

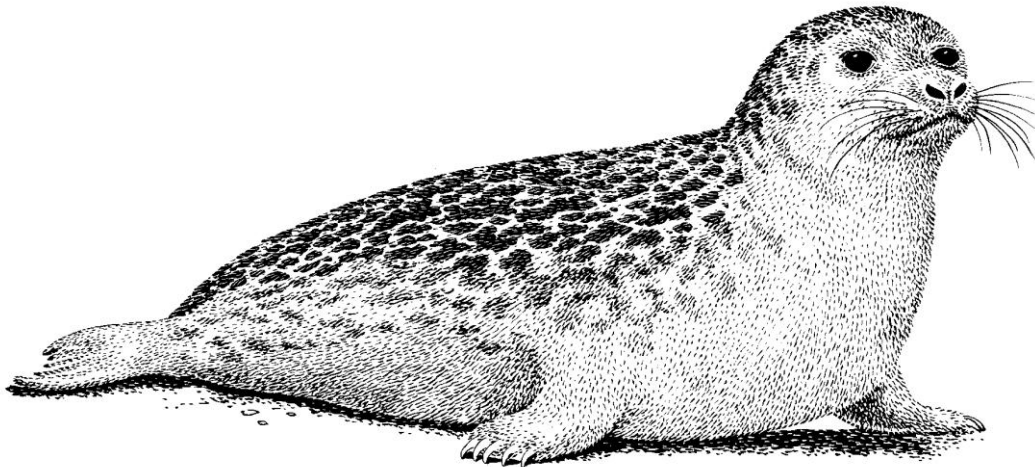


# **Tees Seals Research Programme**

## **Monitoring Report No.28**

**(1989 – 2016)**

Compiled by Ian Bond & Jenny Gibson



# Contents

<b>Summary</b>	<b>3</b>
<b>1. Introduction</b>	<b>4</b>
<b>2. Seal Identification</b>	<b>5</b>
<b>3. Behaviour</b>	<b>6</b>
<b>4. Monitoring Methods</b>	<b>7</b>
<b>5. Results of the TSRP 2016 Seal Monitoring Season</b>	
<b>5.1. Haul-out behaviour at Seal Sands</b>	<b>8</b>
<b>5.2. Birth and Survival of Harbour Seal pups</b>	<b>9</b>
<b>5.3. Maximum Count of seals at Seal Sands / Greatham Creek</b>	<b>12</b>
<b>5.4. Mean Count of seals at Seal Sands / Greatham Creek</b>	<b>13</b>
<b>5.5. Greatham Creek</b>	<b>16</b>
<b>5.6 Disturbance</b>	<b>17</b>
<b>5.7 Mortality / infirmity</b>	<b>18</b>
<b>6. Teesmouth seal data outside of the TSRP</b>	<b>18</b>
<b>7. Discussion</b>	<b>19</b>
<b>8. Acknowledgements</b>	<b>20</b>
Appendix 1 – Teesmouth Area	<b>21</b>
Appendix 2 – Seal Sands Haul-out Sites	<b>22</b>

## Summary

The 2016 season was the 28<sup>th</sup> year during which seal monitoring has taken place at Seal Sands. The first pup of the season was born on 18<sup>th</sup> June. The date of the last seal pup to be born is not known but there was no increase in the number of seal pups recorded after 5<sup>th</sup> July. In total, 18 Harbour Seal pups were born, all of which are thought to have survived to weaning. This number of successfully weaned pups has now been the same for the past three years.

The total numbers of Harbour Seals were also in line with the previous two years. Although the maximum number of 115, recorded on 21<sup>st</sup> August, is the highest so far recorded, it is only one higher than the maximum in 2015 and five higher than in 2014.

The mean number of Harbour Seals across the entire monitoring period was 75.3, compared to 72.6 in 2015 and 72.0 in 2014. In contrast to previous years, mean numbers were at their highest in September rather than August.

Grey Seal numbers have clearly increased this year. The mean number for each of the four months monitored was higher than the corresponding month in 2015 with the mean for September being the highest monthly mean for Grey Seals ever recorded on the Tees. The maximum number of 66 Grey Seals, recorded on 21 August, was the highest number recorded as part of this monitoring programme but as in 2015 it was exceeded by an unrelated count, when over 83 Grey Seals were recorded hauled out on Area D on 30 June. This is currently the highest number of Grey Seals recorded in the Tees Estuary.

The number of instances of disturbance to seals that were recorded is down on the previous two years. Twelve such instances were recorded in 2016, all but one at Greatham Creek.

Outside of the formal Tees Seals Research Programme, a series of casual counts of seals were collated which help to give a broader picture of the seal population in the Tees Estuary. These confirm that Greatham Creek is used by Harbour Seals throughout the year and over high tide, with a mean of 20 seals recorded there between November and early June. They also confirm that Grey Seals are hauling out at Area D throughout the year, with indications that their numbers there are at their highest in early summer.

## **1. Introduction**

Seals have lived at the mouth of the River Tees for many hundreds of years, but had declined rapidly by the late 1800s. This would be likely to have been due to a number of factors, with pollution being the main cause either directly or indirectly. As a result of a combination of these factors, by the 1930s seals had totally disappeared from the Estuary.

The mid 20<sup>th</sup> century saw old-style steel and coke plants being replaced by newer, less polluting works. Reclamation of the lower estuary restricted river access and probably reduced disturbance to the seals. From the early 1970s there began a concerted effort by regulators and industry to reduce the pollution load discharged to the estuary. Eventually Harbour Seals began to re-appear and by the mid 1980s there was again a resident population. Teesmouth is the only known estuary in Europe where Harbour Seals have re-colonised as a direct result of environmental improvements.

The Tees Seals Research Programme (TSRP) was initiated by the Teesside Development Corporation to monitor the effects of the 1988 phocine distemper virus outbreak. Since 1992 the programme has been managed by INCA in order to monitor the status of the seal population in the Tees Estuary as a general indicator of the health of the River Tees and its intertidal area. This report details the results of this year's monitoring and compares them to previous results from 1989, thus providing a 28 year data series.

The TSRP has historically concentrated on Harbour Seal hence takes place from mid June to mid September to coincide with the breeding and moulting periods for that species. However it is known that both Harbour and Grey Seals are present in the Tees Estuary throughout the year. Observations of seals, including counts, that have been obtained through casual records have therefore been collated and are reported in a separate results section of this report. A formal monitoring programme of seals that are present at the Tees Barrage is carried out by the Canal & Rivers Trust annually and is the subject of a separate report.

## **2. Seal Identification**

At Seal Sands the species present are the Harbour or Common Seal (*Phoca vitulina*) and the Grey Seal (*Halichoerus grypus*).

Grey Seals are much larger than Harbour Seals; males (bulls) can be up to 2.6m in length and over 300kg in weight. The females (cows) are distinctly smaller than the bulls being under 2m and rarely exceeding 150kg in weight. Grey Seals have a 'Roman' nose and vertical nostrils which are set further apart and are parallel. The bulls are usually dark in colouration with the cows being a dark silver-grey on their backs and paler with large blotches on their flanks.

