

Thames Marine Mammal Sightings Survey Ten Year Report (2004-2014)



Photo by Richard Spink

Sofia Castello y Tickell, Joanna Barker
UK & Europe Conservation Programme
Zoological Society of London

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Zoological Society of London
Regent's Park
London, NW1 4RY

marineandfreshwater@zsl.org
www.zsl.org/inthethames

Acknowledgements



We would like to thank the 1,229 observers who have reported sightings to the Thames Marine Mammal Sighting Survey (TMMSS) since its launch in 2004. This survey's success is due to their eyes, notebooks and cameras out on the Thames, and we look forward to receiving further comments and submissions in order to continue our marine mammal conservation work in the Greater Thames Estuary. We would also like to thank Acorn Primary School, Notting Hill, who provided financial support to launch the TMMSS in 2004.

Introduction

In 2004, the Zoological Society of London (ZSL) launched the Thames Marine Mammal Sightings Survey (TMMSS) to collect opportunistic public sightings of marine mammals in the Greater Thames Estuary. This survey was created to fill a critical data gap on the distribution of marine mammals around the UK coast in order to inform conservation efforts. Through gathering reports sent in by members of the public, ZSL has built a long-term dataset on the presence of whales, dolphins, porpoises and seals in one of the world's busiest waterways.

Over the 10 years covered by this report (2004-2014), 1,317 marine mammal sightings have been submitted by members of the public. The majority of sightings are concentrated in Greater London, most likely due to the greater density of people in this area. However, the TMMSS covers the entire Greater Thames Estuary, delineated by Teddington Lock in the West, Felixstowe in the North East and Deal in the South East. The method of data collection for the TMMSS has evolved since the survey was launched in 2004. Initially, it took the form of a postal survey, but in 2007 reporting was completed using an online form and since August 2013, the survey has been based around an interactive map at www.zsl.org/inthethames.

When these public-sightings data are analysed appropriately, with consideration of their limitations and benefits, they can be used to understand where marine mammals are present and identify hotspots of activity where people overlap with marine mammals. Furthermore, this survey is an important awareness raising tool for members of the public to learn about the presence of marine mammals and provides an opportunity for people to contribute to marine mammal conservation.

 <p>Pinniped:* A carnivorous aquatic mammal of the order <i>Pinnipedia</i>, such as a seal or walrus. (Oxford English Dictionaries 2015)</p>	 <p>Cetacean:* A marine mammal of the order <i>Cetacea</i>; a whale, dolphin, or porpoise. (Oxford English Dictionaries 2015)</p>
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**Throughout this report, we make reference to two categories for marine mammals in discussion and analysis: pinnipeds and cetaceans. We have colour coded these groups as above (red for pinnipeds, blue for cetaceans) in tables, graphs and maps.*

Aims and Objectives

The TMMSS aims to provide information on the presence and behaviour of pinnipeds (seals) and cetaceans (whales, dolphins and porpoises) in the Greater Thames Estuary. These data can be used to inform conservation measures and planning applications, as well as raising awareness of the presence of marine mammals in the Greater Thames Estuary.

This report is intended to give an explanation of findings from data collected in the first ten years of the survey and point out basic trends in data.

History of Marine Mammals in the Greater Thames Estuary

Records of the presence of marine mammals in the Greater Thames Estuary have been kept for centuries. With the arrival of human settlements they were often killed or harassed upon arrival in London, and their presence is little understood prior to 2004. The earliest record of a marine mammal in the River Thames dates back to 1240, when a whale was chased up the river to Mortlake and butchered (Velten 2013). Subsequent marine mammals met a similar end; a seal was shot at in Battersea in 1869, and a bottlenose dolphin met bullets and missiles nearby in May 1918 (Velten 2013).

But attitudes to marine mammals have changed. A 5.85m juvenile female northern bottle-nose whale (*Hyperoodon ampullatus*) that became stranded in central London in 2006 met a very different welcome. The whale was feted by the media and the public, and an extensive two-day rescue effort made every attempt to ensure its survival, though the whale ultimately died of dehydration caused by organ failure on a rescue barge (Deville and Jepson 2006).

Marine mammals in the UK have generally been studied where they are most abundant, and so the activities of marine mammals in the Greater Thames Estuary were rarely documented before the TMMSS. In the case of seals, about 88% of the UK's grey seals breed in Scotland, which is also home to 79% of the UK's harbour seal population (SCOS 2013). As a result, much current research effort is based in Scotland. Harbour porpoises are relatively rare on the South and Southeast coast of England, but they are seen in large numbers, year-round in four priority areas: the Shetland Isles, parts of western Scotland, southern Cardigan Bay and the north Pembrokeshire coast (Evans & Wang 2008).

Threats to Marine Mammals

Marine mammals in the Greater Thames Estuary face a variety of threats, including pollution, disease, habitat loss, noise disturbance, collisions with boats, entanglement in fishing gear, conflicts with fishers, competition and predation.

New sources and persistent legacies of pollution can cause significant problems for cetaceans and pinnipeds. The ingestion of anthropogenic contaminants through their prey can lead to the bioaccumulation of toxins, which can affect mortality rate. Cetaceans are thought to be more vulnerable to pollution than pinnipeds in the UK (Simmonds 2011). In a study of a large group of stranded harbour porpoises, a correlation was found between chemical contamination and mortality due to infectious diseases (Jepson *et al.* 2005), and there is evidence to suggest pollution may lower bottlenose dolphin calf survival (Hall *et al.* 2006).

Marine mammals are also vulnerable to disease related mortality. The population of harbour seals along the east coast of England was reduced by 48% following an epizootic of phocine distemper virus (PDV) in 1988, and a second outbreak in 2002 killed 22% of the population (SMRU 2004). Based on epidemiological models, PDV may have an inter-epidemic period of approximately 13 years, indicating that another outbreak could occur in the next few years (SCOS 2013). Of 1,692 harbour porpoises analysed through post-mortem by the Cetacean Strandings Investigation Programme (CSIP, www.ukstrandings.org) between 1991 and 2010, 23% were found to have died from infectious diseases, as was the case with 13% of 63 bottlenose dolphins (Deville and Jepson 2011).

Loss of suitable habitat is another concern, as are changes in the availability of prey (Lambert *et al.* 2014). The noise of heavy boat traffic, such as that found in the Greater Thames Estuary, could also be impacting the behaviour of cetaceans and pinnipeds, as it can lead to short-term shifts in local habitat and affect swimming patterns (Nowacek & Wells 2001; Rako *et al.* 2013). Boat traffic was found to impact the resting of grey seals around the Isle of Man, with the duration of the interaction playing a significant role in the level of disturbance (Britton 2012). An investigation of a mass stranding of common dolphins in 2008, where at least 26 dolphins died, led researchers to the conclusion that acoustic disturbance by international naval exercises, including mid-frequency sonars, was the most likely cause of the stranding (Jepson *et al.* 2013). Heavy boat traffic can also lead to collisions with marine mammals. CSIP researchers diagnosed physical trauma from a ship or boat strike as the cause of death for 4 harbour porpoises, 3 common dolphins, and 1 minke whale that were stranded and examined post-mortem between 2005 and 2010 (Deville and Jepson 2011).

Entanglement in fishing gear, also known as by-catch, is a serious problem for cetaceans and pinnipeds. In post-mortem examinations carried out on stranded cetaceans between 1991 and 2010, by-catch was diagnosed as the cause of death for 51% of 537 common dolphins, 17% of 1,692 harbour porpoises and 6% of 63 bottlenose dolphins (Deaville and Jepson 2011). Furthermore, a survey of 52 fishermen in Cornwall in 1998 reported a total of 82 bycaught grey seals each year, with 80% of these being pups (Glain *et al.* 1999). Significant conflicts have also arisen with fishers in the UK, who are frustrated by seals feeding on target fish stocks and interfering with their nets. On some occasions, this has led to shooting or harassment of the animals (Wilson 2002).

