

Grey Seal Behaviour, Pup Census and Photo Identification Study: Calf of Man

Final Report 2012

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Key Findings

- 41 pups at 12 different sites.
- Predominant behaviour at sites was resting, with suckling observed in 15% of intervals.
- Individual variation was quantified in the mothers' investment in their pups, revealing personality differences across the colony.
- 26 females and 4 males were fully identified.
- 16 females and 4 males have been seen in previous years.

1.0 Introduction

Grey seal monitoring during the pupping season has again taken place in 2012, covering the majority of the pupping season. The study was conducted between the 25th September and 29th October 2012, with assistance before and after from the Calf wardens. The project was again carried out under license from the Isle of Man Government (Department of Environment, Food & Agriculture, license number WLA/G003/12).

2.0 Methods

Methodology followed was the same as in 2010 and 2011 (see previous reports for methodology). The pup count was carried out on an ad hoc basis while the wardens were carrying out other duties. When the volunteer observers arrived, effort was increased with almost daily walks to the main pupping sites. Pup presence was recorded and pups were assigned to one of 5 developmental stages, to ensure that pups weren't double counted. Behavioural observations were carried out, with the majority of effort concentrated at 3 sites, Grant's Harbour, the Puddle and Cow Harbour. Photo identification of females, males and fully moulted pups was carried out wherever possible.

An additional behavioural study was initiated in 2012, to look at the variation in the behaviour of individual mothers in relation to their pup and responses to other adults at the pupping site. This gives an indication of differing personalities among the population, which in turn may affect a population's ability to respond to rapid environmental change (Twiss et al, 2012). For this study, information was recorded in 5 minute intervals. At the start of each interval, the distance of the mother to the pup (<1m, 1-5m, 5-10m, >10m) and whether the mother was suckling the pup was recorded. Within each interval, the reaction to an approach by another female or male and the reaction to an approach to another female or male were also recorded (either positive, none or aggressive). An approach was defined as one seal coming within 5 metres of another.

3.0 Results

3.1 Pup Census

There were 41 pups found on the Calf in 2012, at 12 different sites. Only 3 dead pups were seen, making the pre-weaning mortality rate 7%. This is similar to previous years on the Calf, as well as being relatively low compared to general grey seal pup mortality. This is the highest number of pups recorded in one season (previous range: 27*-38. *=2009 which was only a short pilot study). It is also the highest number of sites recorded in one year (previous range: 9-11).

The distribution of pups can be seen in Figure 3.1.1 below. This map also has the distribution of pups in previous years. Distribution is broadly similar, with a clear high density of pups at Cow & Grant's harbours once again. However, in 2012 Ghaw Lang had a higher than expected number of pups with 7 recorded in this narrow, restricted site.

3.2 Pup Development

Due to the timing of volunteers and the confusing nature of the distribution at the sites, it was not possible to follow any pups from birth through to full development.

3.3 Behaviour

Behavioural observations were carried out for a total of 107 hours, over 32 days. The breakdown of time spent at each site is shown in the table below:

Site	Hours Observation
Grant's Harbour	30.5
The Puddle	27.5
Cow Harbour	18.75
Smugglers Cave	6.25
Fold Point	6
Ghaw Lang	5
The Leodan	5
Gibdale	3
Mill Giau	3
The Cletts	2

Figure 3.1.1: Distribution of pups, 2009-2012 (2012 locations and pup numbers in red)