In Harbour Seal the males and females are more equal in size being around 1.5m in length and weighting around 100kg. Harbour Seals have a smaller, more rounded head, with smaller V-shaped nostrils. Their colouration tends to be either a sandy-brown or with small spots that are more evenly distributed around their body than is the case with Grey Seals.

Figures 1 and 2 show the two species described.



Figure 1: Harbour Seal (John Bridges, [www.northeastwildlife.co.uk](http://www.northeastwildlife.co.uk))



Figure 2: Grey Seal (John Bridges, [www.northeastwildlife.co.uk](http://www.northeastwildlife.co.uk))

### **3. Behaviour**

#### **3.1. Haul-out**

All seals moult once a year and spend a higher proportion of time hauled out than at other times of the year. They haul-out in groups as they moult and are often seen to be very irritable and listless during this period. For Grey Seals, moulting occurs between January and March, compared to August for Harbour Seals.

At Seal Sands the two species of seal generally haul-out in separate groups. Harbour Seals tend to leave a significant amount of space between individuals in the group, whereas Grey Seals haul-out in a tightly-bunched group.

Seal Sands provides an opportunity for seals to haul out across low tide but rapidly becomes inundated as the tide comes in. An exception is Area D, which being at the base of an embankment provides an opportunity to haul out across a greater part of the tidal cycle. Conversely Greatham Creek generally becomes unsuitable for seals at low tide as they risk becoming land-locked as the tide goes out, leaving a very shallow freshwater creek. On spring tides, seals typically vacate Greatham Creek around one hour before low tide but on neap tides they might stay there over the low tide period. Greatham Creek also provides a haul out location across the high tide period, although this is not monitored as part of the TSRP.

#### **3.2. Breeding**

Harbour Seals usually have their pups between late June and early July. The pups are very small when born, being around 0.7m long and 10kg in weight. They appear very dark in colour, almost black from a distance. Pups are taken into the water only hours after birth, remaining with their mother constantly. The mother/pup relationship is critical in ensuring that the pup is cared for and is not malnourished or abandoned. Typically, a pup will need to feed for at least 10 minutes in every hour to wean successfully and there is a four week lactation period during which the pups more than double their birth weight.

The Grey Seal does not breed at Seal Sands. New-born Grey Seal pups, which, on the east coast of England, are born around October and November, are fur-covered at birth and cannot swim. Therefore, Grey Seal cows give birth above the high water mark and haul out there for long periods of time after giving birth. This is not possible on Seal Sands itself, as haul-out sites are inundated at high tide. The amount of suitable breeding sites in the wider Teesmouth area would also seem to be very restricted but in theory it is not impossible that a small number of Grey Seals could pup here. As they do not breed here, some Grey Seals are assumed to leave the River Tees to return to their breeding sites but it is known that a number of them remain here throughout the winter.

## 4. Monitoring Methods

Monitoring was carried out on a daily basis from 15<sup>th</sup> June to 9<sup>th</sup> September, to cover the period in late June and early July when the Harbour Seals give birth and the period in August and early September when they gather to moult.

Counts of seals were carried out simultaneously at Seal Sands and Greatham Creek, with the surveyor at Seal Sands being stationed at the observation hide on the sea wall above Greenabella Marsh and the surveyor at Greatham Creek stationed on the public footpath on the north side of Greatham Creek. A telescope was used at Seal Sands and binoculars at Greatham Creek. Counts took place every half hour, two hours either side of low tide, giving nine counts at each station per day. A total of 84 days of observations took place in 2016.

The following information was recorded at each of the nine counts each day:

- Numbers of each species.
- The locations where the seals were hauled out.
- The number of pups

In addition a record was made of the following during the whole of the four hour count:

- Instances of disturbance to seals
- Deaths or injuries to seals
- Abandonment of pups
- Notable features such as behavioural interactions between seal species
- Weather conditions

Appendix 1 shows the main areas at Teesmouth that the seals frequent, while Appendix 2 shows the specific haul-out sites used at Seal Sands.

## 5. Results of TSRP monitoring in 2016

### 5.1. Haul-out Behaviour at Seal Sands

The following data give a summary of monthly mean numbers of both Harbour and Grey Seal observed over the four hour low tide period at each of the haul-out sites on Seal Sands and is discussed in Section 6.1. The named sites (Site 'A', 'B', etc) are shown in Appendix 2. Usually, site 'A', 'B', 'E' and the 'Wall' are used mainly by Harbour Seals, while Site 'D' is used by Grey Seals. Site 'C' and the 'Spit' are used by both species.

Site usage is dependent upon the height of the low tide. The position of Site 'A' is relatively high in comparison with most of the other haul-out sites (except Site 'D', which is exposed for most of the tidal cycle). Site 'B', Site 'C', the 'Spit' and the 'Wall' are only 2.3m above the Lowest Astronomical Tide (LAT), so they are often mostly covered by water on low neap tides.

Monthly means were obtained using the maximum numbers of seals present on each site during each low tide period on the days where monitoring took place. Comparative data from the period 2007 to 2015 is shown in the figures which follow in order to place the 2016 data into context. The bar charts below show blue columns corresponding to the average number of Harbour Seals, while red columns correspond to the number of Grey Seals.

The relative importance of the sites in 2016, both inter and intra-specifically, generally follows the usual pattern though Grey Seal numbers at Site C and Harbour Seal numbers at The Spit are respectively, notably higher than in previous years.

