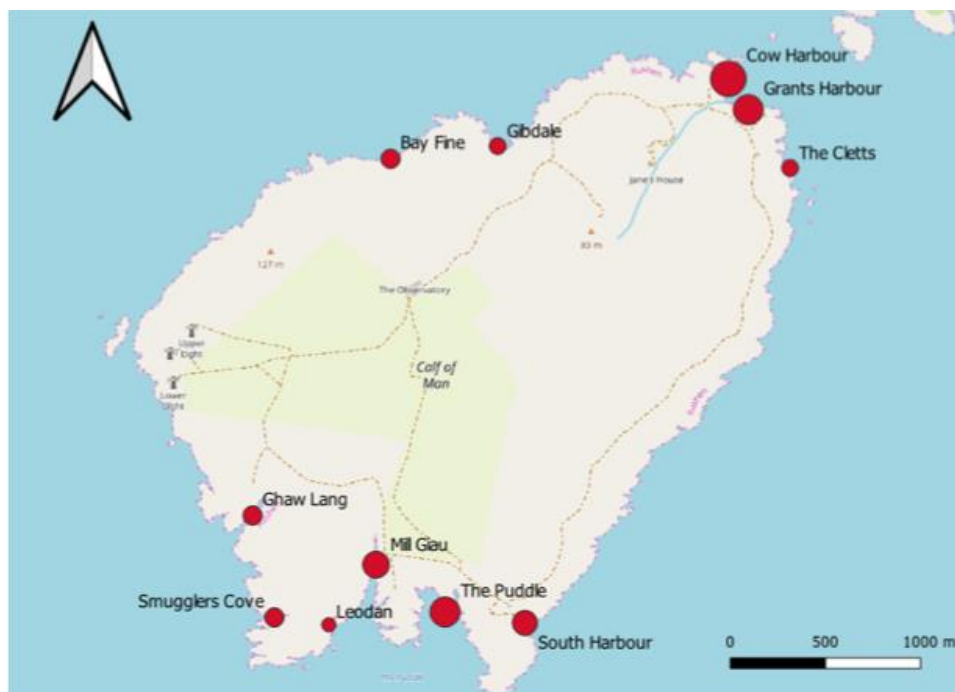


Figure 4 - The distribution of 2019 pups across 12 pupping sites. Symbol size is proportional based on the abundance of pups at each site. Map generated using QGIS software.

The number of pups born in the north route compared to the south was almost exactly equal; with 49% (n = 34) born in the northern sites (Bay Fine - Cletts) and 51% (n = 35) born in the south (Ghaw Lang - South Harbour).

3.3 Adult distribution

The highest number of adults was seen at Cow Harbour (an average of 28 adults per survey), then the Cletts (average of 27 per survey). Bay Fine, Leodan, Smuggler's Cove and Ghaw Lang were the least visited sites by adult Grey seals, all with an average of less than 2 adults being present per survey.