Interspecific competition, intraspecific competition and predation may also be playing a role in marine mammal behaviour in the Greater Thames Estuary. There have been reports of grey seals preying upon grey seal pups in Scotland (Thompson *et al.* 2015) and grey seals preying upon harbour seals in Germany (Van Neer *et al.* 2015). Furthermore, grey seal attacks were found to be the cause of death for 17% of stranded porpoises in the Netherlands (Leopold *et al.* 2014) and grey seal predation on porpoises has been documented in Wales (Stringell *et al.* 2015). Bottlenose dolphins are also known to attack porpoises and were identified as cause of death of 17.2% of 457 harbour porpoises examined between 2005 and 2010 (Deaville and Jepson 2011).

Legislation to Protect Marine Mammals

There is a range of legislation to protect marine mammals in UK waters. The Grey Seal Protection Act (1914) established the first closed season for grey seals, making it unlawful to kill grey seals during their breeding season. The Conservation of Seals Act (1970) expanded this by detailing acceptable hunting methods and establishing closed seasons for grey and harbour seals.

Grey seals, harbour seals, bottlenose dolphins, harbour porpoises and otters are listed under Annex II of the European Commission's Habitats Directive (92/43/EEC), which requires EU member states to designate areas for the protection of habitats and species. The UK has 16 Special Areas for Conservation (SACs) designated specifically for seals, seven for grey seals and nine for harbour seals. Grey seals are qualifying features in thirteen SACs, and harbour seals are qualifying features in twelve. Two SACs have been designated specifically for bottlenose dolphins, and they are a qualifying feature in an additional SAC. Harbour porpoises are qualifying features in one SAC and the JNCC are currently analysing species distribution data to identify possible dedicated SACs (JNCC 2015).

Marine mammals are also protected by the Wildlife and Countryside Act (1981), the Conservation of Seals (England) Order 1999, the Conservation of Seals (Scotland) Order 2004, the Conservation of Seals (Scotland) Order 2007, the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), and the Marine (Scotland) Act, 2010.

Methodology

Data collection:

TMMSS data mostly consist of sightings submitted by untrained members of the public who opportunistically encounter a marine mammal. Some sightings are also submitted by bird watchers, anglers, tour boat operators, and organisations such as the Port of London Authority (PLA), Environment Agency (EA), Thames River Police, Port of London Health Authority and the Kent Mammal Group.

The method of data collection for the TMMSS has evolved in line with technical advances since it was launched in 2004. Initially, it was a paper survey that needed to be posted or emailed to ZSL. An online reporting form was developed in 2007 and since August 2013, sightings are submitted through an interactive map at www.zsl.org/inthethames (Fig. 1). Information requested for each sighting includes the time and date of the sighting; duration and location of sighting; certainty of identification; type and species of marine mammal sighted; number and age of marine mammals sighted; activities and direction of travel of the marine mammal; and environmental conditions on the day. There is also open space for comments and the option to upload photographs. Observers are asked to record their names and contact information, but this is not compulsory.

All submissions are reviewed by ZSL staff and an email is sent to each observer to thank them for submitting their sighting, provide information about the programme, encourage further sightings and clarify information where necessary.

Outreach for the TMMSS took place at festivals and local events, such as the Totally Thames Festival, the Leigh-on-Sea Maritime festival, the River Crane Festival and the BBC Summer of Wildlife, and on social media. The TMMSS was the focus of two ZSL press releases, one announcing the start of the TMMSS in July 2004 and another presenting preliminary results in August 2007. The TMMSS was also included as a main call to action in further press releases about ZSL's Thames Seal Programme in August 2013 and September 2014.

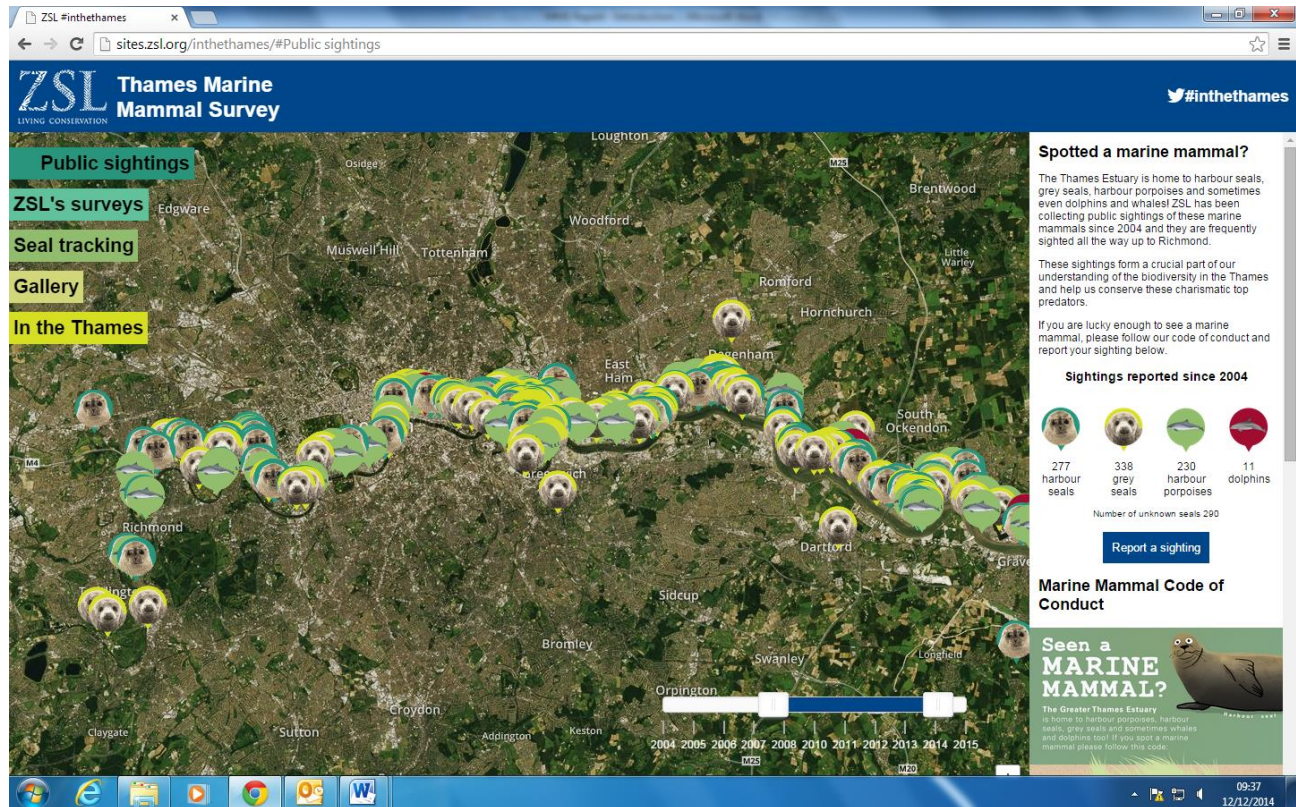


Figure 1. TMMSS Online Survey located at www.zsl.org/inthethames

Data cleaning:

As the TMMSS has gone through various iterations, including the shift from paper to online submission, data cleaning was necessary when compiling data for analysis. GPS coordinates were converted to decimal degrees, sightings that did not provide a valid date were deleted (n=36), and categories including species, length of sighting, activity and degree of certainty were condensed and standardised to allow for analysis. All sightings were mapped and checked for accuracy; their position was corrected if it was on land according to comments in the description.

