

Tourism-based Human Activity and Seal Interactions in Cornwall

Summary Report 2019

Based on systematic surveys conducted by
Cornwall Seal Group Research Trust
In association with the Cornwall Marine and Coastal Code Group

Cornwall
SEAL
Group
Research
Trust



Cornwall Marine
& Coastal Code
Group



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Executive Summary

As one of the largest sectors contributing to Cornwall's economy, tourism is essential to the prosperity of the region. As a result of this, there has been a rapid expansion of service providers including wildlife watching and private recreational activity around the coast. This has resulted in increasing numbers of interactions between wildlife and human (anthropogenic) activities, which have been observed to have potentially harmful consequences for the wildlife, such as disturbance

Seals have become an important and reliable asset to many commercial tour operators, providing focused trips for patrons looking for a wildlife experience. Their use of terrestrial habitats and tendency for site fidelity result in them being more reliable and predictable than entirely aquatic marine mammals such as dolphins and whales.

Seals haul out on land (beaches, offshore islands and rocky outcrops) for vital rest. They need to recover energy spent when out at sea foraging and travelling, replenish oxygen supplies for diving, thermoregulate, digest their food and to breed. When disturbed prematurely back into the sea, they are not able to complete these vital processes. This can affect their ability to successfully breed and seriously compromise their life expectancy.

Disturbance is a change in an animal's natural behaviour as a result of human activity to which seals are particularly sensitive. Seals have behavioural and physiological responses to human disturbance, becoming more vigilant and alert and can prematurely flush, stampede or tombstone into the sea. Long term effects can result in permanent site abandonment, behaviour alterations, reduced survivorship and wider population effects.

Cornwall Seal Group Research Trust have conducted the first year of human activity and seal interaction surveys to assess potential hotspots, impacts and disturbance levels at sensitive seal sites around the Cornish coast. Surveys took place at four locations (Newquay, Mounts Bay, St Ives 1, St Ives 2) between June and August 2019. Further surveys will take place in 2020 after which further detailed analysis will be conducted.

High rates of disturbance were recorded at all four sites surveyed, with 392 total disturbance events and 1956 individual seal reactions recorded and each site experiencing disturbance events multiple times per hour. Disturbance events occurred on average every 14 minutes (St Ives 2), every 20 minutes (St Ives 1), every 27 minutes (Mounts Bay) and every 29 minutes (Newquay).

Both sites near St Ives showed the highest number of disturbance events and individual seal reactions with a high proportion of events caused by RIBs and commercially operated tripper boats. Tripper boats were identified as the leading cause of disturbance across all sites (40.6%), however were not a substantial issue in Newquay. Other activities that contributed to overall disturbance were air-based sources (19.6%), RIBs (13%) and non-motorised vessels such as kayaks (11%).

All sites varied in disturbance rates, levels and dominant activity cause, indicating that management at each location needs to be site-specific. Recommendations include engagement with and education of commercial operators, full implementation of voluntary codes of conduct, engagement of local businesses within the tourism sector to spread awareness to potential customers and members of the public. In addition, continued monitoring and research is needed to assess efficiency of any management practices put into practice.

Recommendations

- Stakeholder engagement should be carried out with groups such as wildlife watching boat operators, water activity hire companies and recreational water users to provide information on appropriate wildlife watching conduct. This includes areas to avoid and education on wildlife behavior and signs of disturbance.
- Educational resources should be used including effective signage in sensitive areas and informative reading material and infographics to highlight the issue of disturbance to members of the public.
- A national voluntary code of conduct should be put in place for all operators to reduce disturbance levels. This should include a requirement to partake in accredited training, such as the WiSe course.
- If the initial voluntary approach proves ineffective, statutory measures should be taken. For example implementation of licensing for tourist based vessels from key harbour sites to control volume of boat tour operators working out of hotspot areas. This will avoid high increases in activity levels that have potential to raise disturbance rates further.
- Marine protected areas (MPAs) should be reviewed to assess effective management measures for key species. Where appropriate any sensitive seal sites in or adjacent to existing Sites of Special Scientific Interest (SSSIs) could be formally reviewed by Natural England with a view to increasing statutory protection for our globally rare grey seals at the locations.
- Adequate funding is required to continue research on tourism-based human activity levels and interactions with wildlife. This will enable further assessment of disturbance levels as well as efficacy of any management strategies implemented