#### 5.1.1. 'Site A'

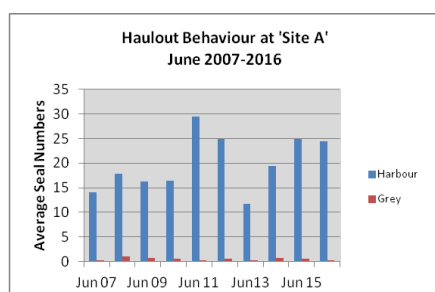


Figure 3a: June 2007-2016

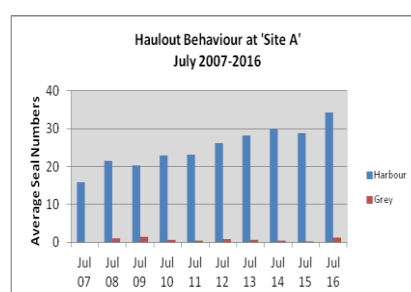


Figure 3b: July 2007-2016

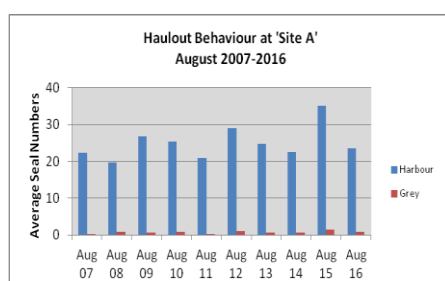


Figure 3c: August 2007-2016

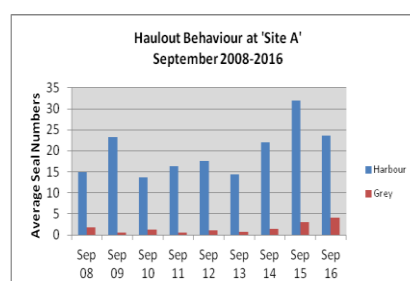


Figure 3d: September 2008-2016

**Figure 3:** Incidence of seals using 'Site A' between 2007 & 2016



### 5.1.2. 'Site B'

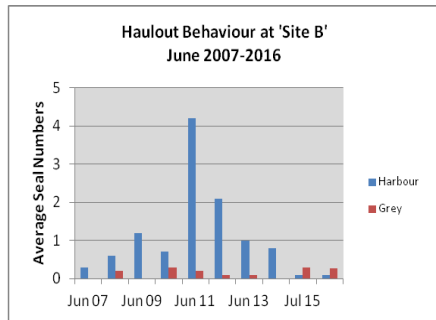


Figure 4a: June 2007-2016

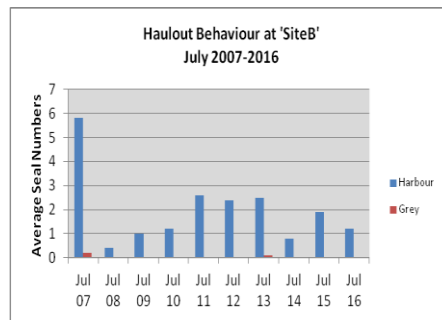


Figure 4b: July 2007-2016

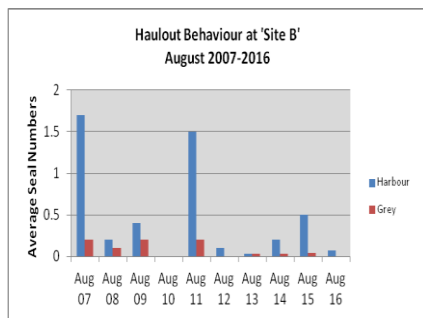


Figure 4c: August 2007-2016

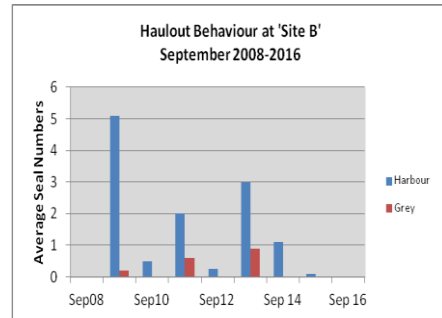


Figure 4d: September 2008-2016

Figure 4: Incidence of seals using 'Site B' between 2007 and 2016

### 5.1.3. 'Site C'

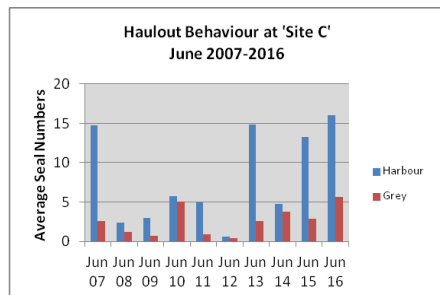


Figure 5a: June 2007-2016

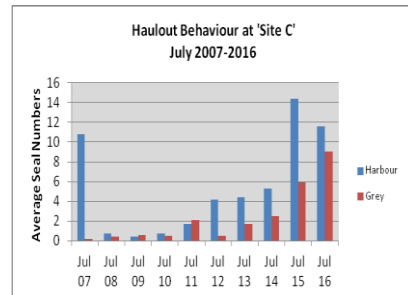


Figure 5b: July 2007-2016

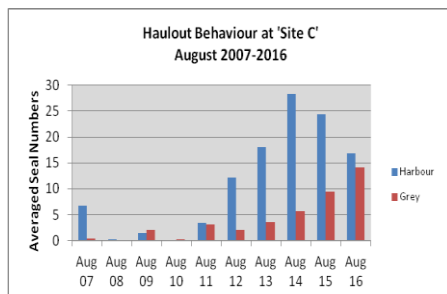


Figure 5c: August 2007-2016

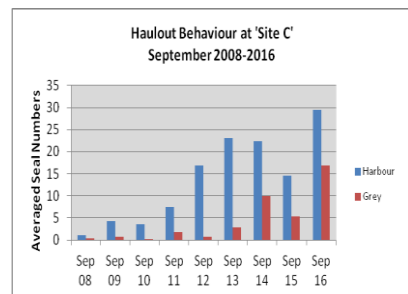


Figure 5d: September 2008-2016

Figure 5: Incidence of seals using 'Site C' between 2007 and 2016

### 5.1.4. 'The Spit'

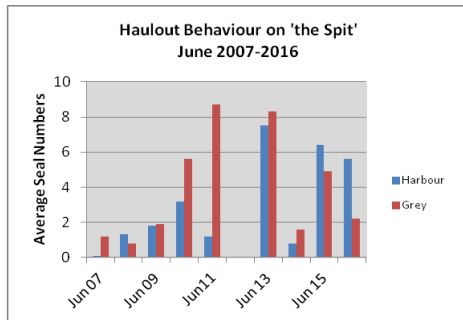


Figure 6a: June 2007-2016

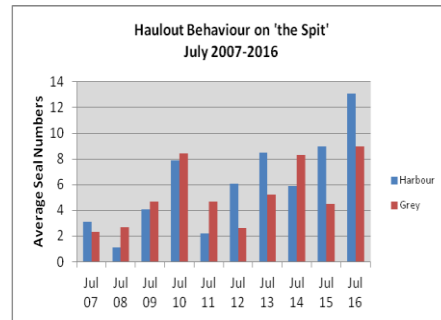


Figure 6b: July 2007-2016

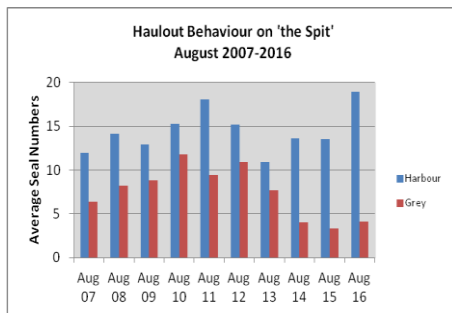


Figure 6c: August 2007-2016

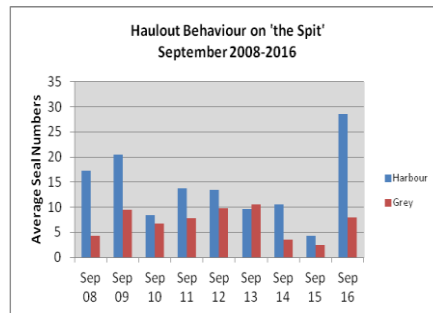


Figure 6d: September 2008-2016

**Figure 6: Incidence of seals using the 'Spit' between 2007 and 2016**

### 5.1.5. 'The Wall'

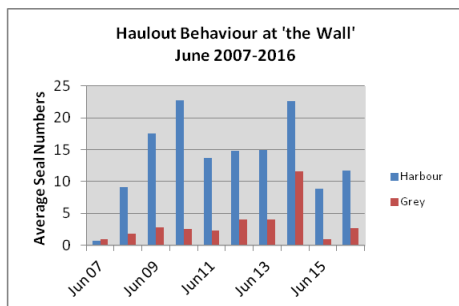


Figure 7a: June 2007-2016

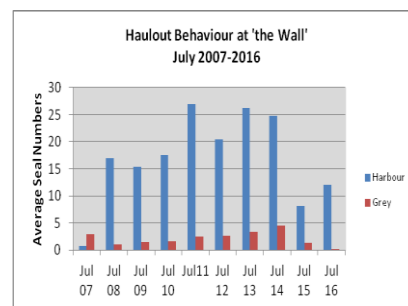