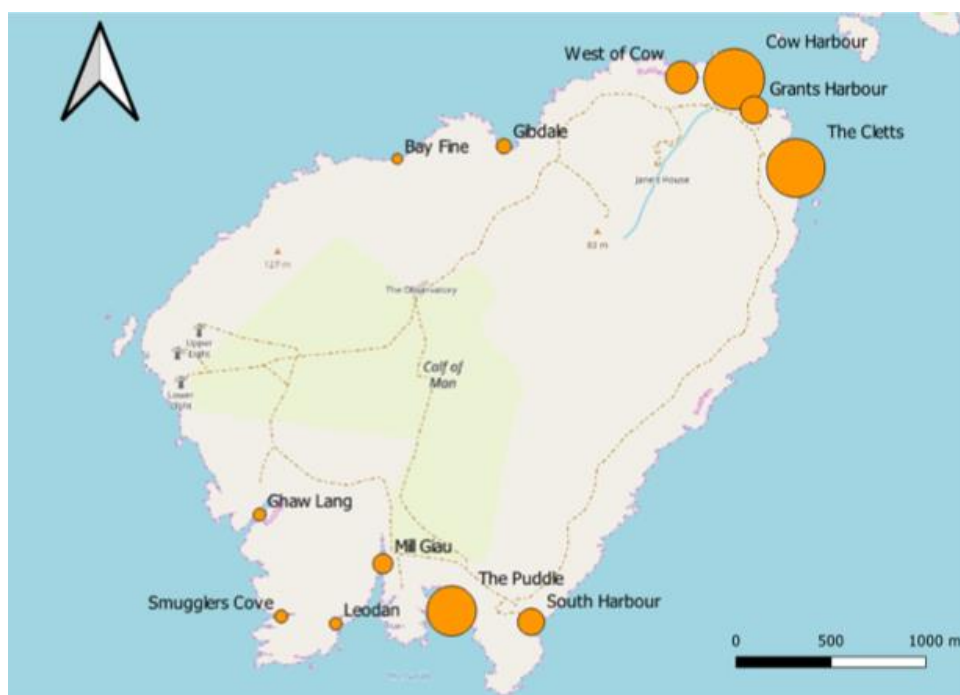


Figure 5 - The distribution of Grey seal adults across the Calf. Symbol size is proportional based on the abundance of seals at each site. Map generated using QGIS software.

3.4 Photo-identification

Of the 69 mothers, 39 were identified as returning mothers. 18 mothers were identified as new and were subsequently added to the catalogue; one of these (025) had been observed in 2010 on the Calf but not seen to produce a pup. The 12 other mothers were either not ever observed alongside their pup or were unable to be photographed clearly enough to be identifiable. 4 of these 12 were due to older pups (late stage 3 onwards) appearing without their mothers at a new site- therefore their natal beach and mother could not be identified.

Table 2 relative proportions of identified, unidentified and new mothers.

Number	Identified mothers (%)	New mothers (%)	Unidentified mothers (%)
69	56.5	26.1	17.4

Of the ten males we identified, six were identified from our archive (60%), with four being new (40%).

3.5 Site fidelity

Overall fidelity across all sites of our identified mums was calculated at 76.4%. This included 18 mums who had 100% fidelity; having only ever pupped in the one site. Of particular note is female 007, who has been seen to pup in the same location (Grant's Harbour) for 10 years. The identified males had on average 98.2% site fidelity. Other males were observed but were unable to be identified due to their lack of unique pelage markings/scars.

4. Discussion

4.1 Pup census

In total we observed 3 deceased pups, with one being stillborn. The remaining two were seen deceased after periods of poor weather, indicating this may be the cause for their mortality. Our survival rate this year – 78.3% confirmed, 89.9% with insufficient data included - is similarly high when compared to previous years. Last year the overall survival rate (including insufficient data) was only slightly higher at an estimated 92%.

Pups whose survival could not be determined due to insufficient data were all located at either BF, GI or SC – all sites notoriously difficult to survey with any efficacy due to the height and angle causing observation constraints. SC is also made up of two relatively dark, deep caves, massively affecting the visibility of pups for the surveyors. It is likely, therefore, that the counts for these sites are an underestimate.

For the rate of new pups observed per week (see figure 3), we appear to have the highest rate in week 1 - the end of September. This however is a slightly inflated rate of births, as it is likely that some of these pups were born before the initial arrival of the survey volunteers on the Calf and thus predate survey efforts for this season. At least two of our 2019 pups seen in the first week were old enough (stage 3 – see appendices) when seen in the first week that we can be certain they had been born at least a week prior. Last year, surveyors arrived on the Calf a week earlier than the 2019 surveyors and observed 6 pups born in that time. Despite this, their peak rate of pupping was timed concurrently with ours - between the 25th September and the 1st of October.