We did not attempt to correct data for replicate sightings, as the data consist of opportunistic sightings and was not effort-based. We treated each data point as an interaction between an observer and a marine mammal, rather than as a unique animal in a given area. Thus, these data cannot be used to estimate abundance of marine mammals in the Tidal Thames.

Data Analysis & Representation:

All analysis and representation of TMMSS data took place using RStudio Version 0.98.1091 and QGIS 2.8.2. Sightings were mapped on QGIS, and heat maps, scaled points, and symbols were used to represent TMMSS data at three different scales: the Greater Thames Estuary, Greater London and Central London. The Greater Thames Estuary was delineated by Teddington Lock in the West, Felixstowe in the North East and Deal in the South East; Greater London was delineated by Teddington Lock in the West and Gravesend in the East; and Central London was delineated by

Battersea Park in the West and North Greenwich in the East. All plots were constructed using RStudio and all statistical analyses were conducted using a combination of Excel and RStudio. Analyses were largely limited to calculating means and conducting a simple assessment of the data at hand, as the data were not effort-based. Plots were used to represent total sightings and total animals sighted over time.

Results

Overview of sightings:

A total of 1,317 sightings were submitted to the TMMSS between 2004 and 2014. Of these, 1,281 sightings were complete and considered valid for further analysis (Table 1, Fig. 2). A total of 2,732 animals were reported in complete sightings (Table 1, Fig. 2). Additional TMMSS data can be found in Appendix 1.

Pinniped sightings were the most common (79.86 % of complete sightings), followed by cetacean sightings (19.98 % of complete sightings) and sightings of other marine mammals, in this case otters, (0.16 % of complete sightings). A similar trend was observed for number of animals, where pinnipeds accounted for 81.84 % of the total animals encountered, while cetaceans accounted for 18.05 %, and other marine mammals accounted for just 0.11 % of animals sighted.

Table 1. Complete Marine Mammal Sightings submitted to TMMSS

	Unknown seal	Harbour seal	Grey seal	Total Pin.	Harbour porpoise	Dolphin	Whale	Total Cet.	Otter	Totals
Total Sightings	466	307	250	1,023	226	26	4	256	2	1,281
Total Animals	823	1,080	333	2,236	398	46	49	493	3	2,732

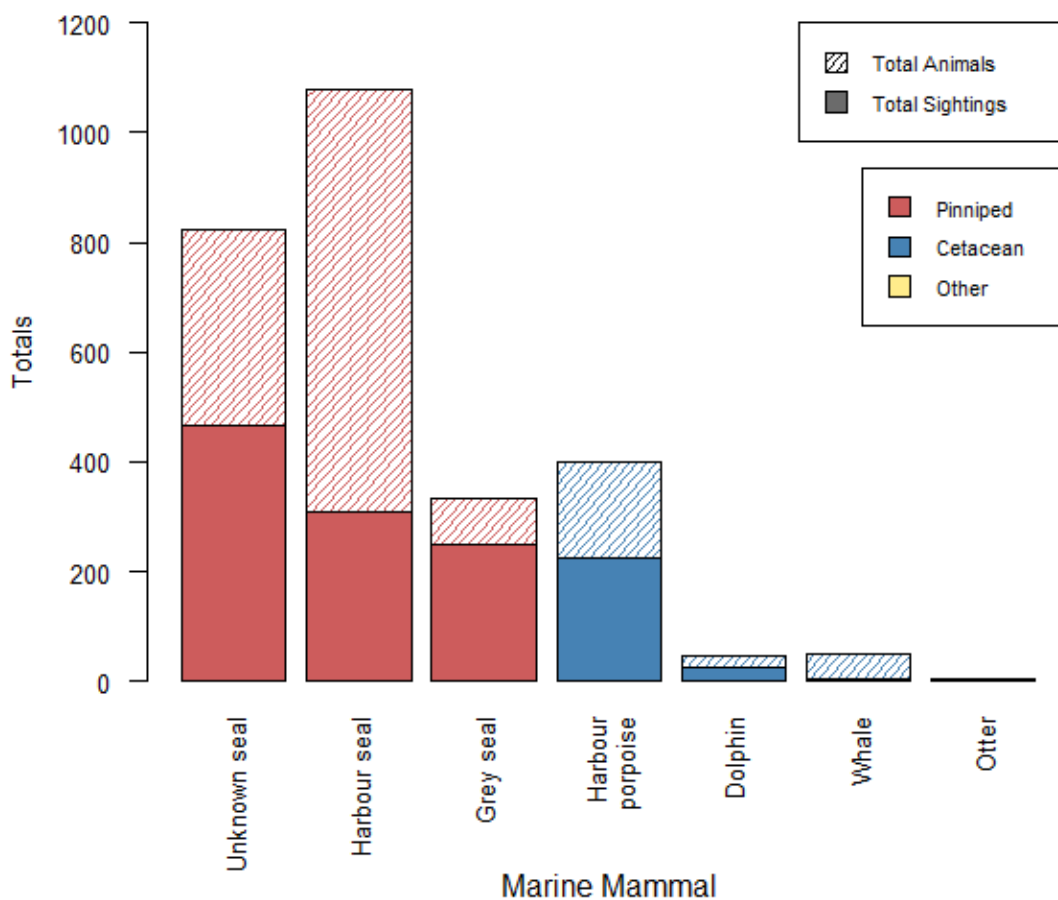


Figure 2. Total Animals and Total Sightings submitted to the TMMSS between 2004 and 2014

Timing of sightings:

On average, 113 sightings were reported each year between 2004 and 2014. 2013 was the year with most sightings reported (n = 239), and 2009 had the least sightings reported (n = 72) (Fig. 3). Some sightings were backdated, as people reported past sightings when they became aware of the TMMSS. The peak of monthly sightings was in August; this may be due to the launch of ZSL's interactive marine mammal map in August 2013 (www.zsl.org/inthethames) and the associated press release, which reached 72 million people as calculated by ZSL's Press Office (Fig.4)

Marine mammal activity:

Almost all complete sightings of marine mammals (99.06 %), reported an activity for the marine mammal observed (Fig. 5). About half of the sightings (50.43 %) reported that the animals observed were swimming (Fig. 5). The next two most popular categories were resting (18.75 %), and feeding (12.45 %) (Fig. 5). Sixteen animals, including 14 cetaceans, were reported dead and information was passed to the CSIP (<http://ukstrandings.org/how-to-report-a-stranding>).

Distance and length of sightings:

Observers provided a response for the length of their sighting in 81.73 % of complete sightings, and calculated the distance to the marine mammal in 84.70 % of complete sightings. Most sightings were short, with 68.00 % of sightings lasting under 10 minutes (Fig. 6). The majority of marine mammals (39.6 %) were encountered at a distance of 11-50m from the observer (Fig. 7).

Distribution of sightings:

The greatest density of sightings was around Canary Wharf in Central London, with a density of 138 sightings per square kilometre (Fig. 8a, b, c). This is likely to be due to the high number of people (potential observers) living and working in the area, and the relatively small, partially enclosed and highly visible areas of water. Central London in general saw a high density of sightings, with various hotspots of around 30 sightings per sq. km between the Houses of Parliament and the O2 arena (Fig. 8b, c). This area contains bridges (London Bridge, Tower Bridge, etc) and walkways on the edge of the river and is often frequented by high volumes of pedestrians who may look out over the river and spot a marine mammal. Other hotspots in the Greater Thames Estuary included Hammersmith, Southend on Sea and Cliffe.