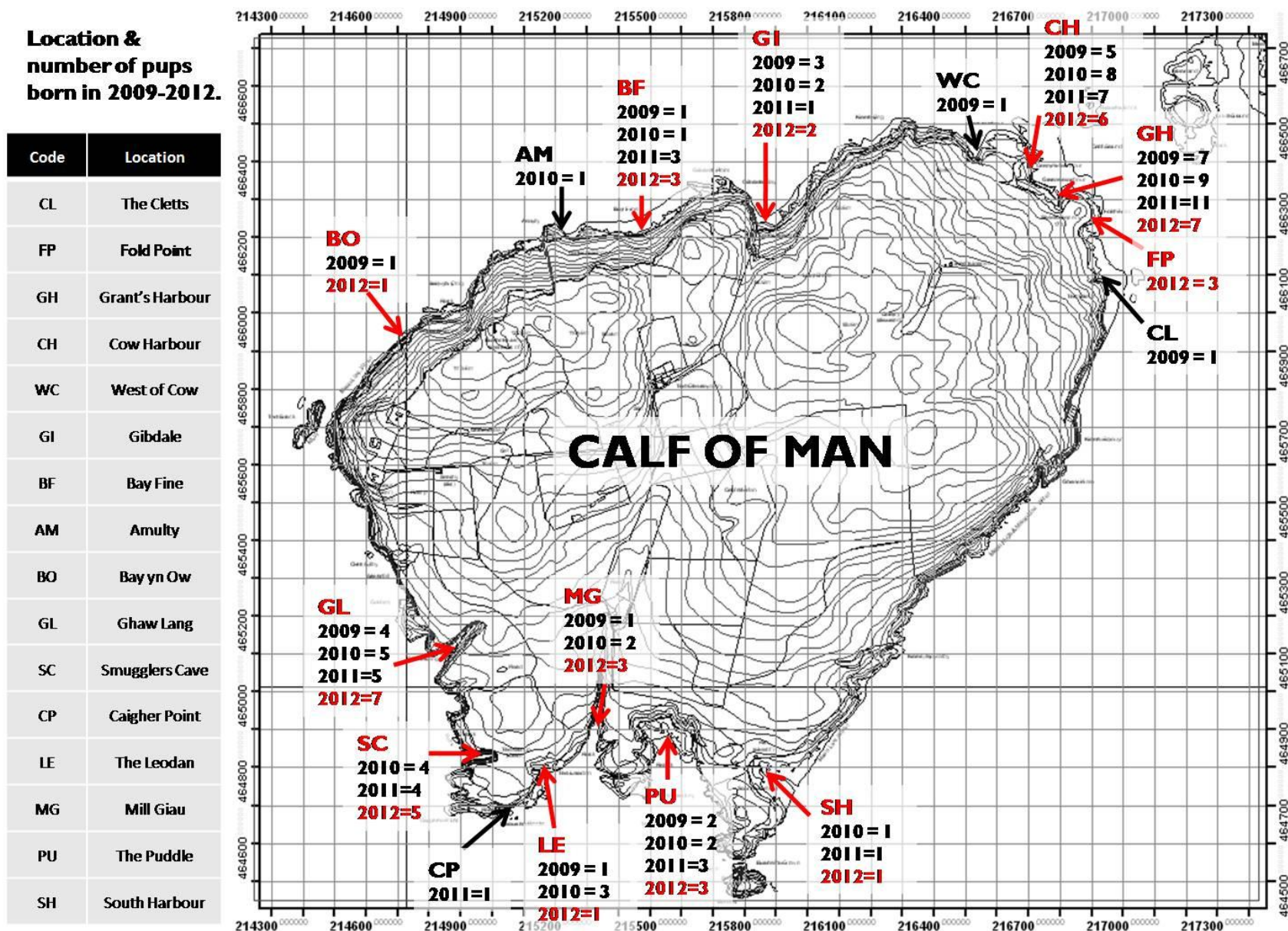


Figure 3.3.1 below shows the breakdown of the occurrence of all behaviours, males and females combined. This represents the number of intervals that were positive for that behaviour, rather than the length of time spent engaged in that behaviour. It can be seen that once again, the most commonly observed behaviour was resting, both on land and in the water. Travelling in the water was observed more than in 2011; however its occurrence was very similar to that in 2010. Suckling was observed in 15% of intervals, which is slightly lower than the 19% and 21% recorded in 2011 and 2010 respectively. Whether this is an artefact of carrying out watches over a broader range of sites, whether it is an anomaly of the year or whether it is a cause for concern, is not known. However, this should be monitored over subsequent years.

Figure 3.3.1: Occurrence of each behaviour, males and females combined. H = hauled, W = in the water, L-S = moving from land to sea, S-L = moving from sea to land.