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Tourism is one of the largest sectors of industry within Cornwall and the southwest. The southwest is one of the most popular destinations to visit in England with over 20% of overnight visits within the region (Visit England, 2018). Cornwall alone receives 4.5million visitors a year, spending approximately £1.86 billion and supporting 17-20% of the county’s jobs (Cornwall Council and Visit Cornwall, 2014).

Many visitors to Cornwall come to enjoy the unique natural surroundings and coastal scenery as well as the wide range of wildlife that inhabit the area. As tourism in Cornwall continues to expand, many new and existing businesses have taken advantage of the growing interest in eco-tourism, with increasing numbers of wildlife watching tours and outdoor activities such as surfing, kayaking and coastal walking. Many of these activities are marine based, focused on providing patrons with fantastic views of dolphins, seals and birds.

Seals, in particular, are a key species that marine-based tourism is centred around (Kirkwood *et al.*, 2003; Curtin *et al.*, 2009), particularly in Cornwall. Their natural behaviour includes hauling out on land, either on beaches or offshore islands and rocky outcrops (Leeney *et al.*, 2010; SCOS, 2017). Seals need to haul out on land for vital rest to digest and replenish oxygen and energy levels as well as to breed (Reidman, 1990).

This use of terrestrial habitats makes them easier to spot than the other entirely aquatic marine mammals such as dolphins and whales. Pinnipeds are also known to display site fidelity, making it possible to predict when and where they may be, giving tour operators a good chance of satisfying their customers (Pomeroy *et al.*, 2000; Dietz *et al.*, 2012; Sayer *et al.*, 2019). It is due to this that has established seals as an important and reliable asset to Cornwall’s economy. In addition, the rise of social media has enabled members of the public to learn of the seal haul-out locations and use their own private recreational time to visit them.

Both commercial tour operators and recreational activities are currently unlicensed with minimal limitations on numbers within each harbour or local area, and no legislative guidelines on how these activities are conducted. This can lead to a high level of human activity and wildlife interactions, which can very often lead

to disturbance. It is important to note that the majority of seal disturbance is not committed intentionally, occurring mainly as a result of a lack of awareness or information about appropriate behaviour to conduct around wildlife. This can result in an absence of ‘best practice’ behaviour from both operators and the public (Strong and Morris, 2010; Moorhouse *et al.*, 2015; Granquist & Nilsson, 2016; Trave *et al.*, 2017).

Disturbance is defined as a change in natural behaviour of an animal as a result of an anthropogenic (human) stimulus. Seal disturbance has been recorded to result in potentially harmful and negative impacts on individual animals and on a population level in both the long and short term; seals have physiological and behavioural responses to human disturbance. They may become more alert and each seal’s heart, breathing rate and stress levels will have been increased. Additionally, seals may prematurely flush, stampede or tombstone into the sea resulting in temporary displacement or site abandonment (Boren *et al.*, 2002; Frid & Dill, 2002; Andersen *et al.*, 2012; Granquist & Sigurjonsdottir, 2014; Holt, 2015; Karpovich *et al.*, 2015; Cates & Acevedo-Gutiérrez, 2017). Long term impacts can include permanent site abandonment and a decrease in pupping success, which can result in declines in population stability and growth (Pomeroy *et al.*, 1999; Olsen and Acevedo-Gutiérrez 2017; Pirotta *et al.*, 2018).



Figure 1 Grey seals showing behavioural responses as a result of disturbance from anthropogenic stimuli. Tombstoning and vigilant behaviour at an offshore island haul-out (left), multiple seals stampeding into the sea (right). Photos by Sue Sayer.