Pinnipeds and cetaceans were spotted throughout the Greater Thames Estuary. Teddington Lock demarked the most westerly sighting for cetaceans and Hampton Court Palace was the most westerly sighting for pinnipeds (Fig. 9, a b c). Large groups of pinnipeds were reported near Greenwich (100 unknown seals in September 2014), Crossness (40 harbour seals in August 2013), and Foulness Island (36 harbour seals in October 2004). Multiple sightings of large groups of pinnipeds were reported near Southend on Sea, in the Swale Estuary and on the Ridge sandbank in the outer estuary. Large sightings of cetaceans were reported near Clacton-on-Sea (30 pilot whales in Nov 2014), the Isle of Sheppey (15 pilot whales also in Nov 2014), and Southend on Sea and Canvey Island (12 and 15 harbour porpoises in April 2005). In both of these instances, observers may have spotted the same group of animals travelling. There were also two groups of cetaceans spotted in Central London, with 8 harbour porpoises spotted near Kew Gardens in May 2009 and 10 bottlenose dolphins spotted near Deptford in April 2006.

As was previously demonstrated through graphs and tables, sightings of pinnipeds were more abundant than those of cetaceans, and a greater number of pinnipeds were sighted than cetaceans.

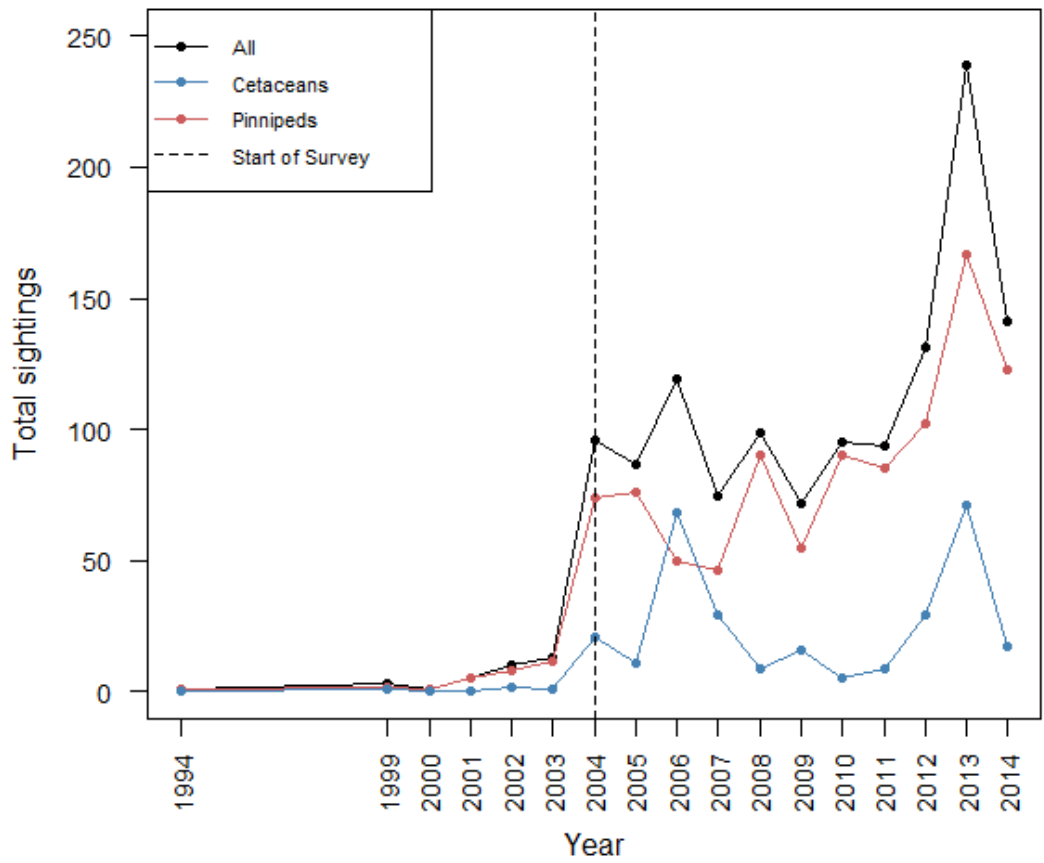


Figure 3. Marine mammal sightings submitted to TMMSS for each year (some sightings backdated).

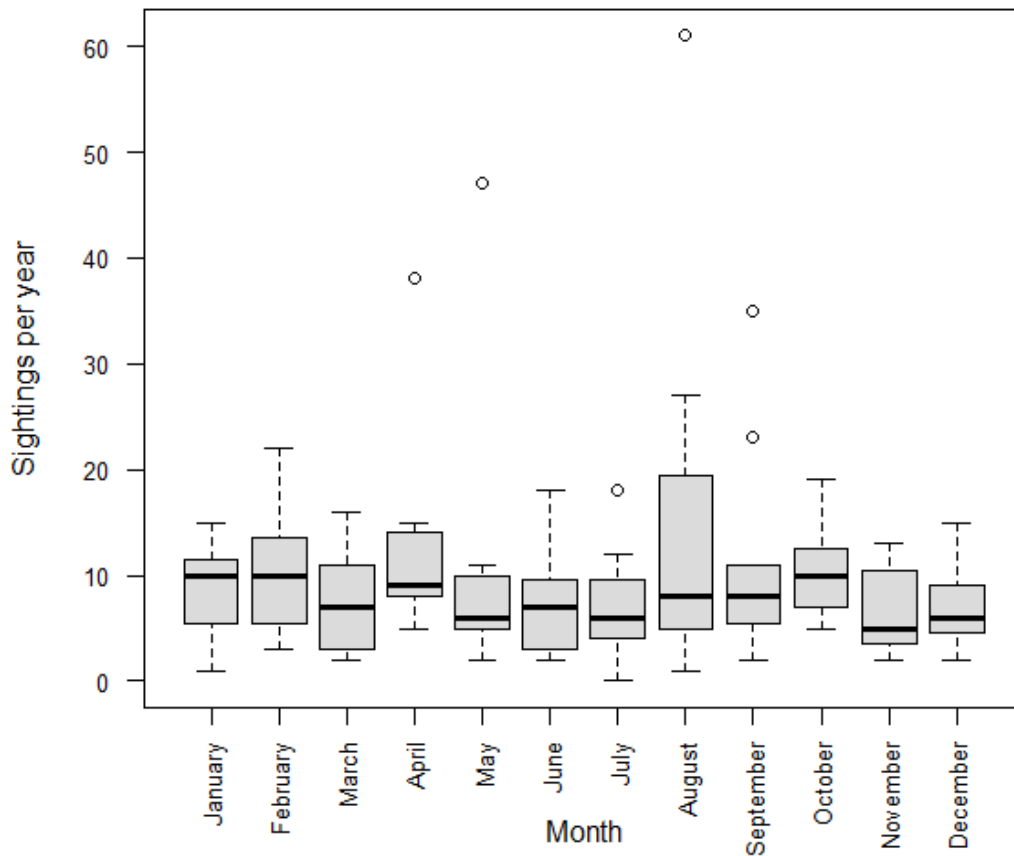


Figure 4. Marine mammal sightings submitted to TMMSS each month from 2004-2014 (data prior to 2004 excluded).