The generally positive trend shown for total recorded pups per year may be best explained by improvement in survey methodologies and increased knowledge on precise pupping locations since the project's inception in 2009, opposed to a legitimate increase in the Grey seal breeding population.

4.2 Pup distribution

The pupping rates on both the north and south routes were compared and seen to be almost equal (North = 49%, South = 51%). Disturbance levels around the North and South coasts likely differs as the Sound appears to be more regularly used by fishing boats and recreational vehicles. Our most densely used pupping site (CH) occupies the southern shore of the Sound, despite high rates of seal disturbance recorded in this area (Peters, 2007).

Pup abundance was the highest at CH (n = 14), GH (n = 10) and PU (n = 10). All of these sites are optimal pupping sites due to their low gradient, the presence of tidal pools and a relatively large area of available ground left uncovered at high-tide creating ample haul-out space (Anderson *et al.*, 1979). This is consistent with previous years' data, where GH and PU were the most productive sites from 2013 through to 2017 and CH the most used site in 2018.

The places with the fewest pups was LE (n = 2), CL (n = 3) and GI (n = 3). A possible explanation for this lower level of productivity within LE is that it is a small site where there is simply not enough space for many pups, rather than any reflection on its suitability for raising pups. Throughout the 11 years since the project's inception, there have never been more than 3 pups born in LE. CL is considered to be relatively exposed and wave-affected, reducing the number of protected platforms for supporting pups safely. Lastly, the main inlet at GI is not wholly visible from any viewable angle. While pups were often spotted during low tides or swimming, it is entirely possible that additional pups may have been out of view.

4.3 Adult distribution

As expected, CH and CL showed the largest adult Grey seal aggregations - these are historically known to be frequently used areas due to the existence of exposed rocky features suitable for haul-outs.

Four sites had an average of less than two adults per survey (SC, LE, GL & BF). As above, this is probably due to observation constraints (SC and BF) or the paucity of pupping space at the site (LE and GL).

WC had the fourth highest presence of adult seals (mean = 9.3) but interestingly was the only main site where no pups were born this year. Anecdotal evidence from returning volunteers (Prior, M., *pers. comm.*, 2018) and from first-hand observations would suggest that this area of the Calf is used mostly by smaller adults, who have perhaps not yet reached sexual maturity.

4.4 Photo identification

12 mothers were either not observed or unable to be identified. Photographing seals at some sites (SC, BF & GI) was made difficult due to the relative proximity of surveyors atop high cliffs and/or the viewing angle when viewing into a cave. In SC especially, seals were often obscured by darkness within caves, reducing the quality of photographs suitable for identification. For such areas we suggest it may be more effective to survey by boat if feasible.

It may be important to note that the number of identified males in this study was low, due to male Grey seals' general lack of markings. Older males appeared easier to identify as they tended to have accumulated more scarring over their lifetimes. It was noticed that males were generally easier to identify from a front of face shot- where they often have more significant distinctive scarring from fights. For this reason, it may be worth aiming to collect face-on shots as well as left and right photographs for males around the Calf in future years.

After the 2019 season, the photo-identification catalogue now contains a total of 302 females (18 new mothers) and 46 males (4 new). In addition, there are 108 (2 new) left right nearly's yet to be fully identified. Out of the 10 mothers that were newly added to the catalogue in 2018, only 2 were seen to return and breed again this year. This could indicate a transient breeding population who perhaps bred elsewhere this year, in addition to the regularly returning females. Alternatively, females are known to skip breeding in some years (Pomeroy *et al.*, 1994), explaining their occasional absence.

4.5 Site Fidelity

Site fidelity, where an animal returns to breed in the same location repeatedly, is common among pinniped species (Lunn and Boyd, 1991). Regarding the underpinning causes for site fidelity, it is considered that returning to the same breeding location confers predictability in terms of reproductive success (Switzer, 1993). Additionally, fidelity reduces energy expenditure that would otherwise have been spent searching for and using other potentially inferior sites.