Cornwall Seal Group Research Trust (CSGRT) has been monitoring grey seals around the southwest since 2000, studying the behaviour, movements and threats that the species face. Throughout their research, disturbance of seals has become one of the most frequently recorded negative impacts observed. Disturbance is just one of many cumulative impacts that seals are under today, including; climate change, habitat loss, disturbance, toxic chemical pollutants, shooting and culling (Bowen and Lidgard, 2013; Fietz *et al.*, 2016; Simmonds, 2017; Nunny *et al.*, 2018), as well as fishery related pressures such as; overfishing and depletion of fish stocks (Königson, 2011), live entanglement in lost fishing gear (Allen *et al.*, 2012) and bycatch (Cosgrove *et al.*, 2016; Northridge *et al.*, 2016).

In 2013, the Cornwall Marine and Coastal Code Group (CMCCG) was formed to monitor the amount of marine life disturbance and to spread awareness to educate the public on how to identify and prevent disturbance whilst wildlife watching. CMCCG is a consortium of statutory agencies and non-government organisations whose sole purpose involves wildlife conservation and protection and includes: Cornwall Wildlife Trust, Cornwall Seal Group Research Trust, British Divers Marine Life Rescue, National Trust, RSPB, MMO, Natural England, Cornwall Council, Cornwall and Devon Police, WiSe, Cornwall Bird Watching and Preservation Society and the Cornish Seal Sanctuary.

A main aim of the CMCCG is to promote ‘best practice’ wildlife watching for both commercial operators as well as members of the public. Through this, human activity focused on wildlife watching will benefit the natural environment as well as the local economy. Businesses should be able to provide an educational, inspiring and exciting experience, demonstrating responsible behaviour to prevent negative impacts on seals. Ensuring a

healthy seal population in local areas will enable operators to thrive and secure the longevity of their own businesses, as well as the welfare of this protected species (Kirkwood *et al.*, 2003; Strong & Morris, 2010; Hoover-Miller *et al.*, 2013).

To inform and share best practice, continuous monitoring must take place to identify the behaviours that will improve and minimise disturbance. This report includes a summary of the results from CSGRT’s first year of systematic disturbance surveys during the summer season of 2019. This is an ongoing project to observe levels of human activity around sensitive seal haul-outs and their impact on seal behaviour. Surveys will continue into 2020, after which further detailed analysis will be conducted to assess potential conservation management requirements.

Method

CSGRT conducted systematic surveys over the summer season during 2019 (June- August). Volunteers and university students were trained to record both seal and human activity at four different offshore seal haul-outs around the coast of Cornwall. Any disturbance events resulting from the interaction between seals and human activity were recorded including detail about the level of disturbance (Table 1.) and number of seals affected. Other factors recorded included number of activities, the minimum distance of the human activity from the hauled seals, type of activity (Table 2.) and natural fluctuations of seal haul out numbers.

Table 1. Levels of disturbance and the seal behaviour indicators. If within the same disturbance event (human activity visit) an individual seals behaviour changed between levels, only the highest level was recorded.

Level of Disturbance	Seal behaviour and signs
L1	Alert behaviour (e.g. head up and looking at activity)
L2	Moves towards the water
L3	Enters the water

These surveys took place over two hours – one hour either side of low tide. This time period was chosen as low tide is when there is maximum space for seals to haul out, often resulting in maximum number of seals hauled.

The four sites (Newquay, Mounts Bay, St Ives 1, St Ives 2) were chosen as they represent area of high numbers of seals hauled out during the summer season, as well as being adjacent to extremely popular tourist destinations in Cornwall with very active harbours (Figure 2). They had also previously been identified as human and wildlife interaction ‘hotspots’ from routine and ad-hoc CSGRT data.