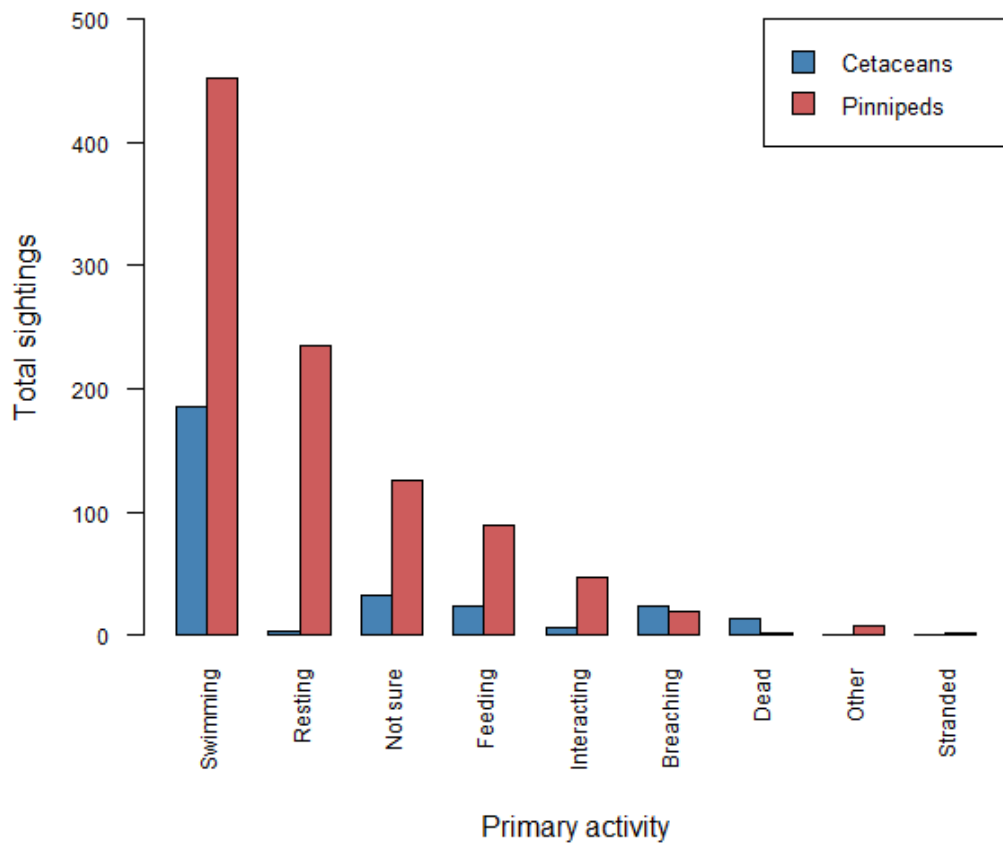


Figure 5. Marine Mammal Primary Activity reported to TMMSS

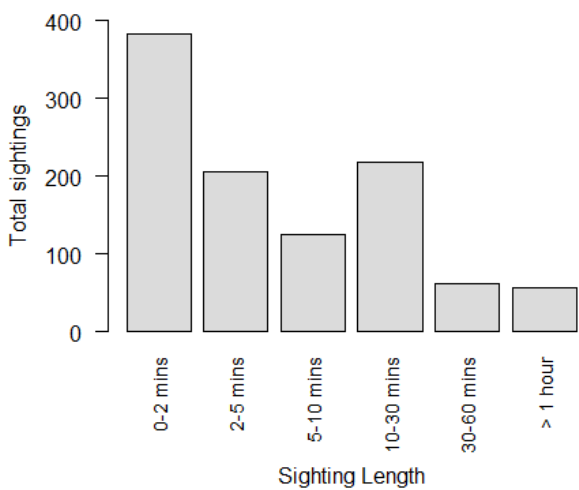


Figure 6. Length of sightings submitted to the TMMSS.

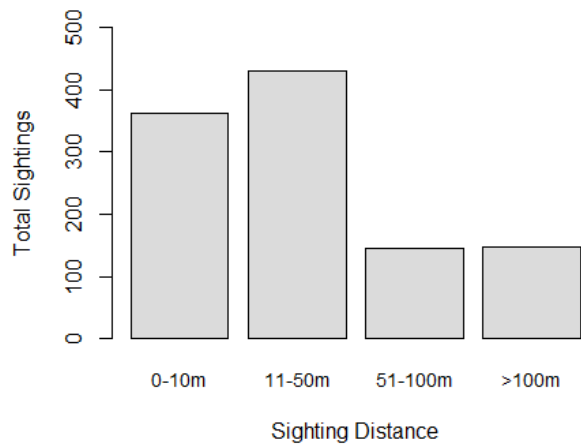
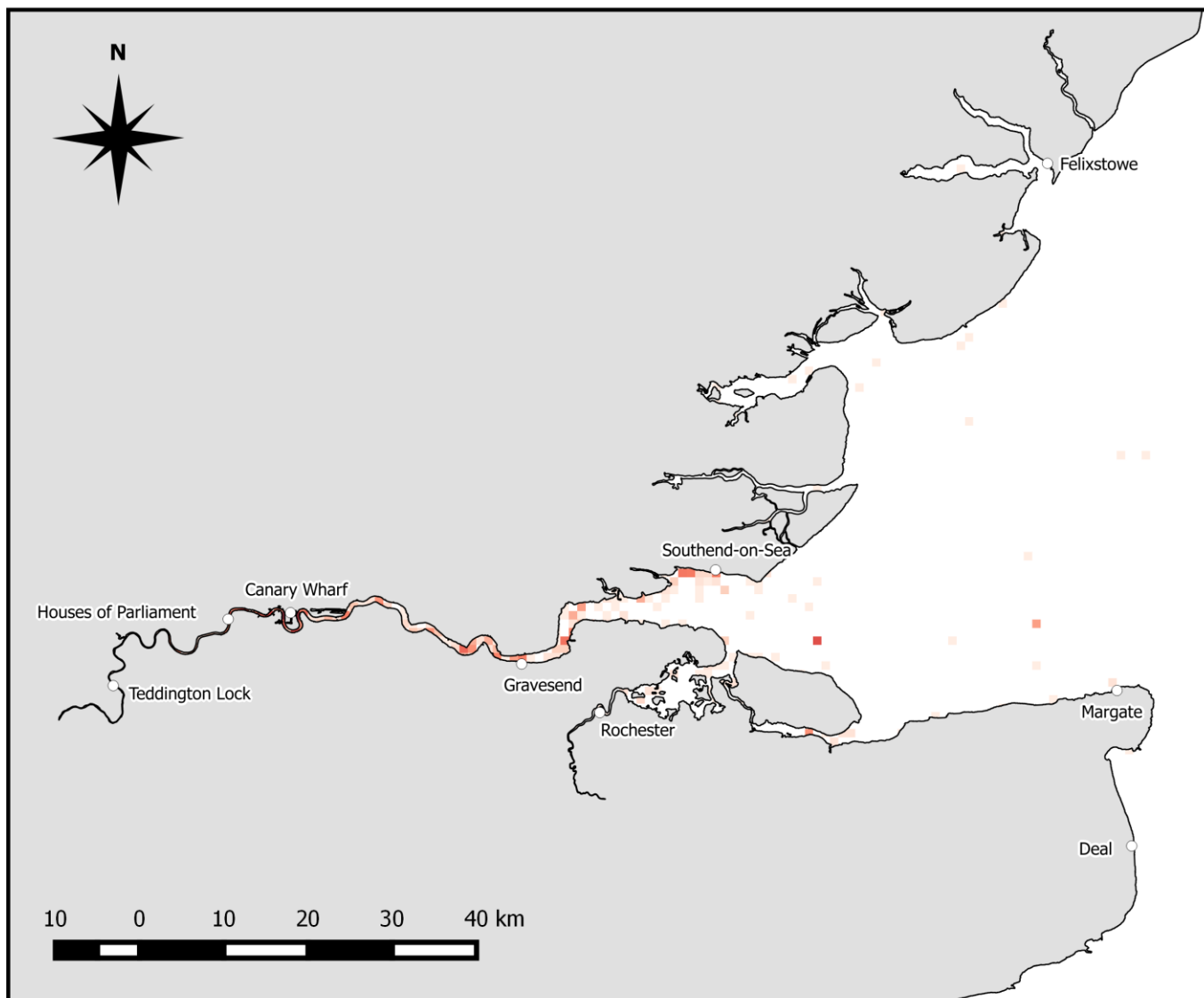


Figure 7. Distance of sightings submitted to the TMMSS.