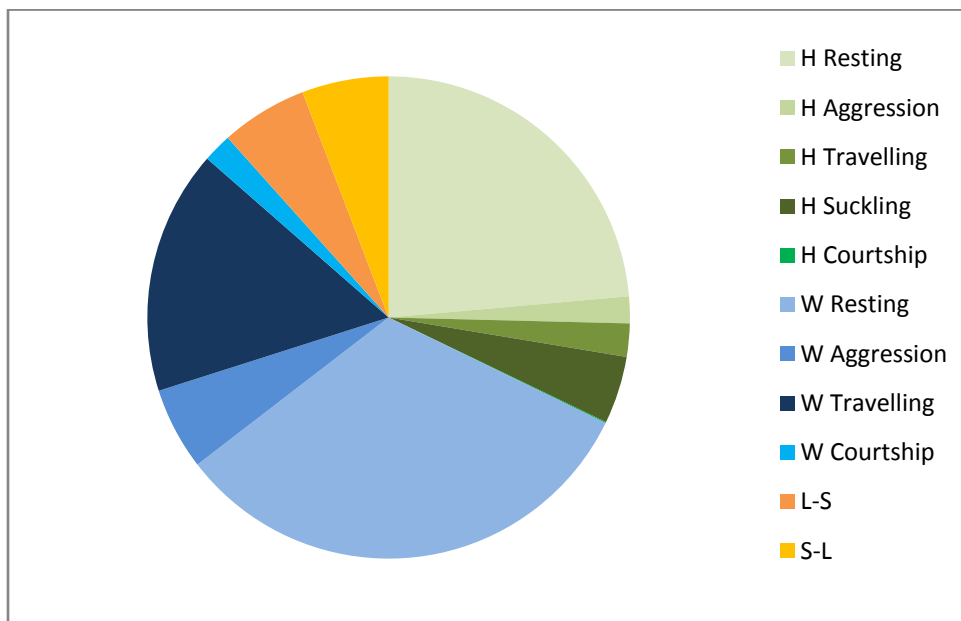
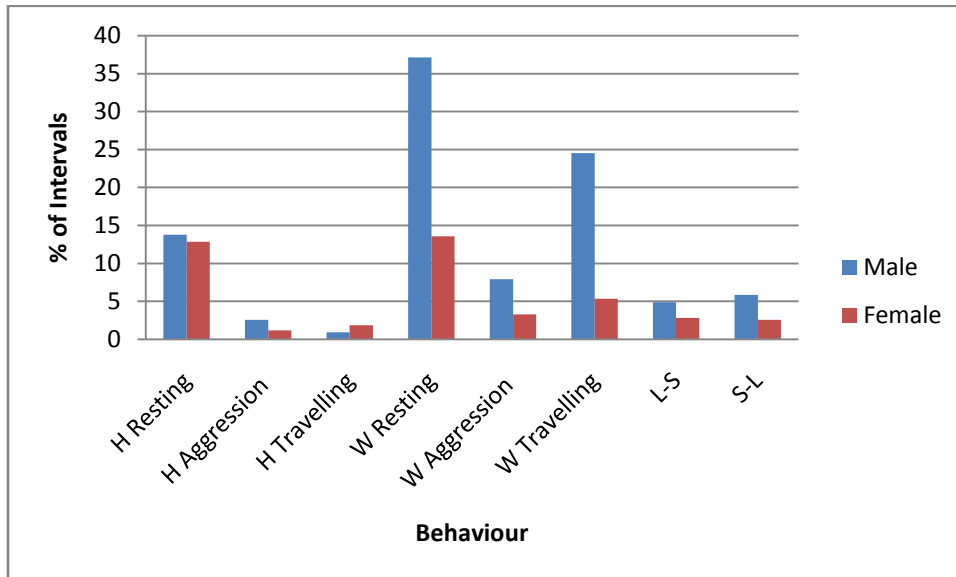


Figure 3.3.2 below shows the breakdown between males and females for the more commonly observed behaviours. The average number of males present in each interval was 1.1 and the average number of females was 4.8 (slightly higher number of females than in previous years, perhaps unsurprising given the slightly higher number of pups). Using these as correction factors makes the results for males/females more comparable.

The main difference between the genders was that males spent considerably more time resting in the water than females. Males were also observed travelling through the water more than females. The main difference between the 2012 pattern and that of previous years was that there was an increased amount of in water aggression and male travelling. This may be an artefact of the greater range of sites studied and their different habitats (both physical and social).

Figure 3.3.2: Breakdown by males and females of the more commonly seen behaviours. H = hauled, W = in the water, L-S = moving from land to sea, S-L = moving from sea to land.



Pup behaviour was not quantified, but, as in previous years, pups showed a variety of behaviours, especially as they got older. There was also individual variation in the amount pups moved around and went in the water, partly dictated by their physical positions on the beach/rocks.