Figure 7b: July 2007-2016

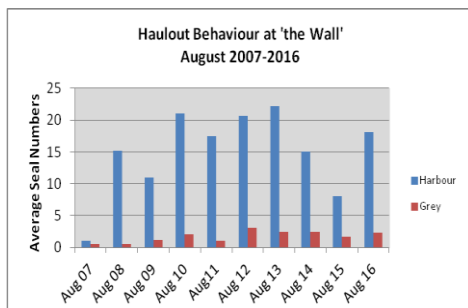


Figure 7c: August 2007-2016

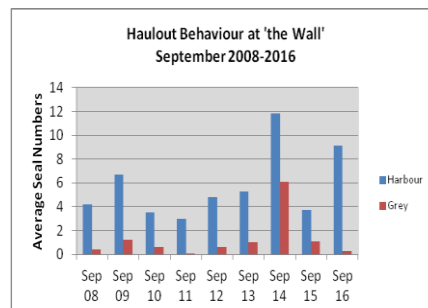


Figure 7d: September 2008-2016

**Figure 7: Incidence of seals using the 'Wall' between 2007 and 2016**

### 5.1.6. 'Site D'

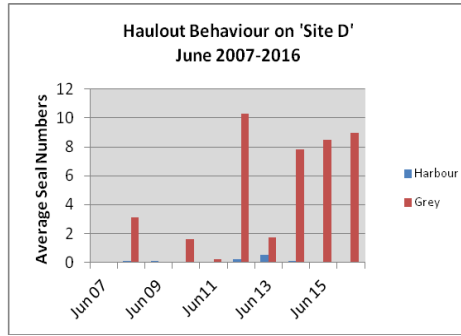


Figure 8a: June 2007-2016

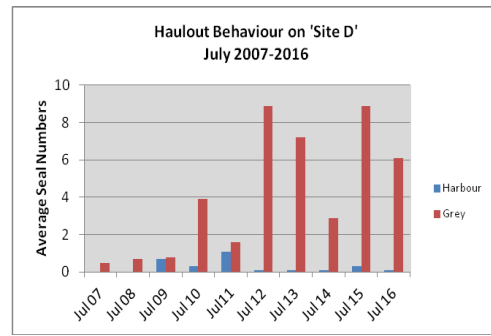


Figure 8b: July 2007-2016

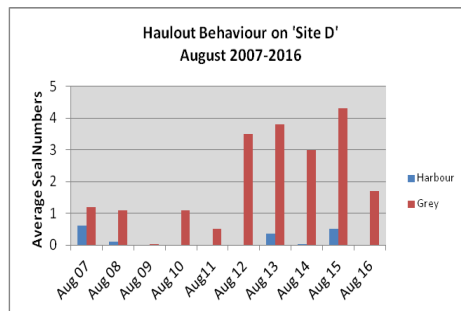


Figure 8c: August 2007-2016

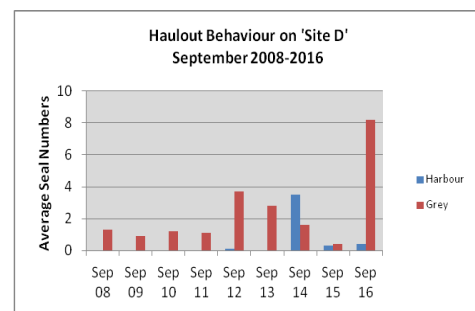


Figure 8d: September 2008-2016

**Figure 8: Incidence of seals using 'Site D' between 2007 and 2016**

### 5.1.7. 'Site E'

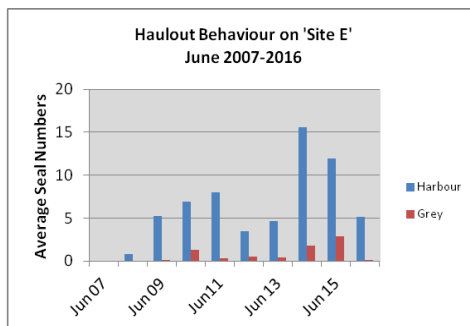


Figure 9a: June 2007-2016

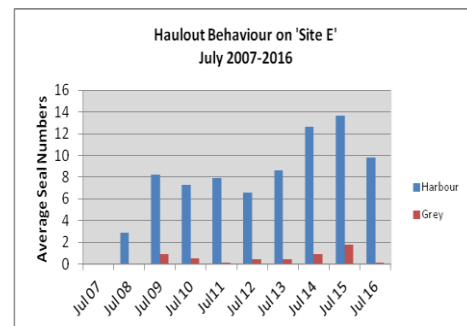


Figure 9b: July 2007-2016

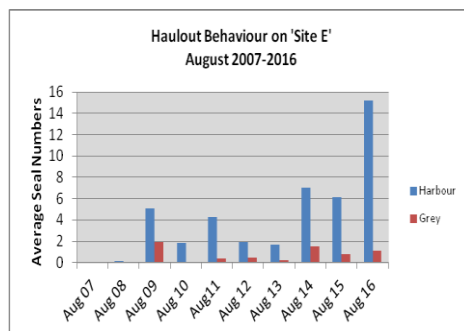


Figure 9c: August 2007-2016

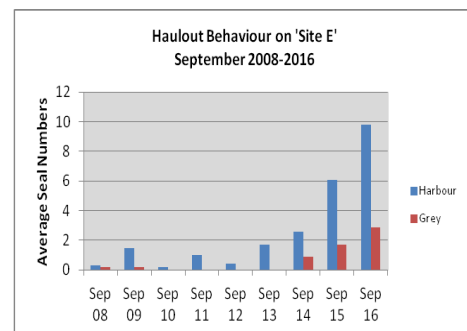


Figure 9d: September 2008-2016

**Figure 9: Incidence of seals using 'Site E' between 2007 and 2016**

## 5.2. Birth and survival of Harbour Seal pups

A minimum of 18 pups were born in 2016, all of which are thought to have survived to weaning. The first pup was born on 18<sup>th</sup> June with a total of 18 pups being recorded by 5<sup>th</sup> July. This is typical of the range of birth dates at Teesmouth. It was noted that there was some ambiguity this year as to the total number of pups born though it is unlikely that the final figure would be significantly higher than that recorded.

Figure 10 shows the birth and survival rates of Harbour Seal pups at Seal Sands since the inception of the seal monitoring project.