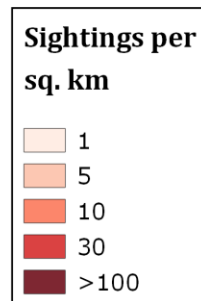


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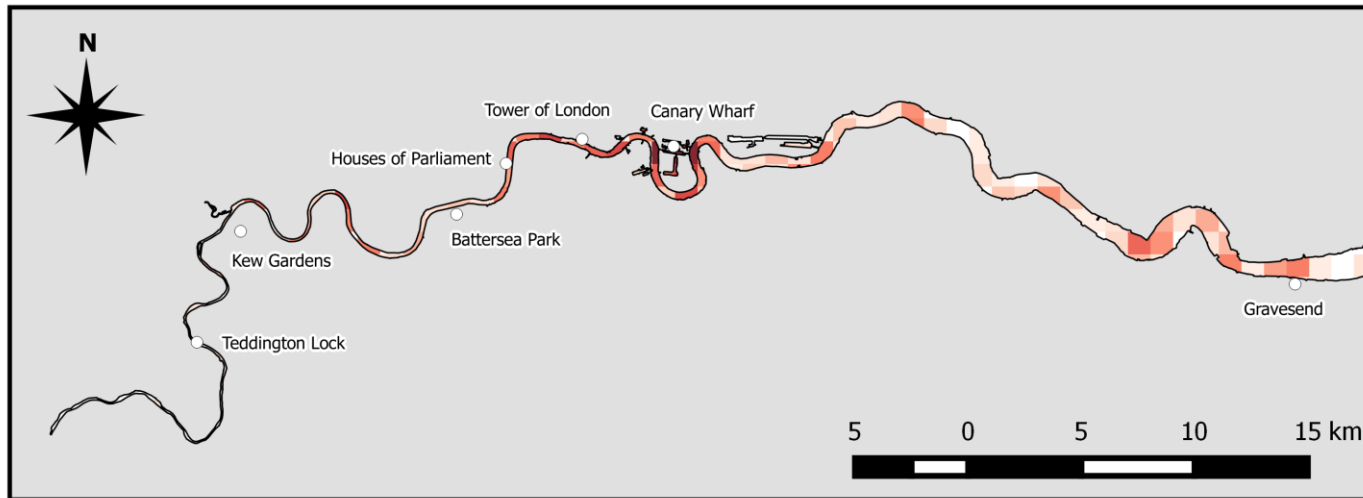
Figure 8a.

Density of marine mammal sightings in the Greater Thames Estuary (sightings per square kilometre).

Scale: Greater Thames Estuary



(Min=0, Max=138)



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Figure 8b.

Density of sightings of marine mammals in the Greater Thames Estuary (sightings per square kilometre).

Scale: Greater London

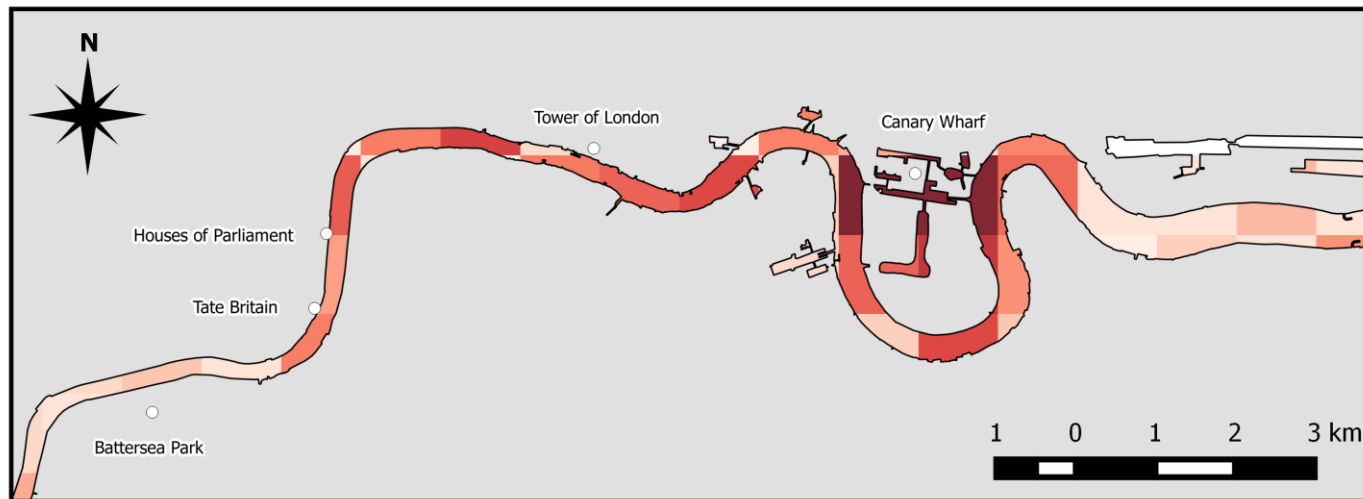
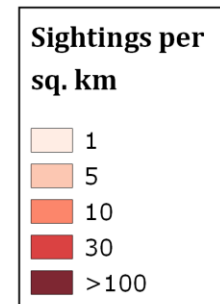
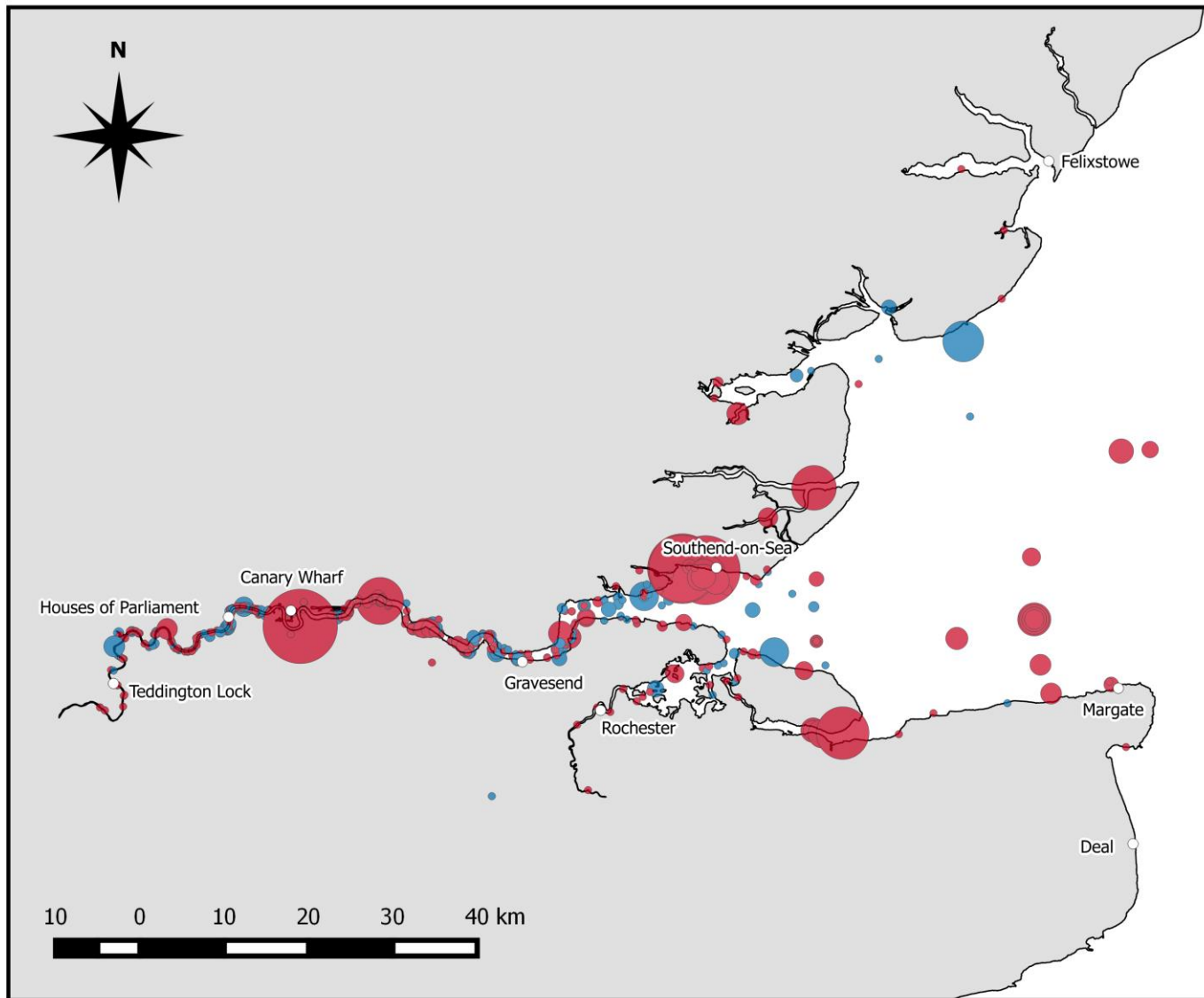