3.4 Mother Focal Study

Behavioural observations of individual mothers were recorded for a total of 180 hours (up to 3 mothers could be recorded simultaneously hence the higher observation time). The breakdown of time and location of observations is shown in the table below:

Location	Mother ID	Hours observation
Grant's Harbour	2	17
	7	21
	79	20
Fold Point	12	6
	56	6
	63	6
Cow Harbour	14	15
	17	6
Puddle	20	15
	82	16

Mill Giau	80	3
Leodan	81	2
Various	Unknowns	47

Six females were observed for at least 15 hours and therefore these will be focussed on for the main analysis of the results. These key females were 2 and 7 (each have had 4 known pups), 14 and 20 (3 known pups) and 79 and 82 (first known pup in 2012). However all mothers are include for the purposes of the 'average' calculations.

Suckling

At the start of each 5-minute interval, whether the mother was suckling the pup or not was recorded. The average percentage of 5-minute intervals in which suckling was observed was 6.5%. This is lower than the overall percentage recorded in the broader behavioural study, but is only thought to be due to methodological differences. For the six key mothers, the percentage of intervals suckling (in increasing order) was as below:

Mother ID	% intervals suckling
20	3.9
14	4.4
2	6.8
79	8.2
82	10.0
7	12.9

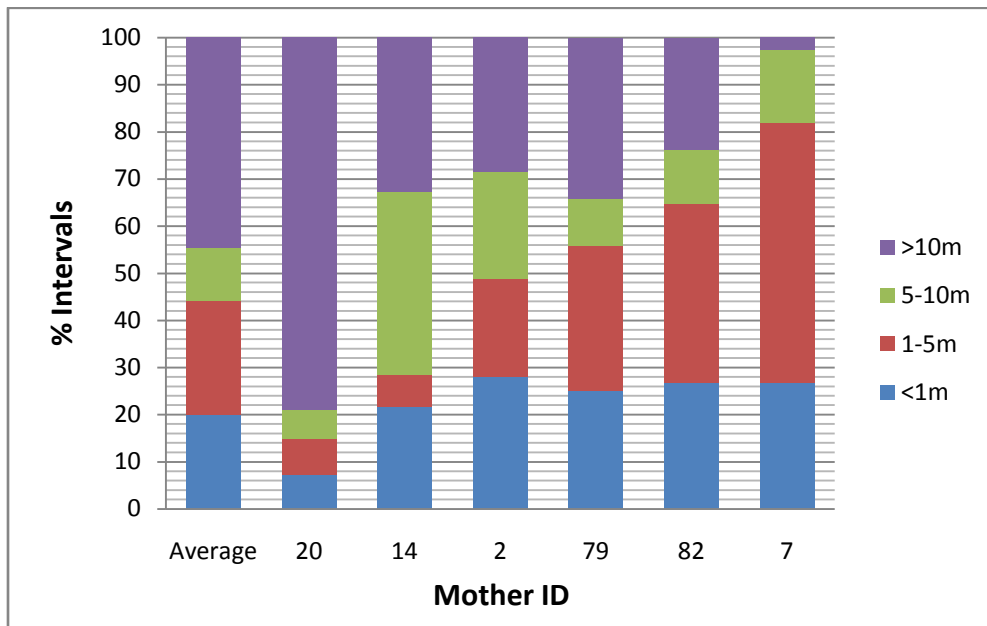
In general, these figures are higher than the average, which is probably an artefact of the longer observation time with these females. However there is individual variation in the amount of time spent suckling the pup. For example, mothers 7 and 82 had a much higher percentage of intervals suckling, whereas mother 14 had a lower percentage. Individual 20 is thought to have had a much lower percentage as her pup was already about 6 days old when first observed, whereas the others were observed from within the first day or two of birth. Nevertheless, all the pups survived and were successfully weaned.

Distance from Pup

At the start of each 5-minute interval, the distance a mother was from her pup was recorded, in 4 distance bands. The percentage of intervals at each distance band for the six key mothers is

shown in Figure 3.4.1 below, along with the average for all the mothers. This has been ordered as in the suckling table above.

Figure 3.4.1: Percentage of occurrence at different distance bands for the key mothers, alongside the average for all mothers.



Although for a mother to be suckling, she would clearly have to be within 1 metre of her pup, this graph shows that in fact all the mothers spent more time than just when suckling at this close proximity. With the exception of mother 20 (whose pup was always older during observations), all mothers spent about 20% of intervals within 1 metre. Mother 20 in fact spent the majority of time at over 10 metres away from her pup, although this may not be surprising given that the pup was older.