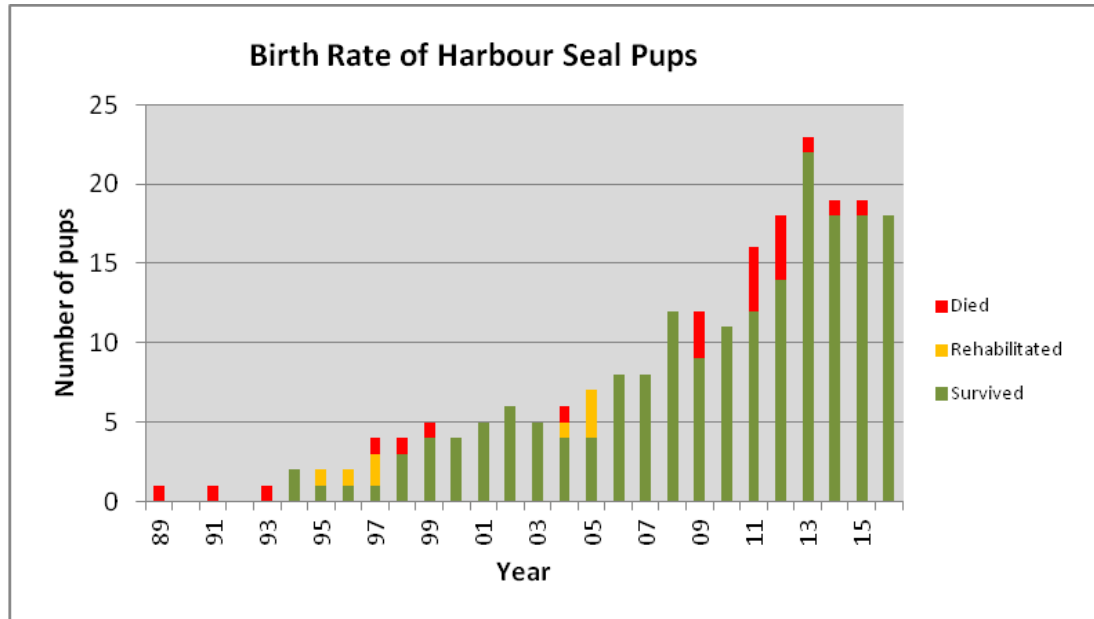


Figure 10: Harbour Seal Birth Rate (1989 – 2016)

### 5.3. Maximum Count of Seals across Seal Sands / Greatham Creek

Data recorded for 2016 are contrasted with that from previous years in Figure 11.

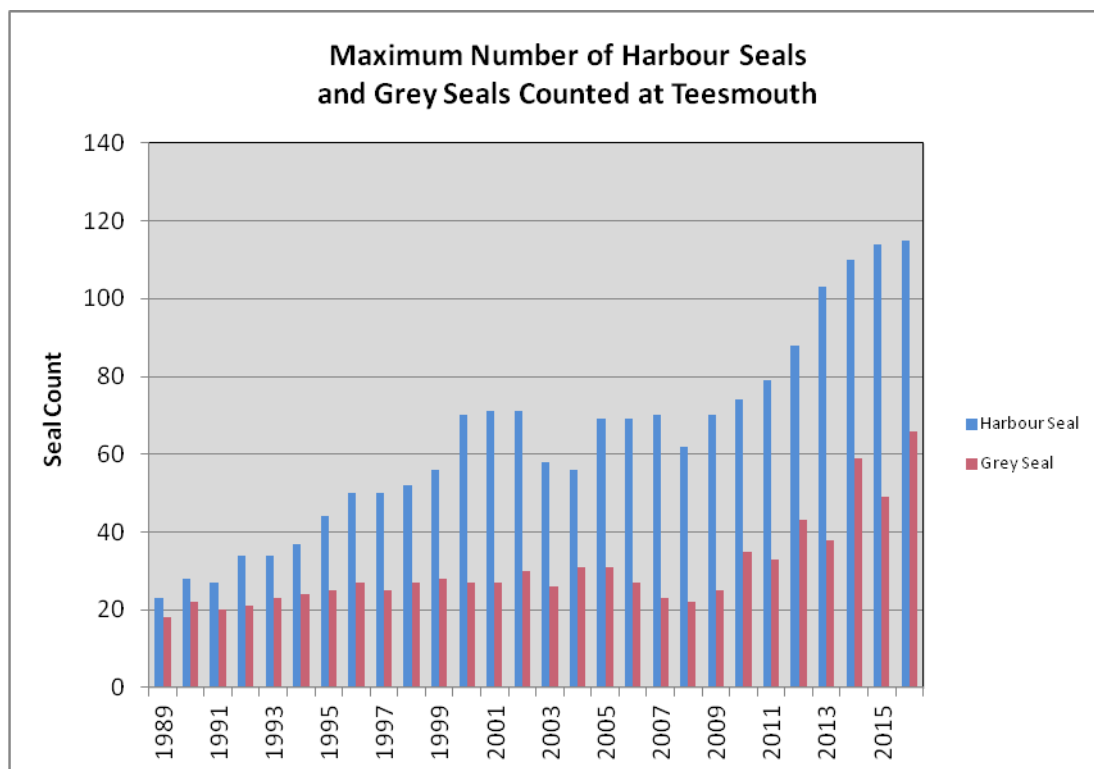


Figure 11: Maximum Number of Seals Recorded Per Day (1989 – 2016)

As for the previous two years, the maximum data recorded for Harbour Seal in 2016 were a result of pooling numbers simultaneously hauling out at Seal Sands and Greatham Creek.

The daily maximum count of 115 Harbour Seal on 21<sup>st</sup> August 2016 is the highest recorded for this species since the monitoring project began. This is only an increase of one animal from last year's maximum count but represents a 67% increase over the past ten years. The last seven years have all resulted in an increased maximum daily count of Harbour Seals.

The maximum Grey Seal numbers for 2016 that were recorded as part of this study have increased by 34% from last year, with the highest count being 66, also on August 21<sup>st</sup>.

With the maxima for both species occurring on the same low tide period, this gives a total of 181 seals recorded as hauling out in the Seal Sands/ Greatham Creek area. This is a 17% increase on the previous highest total, which was 155 seals (114 Harbour and 41 Grey) recorded on 16<sup>th</sup> August 2015. These are, of course, minimum figures for the total number of seals at Teesmouth as there are likely to be other seals that are in the water elsewhere that are not recorded.

#### 5.4. Mean Count across Seal Sands / Greatham Creek

The mean number of seals present during 2016 across both Seal Sands and Greatham Creek was calculated for the four months of the year during which the survey was conducted (June, July, August and September).

##### 5.4.1. Harbour Seal

The mean number of Harbour Seal observed was **53.1** for June (cf 58.2 in 2015; 53.9 in 2014; 39.7 in 2013; 39.6 in 2012; 49.5 in 2011); **69.6** for July (cf 63.4 in 2015; 68.9 in 2014; 63.7 in 2013; 51 in 2012); **85.9** for August (cf 90.6 in 2015; 81.3 in 2014; 73.9 in 2013; 63.3 in 2012) and **90.1** for September (cf 70.1 in 2015; 72.3 in 2014; 50.6 in 2013; 57.8 in 2012). In contrast to previous years mean numbers were at their highest in September and the September 2016 figure was 29% higher than the previous highest September mean, however mean numbers were slightly lower in June and August than the corresponding months in 2015.