Figure 8c.

Density of sightings of marine mammals in the Greater Thames Estuary (sightings per square kilometre).

Scale: Central London

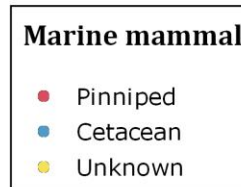


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Figure 9a.

Sightings of pinnipeds and cetaceans in the Greater Thames Estuary (points scaled by number of animals per sighting).

Scale: Greater Thames Estuary





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Figure 9b.

Public sightings of pinnipeds and cetaceans in the Greater Thames estuary (points scaled by number of animals per sighting).

Scale: Greater London



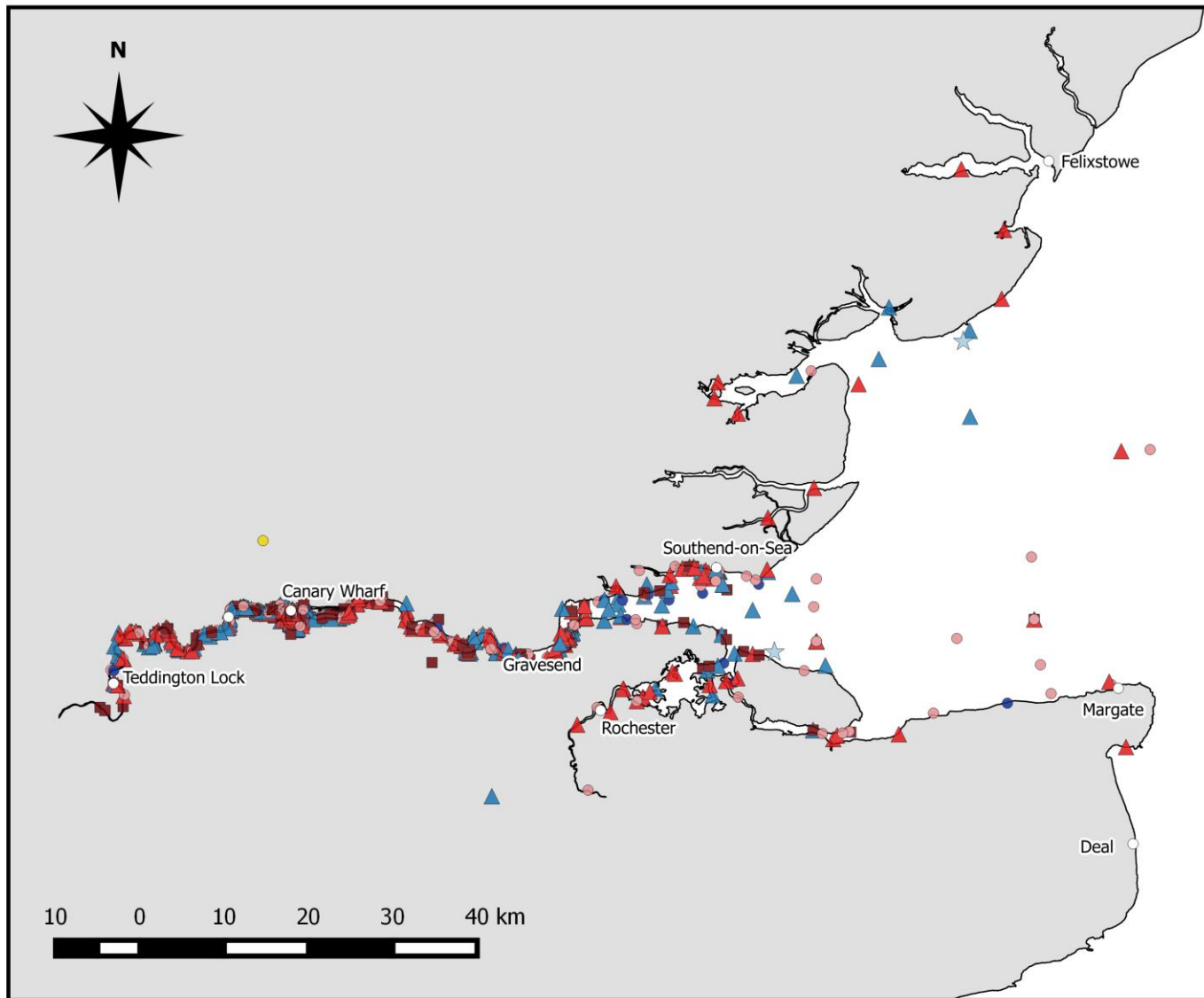
Sightings

- Pinniped
- Cetacean
- Unknown

Figure 9c.

Public sightings of pinnipeds and cetaceans in the Greater Thames estuary (points scaled by number of animals per sighting).

Scale: Central London



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Figure 10a.

Marine mammal sightings reported in the Greater Thames Estuary.

Scale: Greater Thames Estuary





Figure 10b.

Marine mammal sightings reported in the Greater Thames Estuary.

Scale: Greater London

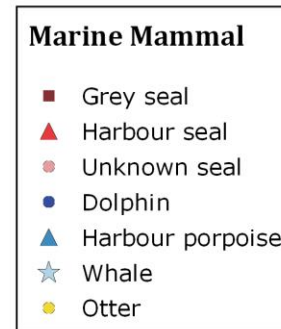


Figure 10c.

Marine mammal sightings reported in the Greater Thames Estuary.

Scale: Central London

Discussion and Conclusions

Analysis of the TMMSS data has been restricted to show general trends and differences between pinniped and cetacean sightings in the Greater Thames Estuary. The TMMSS data cannot be analysed more rigorously as opportunistic public sightings are made by observers that happen to sight marine mammals while completing another activity. Because of this, the TMMSS dataset is not effort-based (we do not know how long observers spent looking for marine mammals, where they searched or didn't search, and how many might have sighted marine mammals and not reported the occurrence). We cannot be 100% confident about identification to species level as we cannot validate an observer's reliability and/or experience in spotting and differentiating marine mammals. A lack of sightings does not necessarily reflect the absence of marine mammals, as it may simply indicate that observers did not encounter a marine mammal in a certain area, perhaps due to restricted access to the area or because their attention was directed elsewhere when a marine mammal was present. For these reasons, the data cannot be used to calculate abundance, as high numbers of public sightings can simply reflect a high density of observers.