The most striking difference between the mothers is the amount of time spent up to 5 metres away (i.e. <1m and 1-5m) compared with over 5 metres away (i.e. 5-10m and >10m). Moving left to right along the graph, the amount of time spent within 5 metres increases, which mirrors the increasing percentage of time spent suckling by these mothers as seen above.

These two factors indicate differing levels of maternal closeness among the different mothers, perhaps reflecting differing levels of protection and care of pups. It is likely that at distances of up to about 5 metres, a mother would be close enough to easily protect and defend her pup, whereas over this distance the pup would be more vulnerable. This does not appear to be related to location as mothers 20 and 82 were at the same location, as were mothers 2, 79 and 7, yet all show different patterns of proximity. It also does not appear related to the previous number of pups recorded for each mother, although this must be treated with caution as it is not known how many pups each mother has actually had, only those recorded previously in this study.

Responses to other adults

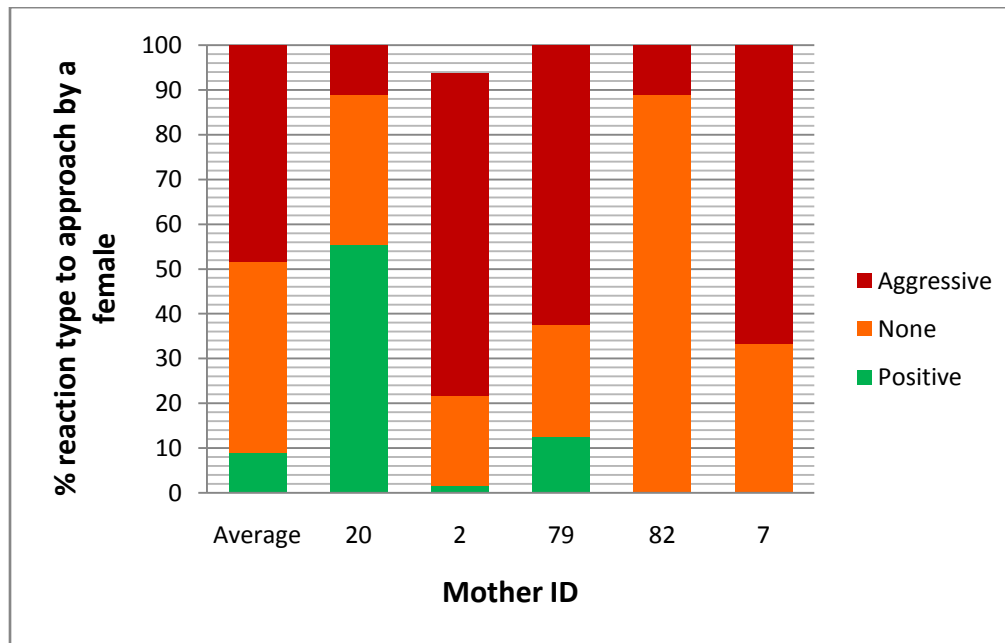
When a focal mother was approached by or actively approached another adult, her reaction to this approach was recorded, as either positive, none or aggressive. Overall, there was a low percentage of interaction between adults, despite most of the pupping beaches having several adults and pups present. There was a higher degree of interaction between females, which is not surprising as there were more females present at the pupping beaches. The percentage of intervals in which an approach and reaction was recorded, for all mothers, is shown in the table below:

Approach:	% of total intervals
By a female	4.2
To a female	3.7
By a male	2.6
To a male	0.3

The lack of data on approaches to males means this is not considered further.

Approaches by another female:

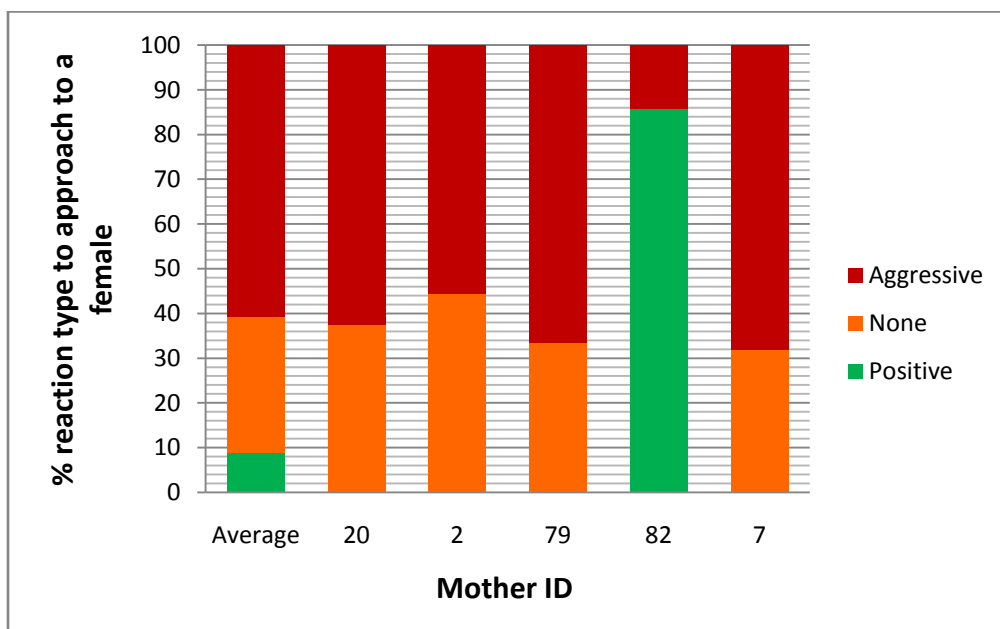
Figure 3.4.2: The different reaction types exhibited by the key mothers to approaches by other females, compared with the average for all mothers. Note, mother 14 was not involved in any approaches by females and hence is omitted.



Overall, most reactions were either neutral or aggressive, however there is considerable variation between the different mothers. This does not appear to correlate with the previous findings relating to the amount of time suckling/ closeness to pup. It also does not appear to be related to location as mothers 20 and 82 were at the same beach, as were mothers 2, 79 and 7, or to be related to the number of pups a female has had. It may be a real difference, or may be due to a small sample size – repeat studies in future years would hopefully start to resolve this.

Approaches to another female:

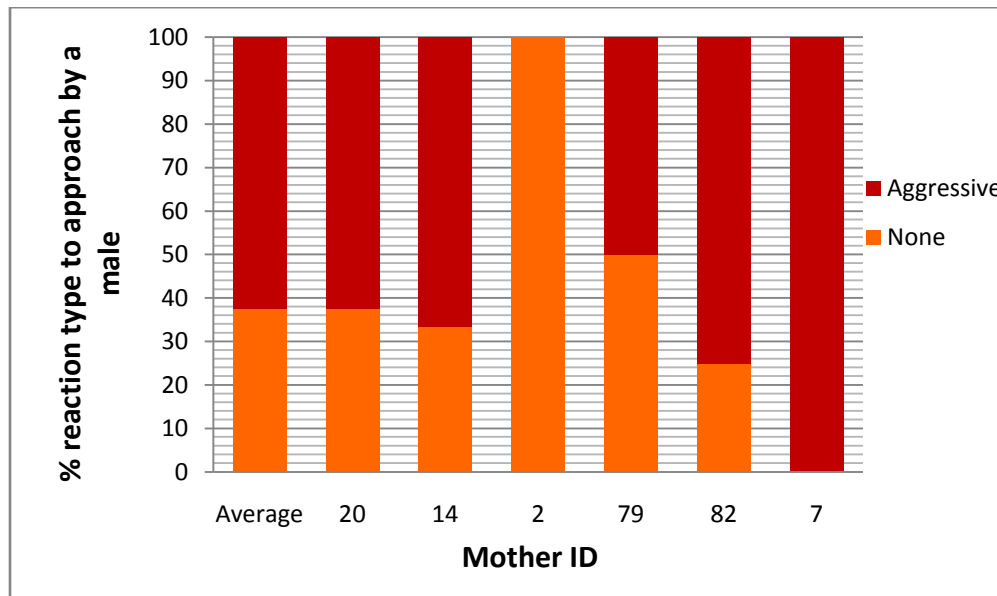
Figure 3.4.3: The different reaction types exhibited by the key mothers to approaches to another female, compared with the average for all mothers. Note, mother 14 was not involved in any approaches to females and hence is omitted.



Again, the reactions are predominantly neutral or aggressive. With the exception of mother 82, the proportion of neutral/aggressive reactions is broadly consistent across the different mothers. The reason for mother 82 having a large percentage of positive reactions may be due to a small sample size.

Approaches by a male:

Figure 3.4.4: The different reaction types exhibited by the key mothers to approaches by a male, compared with the average for all mothers.