Over the entire monitoring period in 2016 the mean number of Harbour Seals was 75.3 (84 days observation) cf 72.6 (79 days) in 2015 and 72.0 (91 days) in 2014. Figure 12 shows the mean numbers of Harbour Seal which have been observed in previous years. Note: data are not available for June in years prior to 2005 or September for years prior to 2008.

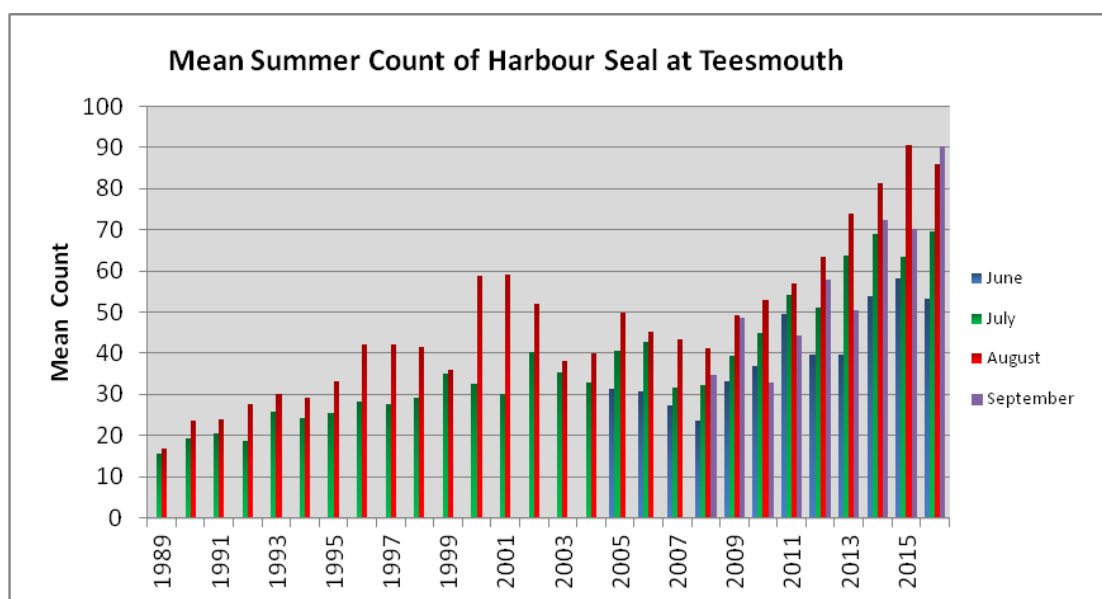


Figure 12: Mean Harbour Seal Count from June to September (1989 – 2016)

##### 5.4.2. Grey Seal

The mean number of Grey Seal observed was **17.1** for June, **22.8** for July, **21.9** for August and **35.9** for September.

Mean numbers of Grey Seals were increased overall on 2015. Each month showed an increase of at least 13.2% on last year's figures, with September displaying a huge 206.8% increase and being the highest monthly mean ever recorded as part of the TSRP.

Figure 13 shows the mean numbers observed in the years 2005 to 2016 in the months for which there are available data.

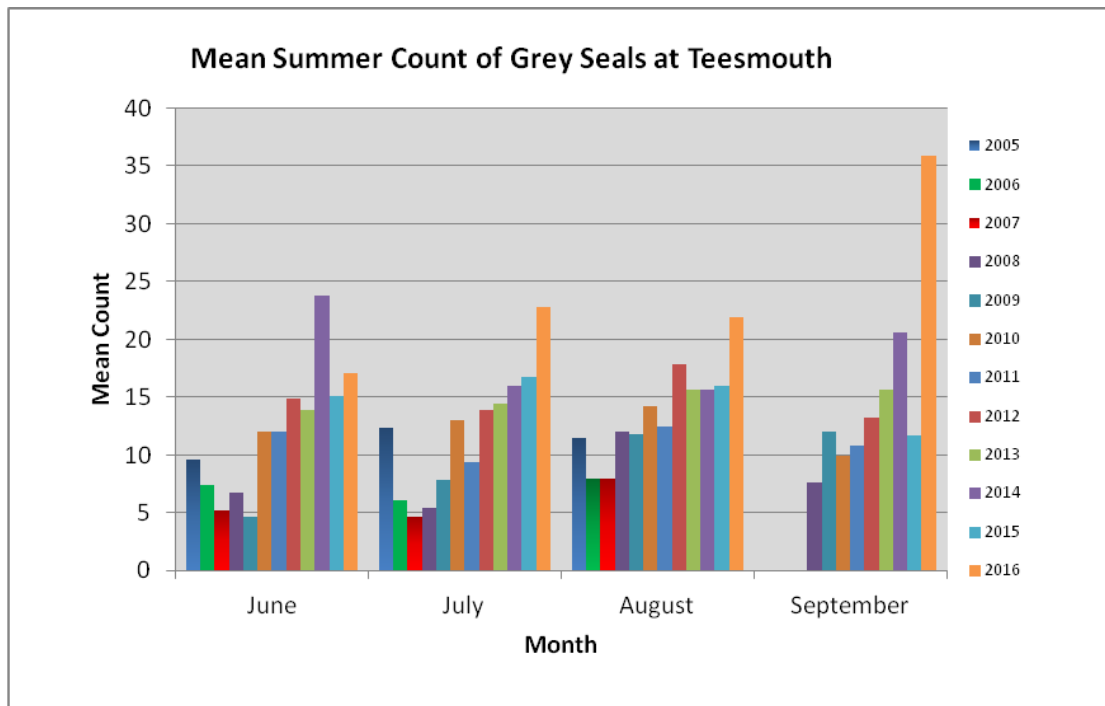


Figure 13: Mean Grey Seal Count from June to September (2005 – 2016)

## 5.5 Greatham Creek

### 5.5.1 Harbour Seal

The mean number of seals hauling out at Greatham Creek has increased markedly in recent years. Harbour Seals typically moult in August and it is then that they spend most time out of water; hence in previous years August is the month when Harbour Seals have been consistently recorded in their highest numbers. The mean of each maximum daily count over the four hour low tide period at Greatham Creek for August is shown in Figure 14. Numbers were fairly consistent from 2010 to 2012 but then increased annually, with the mean number recorded in 2015 being 43, almost double that in the period 2010-2012. While the mean number has dropped by 9 in 2016, 40% of the days surveyed in August 2016 had a maximum count of 40 or more Harbour Seal individuals. The highest number of Harbour Seals recorded at any one time in 2016 was 98, on the 13<sup>th</sup> August, at 1.5 hours before a 2m neap low tide. This is a very large percentage of the Teesmouth population of Harbour Seals and confirms that Greatham Creek continues to be a significant haul-out site for the Harbour Seal population.