However, the TMMSS data do provide important information on where marine mammals are present and hotspots of activity where people overlap with marine mammals in the Greater Thames Estuary. As the TMMSS data were collected by members of the public, they cover a wider range of time and space than would have been possible to cover as part of a dedicated scientific survey for reasons of time and cost. Thus, it makes available observations and information about marine mammals that would otherwise have been lost (Rechsteiner *et al.* 2013). The use of public sightings data has previously been successful in monitoring and/or establishing the presence of a range of species including porpoises (Bravington *et al.* 2010), and public sightings data have been used as support for conservation policy (Wiley & Simpfendorfer 2010) as well as identifying geographic areas for more refined surveys (Evans & Hammond 2004). The TMMSS data provide important information on the presence of marine mammals in the Greater Thames Estuary and can be used to inform conservation measures in the region. Key findings include:

- **Marine mammals are present throughout the Greater Thames Estuary during all months of the year.** Over the last 10 years, the TMMSS has received 1,317 sightings (1,281 complete sightings) from an estimated 1,229 observers covering all months of the year. Sightings of seals were reported as far upstream as Hampton Court Palace. Sightings of harbour porpoises and bottlenose dolphins were reported as far upstream as Teddington Lock and whales were reported as far upstream as Gravesend (apart from the northern bottlenose whale, who died in 2006 after beaching near Battersea Bridge). Marine mammal disturbance should be considered in all planning applications which are related to the Thames or the Thames foreshore. Furthermore, all users of the Greater Thames Estuary should consider how their activity may affect marine mammals and mitigate appropriately.
- **The greatest density of sightings is in Canary Wharf, at 138 sightings per square kilometre.** This area should be prioritised to distribute educational and/or conservation materials about marine mammals, such as ZSL's Marine Mammal Code of Conduct (Appendix 2), to reduce likelihood of negative interactions or disturbance.
- **A high density of sightings occurred at various locations between the Houses of Parliament and the O2 Arena, at Hammersmith, Southend on Sea and Cliffe.** In these areas, pedestrians have good access to the Greater Thames Estuary due to the Thames Path National Trail. Displaying information on marine mammals and how to report sightings at strategic points on the Thames Path would be beneficial to raise awareness of marine mammals in the Thames Estuary and increase the number of sightings submitted to the TMMSS.

Many people are unaware that the Thames is a biodiverse ecosystem that supports a variety of species, including top predators. The TMMSS is an important tool to raise awareness of Thames biodiversity and inspire Londoners to reconnect with nature in a busy urban environment. The large number of reports received by the TMMSS provides encouraging evidence that members of the public are engaging with marine mammals in the Greater Thames Estuary. It is our hope that people who participate in the TMMSS will foster a greater sense of awareness and environmental stewardship in the region and will go on to communicate this knowledge in their own social circles and support conservation efforts.

Next Steps

ZSL is committed to continuing the TMMSS and building up a long-term dataset of opportunistic marine mammal sightings in the Greater Thames Estuary. We encourage members of the public to continue submitting sightings of marine mammals to our interactive map at www.zsl.org/inthethames. Information from this report will be widely disseminated to members of the public and a variety of stakeholders in the region. Data from the report will also be uploaded to the Greenspace Information for Greater London CIC (GIGL) so that they are available to all users, especially during future planning applications.

ZSL are currently investigating ways of bringing an effort-based component to the TMMSS. ZSL did conduct monthly effort-based surveys for marine mammals at Canvey Island, Essex between 15th March and 4th July 2007, but only two sightings were reported during this time and the survey was discontinued. In March 2015, ZSL supported Marine Conservation Research International (MCR International) on the first ever dedicated survey for harbour porpoise in the Greater Thames Estuary. Visual and acoustic transects were completed over a course of 7 days, and 17 sightings and more than 100 separate detections of porpoises were made. A full report on this project will be published by the end of the year.

Furthermore, in January 2012 ZSL set up the Thames Seal Programme to complement data gathered through the TMMSS, with a focus on better understanding the harbour seal population in the Greater Thames Estuary. The programme of work includes completing annual harbour seal population surveys during the harbour seal moult period (Barker 2015); coordinating the Greater Thames Seal Working Group, a group comprised of stakeholder representatives from all sectors with the aim to better understand and manage the interactions between the seal populations and human activities in the Greater Thames Estuary; and completing a harbour seal tagging project to better understand harbour seal movement, foraging behaviours and important haul out sites in the region (Barker et al. 2014). This programme, alongside data from the TMMSS, has highlighted the importance of the Greater Thames Estuary for harbour seal conservation in the UK.

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Appendix 1: Additional data on TMMSS

Table 2. Marine Mammal Sightings Reported by Month and Year (shaded if a press release was issued)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Totals
January	1	10	11	7	15	11	6	2	13	12	5	93
February	3	10	7	3	11	6	15	12	18	22	5	112
March	2	8	3	11	4	7	16	3	11	12	3	80
April	8	8	38	14	14	5	9	6	13	15	9	139
May	2	10	7	5	6	11	4	5	10	47	6	113
June	2	7	2	8	11	3	11	3	7	18	8	80
July	12	3	3	6	8	0	5	5	8	18	11	79
August	26	8	13	5	5	1	4	7	8	61	27	165
September	8	4	23	2	7	7	4	11	11	9	35	121
October	13	8	6	5	5	11	10	12	14	9	19	112
November	5	4	2	3	10	3	6	13	13	5	11	75
December	14	7	4	6	3	7	5	15	5	11	2	79
Totals	96	87	119	75	99	72	95	94	131	239	141	1,248

Table 3. Primary activity for marine mammal sightings submitted to TMMSS from 2004-2014.

	Swimming	Resting	Not sure	Feeding	Interacting	Breaching	Dead	Other	Stranded	Total
Pinnipeds	452	235	126	89	47	19	1	7	1	977
Cetaceans	185	3	32	23	6	24	14	0	0	287
Otter	3	0	0	0	1	0	1	0	0	5
Total Sightings	640	238	158	112	54	43	16	7	1	1,269

Table 3. Length of sightings reported to the TMMSS

	0-2 mins	2-5 mins	5-10 mins	10-30 mins	30-60 mins	>1 hr	Total
Pinnipeds	336	146	96	163	50	45	836
Cetaceans	45	57	28	55	11	11	207
Otter	2	2	0	0	0	0	4
Total Sightings	383	205	124	218	61	56	1,047

Table 4. Distance of sightings reported to the TMMSS

	0-10 m	11-50m	51-100m	>100m	Total
Pinnipeds	313	329	105	113	860
Cetaceans	48	99	40	34	221
Otter	1	2	1	0	4
Total Sightings	362	430	146	147	1,085


Appendix 2: Thames Marine Mammal Code of Conduct

Seen a **MARINE MAMMAL?**


The Greater Thames Estuary is home to harbour porpoises, harbour seals, grey seals and sometimes whales and dolphins too! If you spot a marine mammal please follow this code:



If you see a marine mammal while on land...




Stay 50m
away





Put your dog
on a lead and
walk away






Do not presume a seal pup
is 'abandoned'. Its mum
may be feeding nearby


If you see a dead or
stranded marine mammal,
please call **0800 6520333**

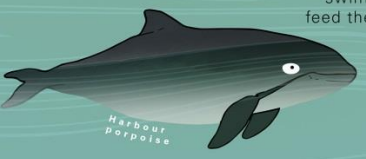


If you see a marine mammal while on the water...




Stay 100m
away





Do not chase,
swim with or
feed the animal

Travel at a slow,
'no wake' speed







Only watch for
15 minutes

Ensure the animal is
not confined between
vessels or between
vessels and the shore




Ensure no more than
two vessels are around
the animal at one time





Please report
your sightings at
zsl.org/inthethames
or with
[#inthethames](https://twitter.com/inthethames)





LIVING CONSERVATION

To find out more about
ZSL's work to protect
marine mammals visit:
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