Reactions to approaches by a male were exclusively neutral or aggressive, with a larger proportion of aggressive reactions. This is with the exception of mother 2, whose reactions were exclusively neutral. These results are also based on a small sample size however. It might also be anticipated that towards the end of the breeding season, there would be a degree of positive reactions, as courtship and mating take place. Whilst some courtship and mating behaviour was generally observed, it was not recorded specifically with the focal mothers during this season.

Overall, these results have highlighted both similarities and differences between different mother's approaches to raising a pup. The correlation between suckling/physical proximity to her pup indicates that different mothers invest different amounts of time and protection of their pup, however the ambiguous differences in reactions to other seals shows that this relationship is complicated as they do not show a similarly correlated level of vigilance. This may be due to a small sample size so further research is needed. It is hoped that in future years the same mothers can be followed again, to see whether their behaviour patterns remain over time or vary.

3.5 Photo Identification

In 2012, 26 females and 4 males were identified fully, i.e from good quality photos of both the left and right side of the head. Additionally, a further 16 females and 4 males were identified, either from poorer quality photos or from photos of only one side. The total number of individuals in the catalogue is now:

Females (full ID) = 56

Left/Right females = 33

Males = 15

Of the females identified, 21 had pups in 2012. 16 females identified had been seen in previous years – 2 of which have now had a pup in 4 different seasons. There is also 1 male who has been identified 4 years running and 4 males which have been seen in previous years.

Returning females generally had pups in a close location to previous years – there is an apparent ‘north south divide’ between the sites in the north (Cow & Grant’s harbours, Fold Point), and the sites on the south west coast. However, one female moved from Grants Harbour to the Puddle, in the south. One female made a similar move last year.

4.0 Potential Disturbance

The study was carried out according to the terms of the license, in order to minimise disturbance. Although it was noticed that females in particular showed a reaction to the presence of the observer, typically they reverted to their original behaviour once the observer had settled into position. There was also considerable individual variation in the level of response shown towards the observer – another indication of different personalities within the colony. Over the length of the study, seals typically became habituated to the presence of the observer.

In 2012 there was another project being carried out on the Calf during the autumn (the Manx shearwater recovery project). This involved a greater number of people being present on the Calf, and hence a greater number of people being in the vicinity of pupping sites. All volunteers were briefed as to the locations of the seal pups and no one needed to get too close to the sites. It is not believed that this had any extra disturbing effect on the seals or affected the success of the breeding season.

Once again, there was a pup in South Harbour. It was born quite late in the season and was not thought to be unduly disturbed by the few boats that came into the harbour. Overall, whilst reactions were shown, it was not thought that this had any significant negative impact on the health of the seals.

5.0 Conclusions

The grey seal pup study was again carried out very successfully during the 2012 season and the results showed similarities to previous year's results. The total number of pups, at 41, was the highest yet recorded. Most of the same locations were used for pupping.

Behavioural observations were also fairly consistent with previous years. The addition of the new focal mother behaviour study has revealed interesting new patterns and revealed the individual personalities that seals have. These different personalities not only highlight the complex and intelligent society that seals live in, but may also confer differing levels of ability to adapt to a rapidly changing environment (Twiss et al, 2012). Continuing this study in future years will not only refine the differences/similarities between individuals, but should also show whether individuals show plasticity in their behaviour over time.

Photo identification is proving very useful for studying site fidelity to the Calf. Each year more females are being added to the catalogue, indicating that we still haven't encountered all the different seals that use the Calf for pupping. However, the increasing number of seals recognised as returning to the Calf indicates it continues to be a suitable pupping location for this population. It has not yet been possible to track any of the seals beyond the Calf, but potentially comparisons with other photo ID catalogues may also show up more wide scale movements. Long term photo ID studies will enable a more accurate estimate of the number of grey seals utilising the Calf, as well as a greater understanding of life history traits such as longevity and fecundity. As the Calf has the highest density of pups around the Isle of Man, long term study should also continue to ensure this protected species is monitored during this crucial life stage.

6.0 References

Twiss SD, Cairns C, Culloch RM, Richards SA, Pomeroy PP (2012) Variation in Female Grey Seal (*Halichoerus grypus*) Reproductive Performance Correlates to Proactive-Reactive Behavioural Types. PLoS ONE 7(11): e49598. doi:10.1371/journal.pone.0049598