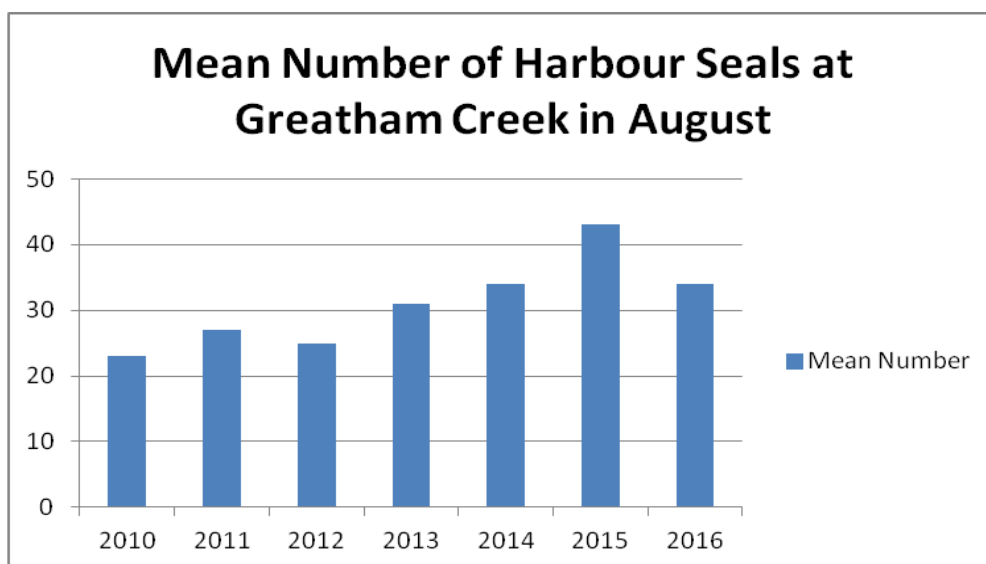


Figure 14. Mean Harbour Seal Count at Greatham Creek in August (2010-2016)

### 5.5.2 Grey Seal

Until relatively recently the appearance of Grey Seals at Greatham Creek was regarded as an unusual occurrence. Anecdotally this appears to be changing and this is borne out, at least at low tide, by the TSRP. Grey Seals were recorded on 19 of the 86 survey days (22%) in 2016. This compares with 17 of the 76 survey days in 2015 (13%). The maximum number of 8 on 14<sup>th</sup> July is 2 lower than in 2015 but still higher than the maximum count of 5 in 2014. The mean numbers however continue to increase with a daily mean of 0.7 in 2016, cf 0.47 in 2015, which itself was a 50% increase on the mean for 2014.

### 5.5.3 Haul out sites on Greatham Creek

It has also been noticeable over the past two to three years that an increasing number of seals are hauling out on the north side of Greatham Creek. Traditionally haul outs have been almost exclusively on the south side. During the 2016 surveys,



it was recorded as to which side of Greatham Creek the seals were hauling out. This is displayed in Figure 15. As this is the first year that this data has been recorded an annual trend cannot yet be recognised. However from this 2016 data Harbour seals clearly still prefer to haul out on the South side of the Creek. As the number of Grey seals hauling out here is still relatively low, it is difficult to see from this data which side they prefer to haul out on, but if Grey seal haul out numbers continue to increase as they are currently, in some years we could also see trends starting to occur in this species too. For example, it would be interesting in the future to see whether the two species haul out on different sides of the Creek or choose the same side.

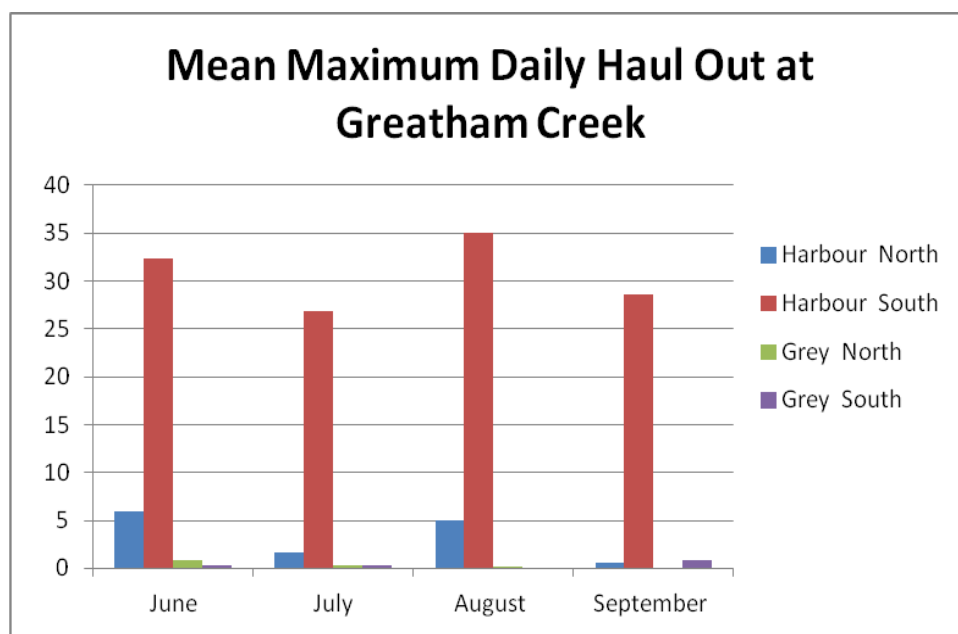


Figure 15. Mean Maximum Daily Haul Out at Greatham Creek (2016)

## 5.6. Disturbance

The term 'disturbance' relates to any observed reaction of seals to a stimulus, in particular of seals taking to the water. It is important to limit disturbance experienced by seals during the summer period when mothers are suckling pups as this can influence the ability of pups to survive their first winter.

In 2016, 12 instances of disturbance to seals were recorded, which has decreased slightly from 2015 when there were 15 occasions where disturbance to seals was observed. Eight of the disturbance events in 2015 were at Greatham Creek but in 2016 this was increased to eleven occasions. Of those eleven, eight were caused by members of the public on the north side of the creek, in the hide, or on the A178 road bridge. Two of these disturbances were caused by people with cameras, the rest were people generally coming close to watch the seals and one disturbance involved a dog barking which caused the seals to leave their haul-out *en masse*. On one occasion, a large organised group of 30 or more people came to view the seals causing them to disperse; the other two disturbances at Greatham Creek were caused by bait collectors.

There was only one disturbance recorded at Seal Sands this year which was caused by boat traffic coming up the channel. The boats did not enter the Seal Sands survey area but as they passed through the channel they disturbed seals hauling out at one of the peripheral haul-out locations.

## 5.7. Mortality / infirmity

Only one dead seal was recorded as part of the TSRP this year, which was an adult Harbour Seal reported by one of the seal monitors at Greatham Creek on 26 July. Outside of the TSRP, a dead Harbour Seal pup was found at South Gare on 19 September.

## 6. Seal data outside of the TSRP

As in 2015, some information concerning seals in the estuary outside of the TSRP has been collated and is summarised below. The counts of seal numbers were obtained as and when an observer was at a particular location rather than being part of a systematic survey. Nevertheless they give an indication of the state of the seal population for the remainder of the year and over other states of the tide.