Previous years have elucidated a high rate of site-fidelity in returning mothers, this was again seen this year. Coincidentally an average rate of 76.4% fidelity was seen both this year and in 2018 across the Calf of Man exhibiting the consistency of the behaviour of our breeding females.

Studies indicate a high rate of site fidelity in males, which is considered to be irrespective of individual breeding success (Twiss *et al.*, 1994). This has also been confirmed by microsatellite data for breeding males that can operate over long periods of time producing pups at these sites (Worthington Wilmer *et al.*, 1999). Such males are often colloquially known as 'beach-masters'. Our results are in agreement with these findings, with all previously identified males showing a high rate of fidelity despite our small sample size.

4.6 Allo-suckling

Grey seals breed colonially which enforces the need for social recognition systems, such as individualised vocal cues (McCulloch *et al.*, 1999), to be in place for the provision of parental care for Grey seal pups. However, these are not always effective and may lead to misidentification.

During surveys on the Calf, we observed instances of allo-suckling (where a mother feeds a non-filial pup, in other words, one that is not her own) at the densest pupping site (CH). This could raise



doubts regarding the accuracy of using suckling to identify mothers in this project. On the Isle of May, off East Scotland, Grey seal mothers fail to distinguish between filial and non-filial pups (McCulloch and Boness, 2000) often leading to regular allo-suckling. Compared with Sable Island off Nova Scotia, Canada, where mother-pup vocal recognition systems are apparently more developed which reduces instances of allo-suckling. This indicates widespread variation in the efficiency of social recognition systems between disparate Grey seal populations. We suggest that studies looking into the prevalence of allo-suckling in Manx waters would be helpful to determine the reliability of relying on suckling to determine parental-pup relations for this study.

4.7 Further recommendations

It would be interesting to compare old stage 5 pup photos (where fully moulted and therefore showing their markings) to new mothers in more recent years to check for potential seals returning to the Calf to breed themselves. Although the markings become clearer with age (contrast between pale and dark areas increases) previous studies have shown that it is possible to successfully match images of moulted pups to adults female Grey seals (Paterson *et al.*, 2013). Grey seal females reach sexual maturity at roughly 4-7 years old (Bowen *et al.*, 2006). The longevity of this project on the Calf of Man makes it suitable for such work, as any photos of stage 5 pups from 2015 and earlier could show individuals who would potentially now be breeding themselves. Seals on the Isle of May have exhibited this natal philopatry, with animals even showing fidelity to the actual site where they were born (Pomeroy *et al.*, 2000).



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6. Appendices

Appendix 1 Pup developmental stages.

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 ($< 100\text{cm}^2$ natal coat remaining) May be aggressive on approach	

Appendix 2 Total pup counts for each site.

Site	Pup count
BAY FINE	4
GIBDALE BAY	3
WEST OF COW	0
COW HARBOUR	14
GRANTS HARBOUR	10
THE CLETTS	3
GHAW LANG	4
SMUGGLERS COVE	4
LEODAN	2
MILL GIAU	8
THE PUDDLE	10
SOUTH HARBOUR	7
Total	69

Appendix 3 Glossary of terms.

Term	Definition
Endemic	Referring to endemism: a term defining a species' uniqueness to a geographical area.
Pelage	The fur coat of a seal. Individual markings on the pelage allow the observers to recognise or identify the individual in-situ.
Pinniped	A clade (grouping of organisms in accordance with the science of cladistics) of mammals, which includes true seals, eared seals and walruses, which itself is a part of the Order Carnivora.
Post-weaning dispersal	Pups and mothers dispersing from breeding beach following natural weaning of the pup.
Sexually-dimorphic	Referring to sexual-dimorphism: where the male & female forms of a species are different physically. In Grey Seals, males are much larger than females and exhibit differences in pelage colouration.
Vagrant	Occurrence of a species observed outside of its typical distribution.