A series of 19 counts were obtained at Area D over the period 30 June 2015 to 6 September 2016. The counts were made from opposite Area D, which enables a more accurate count to be made than from the seal monitoring point. Across all 19 counts, the mean number of Grey Seals hauled out at Area D was 24.5. This contrasts with a series of 27 counts from November 2014 to April 2015 where the mean was 10.6. From the limited data obtained so far, there seems to be a trend for higher numbers in the early summer. A series of 5 counts from May to July 2016 gave a mean of 48.2 Grey Seals, whereas a series of 6 counts from October 2015 to January 2016 gave a mean of 15.5 Grey Seals. The highest number of Grey Seals was on 20 June 2016, when a minimum of 83 were counted. This represents the highest count of Grey Seals on the Tees Estuary to date, though only just exceeding the previous highest which was of 82 on 13 July 2015.

At Greatham Creek *ad hoc* counts were obtained outside of the Tees Seals Research Programme Monitoring period. These formed a series of 23 counts from November 2015 to early June 2016. The mean number of seals hauled out at Greatham Creek across all counts over that period was 20.2. By far the majority of these were Harbours, with Greys averaging just over one animal over the 21 counts where the two species were counted separately. However even this low figure is skewed by a count of 16 Grey Seals on 13 June 2016. As far as is known, this is the highest number of Greys recorded at Greatham Creek to date.

Over the same period, the average number of seals hauled out within two hours of high tide was 22.5 over 11 counts. The corresponding figure for low tide was 17.4 across 5 counts. A further four counts were obtained between mid June and mid August 2016 within 2 hours of high tide. These gave a mean figure of 59.8 seals, with the highest number, 90 on 18 August, being close the highest figure so far recorded at Greatham Creek. Whilst limited conclusions can be drawn from such a small sample it is worth noting that the mean of almost 60 seals recorded at high tide was around double that recorded at low tide over the TSMP period.

As Grey Seals do not breed on the Tees there is some speculation as to which breeding colonies they might be connected with, the closest breeding colonies at The Farnes in Northumberland & Donna Nook in Lincolnshire being roughly equidistant. It was particularly interesting then to find that a Grey Seal pup photographed on Redcar Beach by Chris Small on 23 March 2016 had been tagged on the Isle of May on 2 December 2015. Another recently weaned Grey Seal pup was found on 15 February 2016, also on Redcar Beach, but it had not been tagged, so its provenance is not known.

## 6. Discussion

While 2016 saw another increase in both the maximum and mean numbers of Harbour Seals, resulting in the highest numbers of this species recorded so far in the Tees Estuary, the increase in both is very slight. It might be equally accurate to describe the population as having reached a plateau over the past three years. This is also the case with the numbers of seal pups, which have been almost identical over the same period.

Grey Seals on the other hand clearly seem to be increasing in numbers. The mean number recorded for July, August and September was the highest ever recorded in those respective months as part of the TSRP, as was the daily maximum number. This is corroborated by a series of casual counts over the period of just over one year which produced a mean of 24.5 Grey Seals at Area D. This is higher than the mean for any previous month across the whole of Seal Sands/ Greatham Creek that has been recorded through the TSRP, other than September 2016.

There is inevitably some uncertainty in the precise numbers of seals that are hauled out, let alone the total number in the estuary. There is the perennial difficulty in accurately recording the total number of seal pups when they grow so fast and are so mobile and, as mentioned in Section 5.2, this seems particularly to have been the case this year. There is of course the uncertainty caused by not knowing what proportion of seals are hauled out so, for example, does the slight increase in Harbour Seals counted this year reflect a slightly higher population or just that a slightly higher percentage of the same population was hauled out.

The problems in accurately counting the number of Grey Seals on Area D have been mentioned in a previous report. While the precise number is sometimes an estimate it is still considered to be a useful figure to report as the method of counting has remained the same from year to year so it at least gives information about relative changes in Grey Seal numbers there.

A new factor that has come to light in the past two years that could be affecting the total count is that a number of Harbour Seals are hauling out at the Bailey Bridge, where it is not possible to see them from either of the observation points. Due to problems of access along the usual route, seal monitors had to access the Seal Sands observation hide via the Bailey Bridge for much of this year. It was apparent that Harbour Seals were hauled out there regularly and on several occasions into double figures. It was sometimes possible to include any pups seen there into the total number of pups seen that day but it was not possible to record the overall number of seals at the Bailey Bridge across the low tide survey period. This is a similar situation to that which occurred previously at Greatham Creek and resulted in it being included in the seal monitoring from 1999 onwards. Although the Bailey Bridge haul-out is not large enough to hold anything like the number of Harbour Seals as Greatham Creek does nevertheless it would be useful if it could also be counted in future years as it has been found to hold over 10% of the Harbour Seal population at times.

Notwithstanding that there is some uncertainty in the precise numbers, if the population of Harbour Seals has reached a plateau then there are a range of possible reasons why this might be the case. It is not known to what extent the Harbour Seal population is self-contained or else interacts with other populations. If part of the population is the result of immigration then factors that might be limiting immigration from other Harbour Seal populations could mask what might otherwise be a healthy growth on the part of the "local" seals.

It has been speculated that the lack of suitable haul out sites might limit the numbers of Harbour Seals. As noted above, Harbour Seals tend to haul out with some distance between individuals and undisturbed intertidal space on the estuary is limited, particularly at Greatham Creek. However, while this would impose some upper limit in the absence of other factors, it seems likely that at least a few more could currently be accommodated.

A more immediate limit might be inter-specific interactions with the Grey Seals. Although the number of Harbour Seals has remained relatively static, the number of seals in the estuary has increased through the increase in Grey Seals, such that the total number of seals in the estuary, allowing for those that are not hauled out, will now almost certainly be in excess of 200 individuals. It is possible that the carrying capacity of the estuary might have been reached in terms of the amount of food that is available to support seals, which will be tested in future years depending on whether the total population of seals continues to increase.

A more direct effect might be that the numbers of Grey Seals in some way deters the Harbour Seals. As a separate project, one of the authors of this report (JG) undertook a series of observations relating to Grey Seal/ Harbour Seal interactions on Seal Sands. From this separate study, it was observed that the only potential impact the Grey seals might be having on the Harbour seals could be competition for haul out space. However, no aggressive behaviour between species was recorded. This indicates that the Grey seals are having no obvious direct negative impacts on the Harbour seal population. As it was only possible to observe a relatively small number of interactions it would be useful to be able to undertake further observations in future years.

## **7. Acknowledgements**

We are particularly grateful to The Crown Estate for again providing the funding for this project, enabling us to continue it through 2016. This ongoing project would not be possible without the support of Huntsman Pigments who provide the observation hide and security arrangements for the seal monitors.

The raw data for this report is collected by a dedicated team of monitors. Particular thanks are due to Linda Watson, the co-ordinator of the group. In addition to Linda, in 2016 the monitors were Claire McCarty, Jenny Gibson, David Laing, Dave Thew, Paul Thomson, Dez Watson, Mel Watson and Terry Wells.

Thanks also to Mike Leakey, Alistair McLee, Ken Smith & Graham Megson for providing seal counts outside of the TSRP.

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APPENDIX 2: Location of haul-out sites on Seal Sands