Figure 2 Map of mid and west Cornwall showing the four sites surveyed – Newquay, St Ives 1, St Ives 2 and Mounts Bay

To gain as accurate a picture of the types of activity and regularity of visits to the sensitive seal haul-out areas, each site was surveyed a minimum of five times per month. For all sites combined, there was a total of 70 surveys over the summer months, producing 140 hours of observation data.

Table 2. Activity Codes and description of types of activity included with the allocated groups.

Activity Code	Human activities included within group
Air-based	All stimuli originating from a source above the haul out (e.g. Fixed wing aircraft, helicopters, drones and paragliders)
NMB	Non-motorised boats or vessels (e.g. kayaks and stand up paddleboards)
TB	All tourism-based commercially operated motorised vessels except RIBs (includes wildlife watching boats, fishing charters, pleasure cruises)
RIB	All vessels classed as a 'Rigid Inflatable Boat' (including commercially operated tours, boat hires and private vessels)
JS	Jet skis (both single and guided groups)
OMB	Other motorised boats or vessels (includes fishing boats, privately owned boats, sailing boats and coastguard)
S/D	Water-based human activity not involving a vessel (e.g. wild swimming, snorkelling and diving)
W	Walkers and land-based activities (this was only recorded at Newquay site due to proximity of haul out to the coast path)

Results

Disturbance Events and Individual Reactions

The total number of disturbance events at each site was recorded as well as the number of individual seal reactions (at all disturbance levels) (Figure 3).

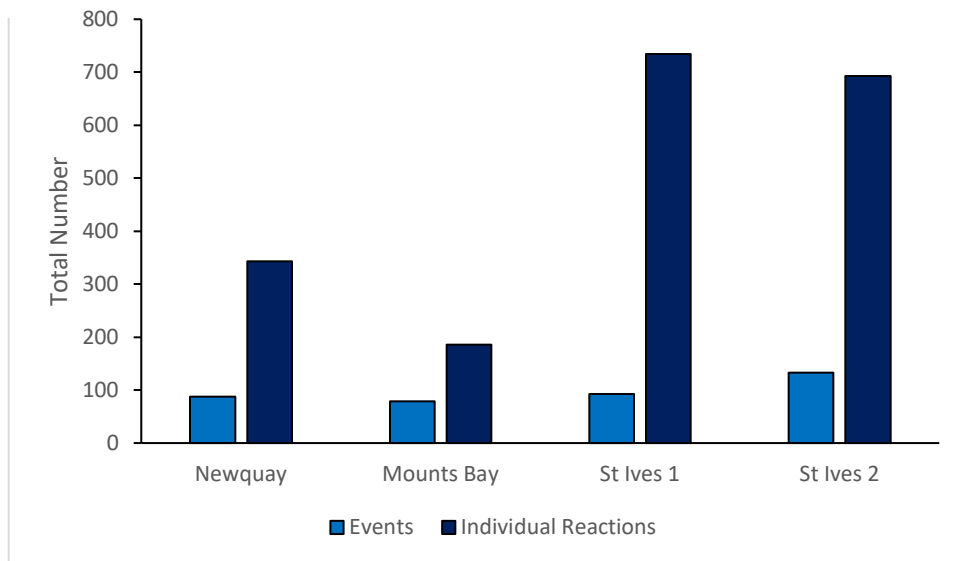


Figure 3 Total number of disturbance events and individual seal reaction recorded over 140 hours of surveys, as a response to human activity at four sites around the Cornish coast (June-August 2019)

Across all four sites, there were a total of 392 different disturbance events caused by a human activity. During these events, 1956 individual seal reactions were recorded to occur. Both of the St Ives sites showed very high numbers of seal reactions, twice as many as at either of the other sites (Newquay and Mounts Bay) (Table 3). St Ives 1 had the most seal reactions ($n=734$), however St Ives 2 was recorded as having the most disturbance events ($n=133$). Number of activities during each survey varied greatly, with some showing no activity and the highest number being 30 occurring within a two hour period (Figure 4).

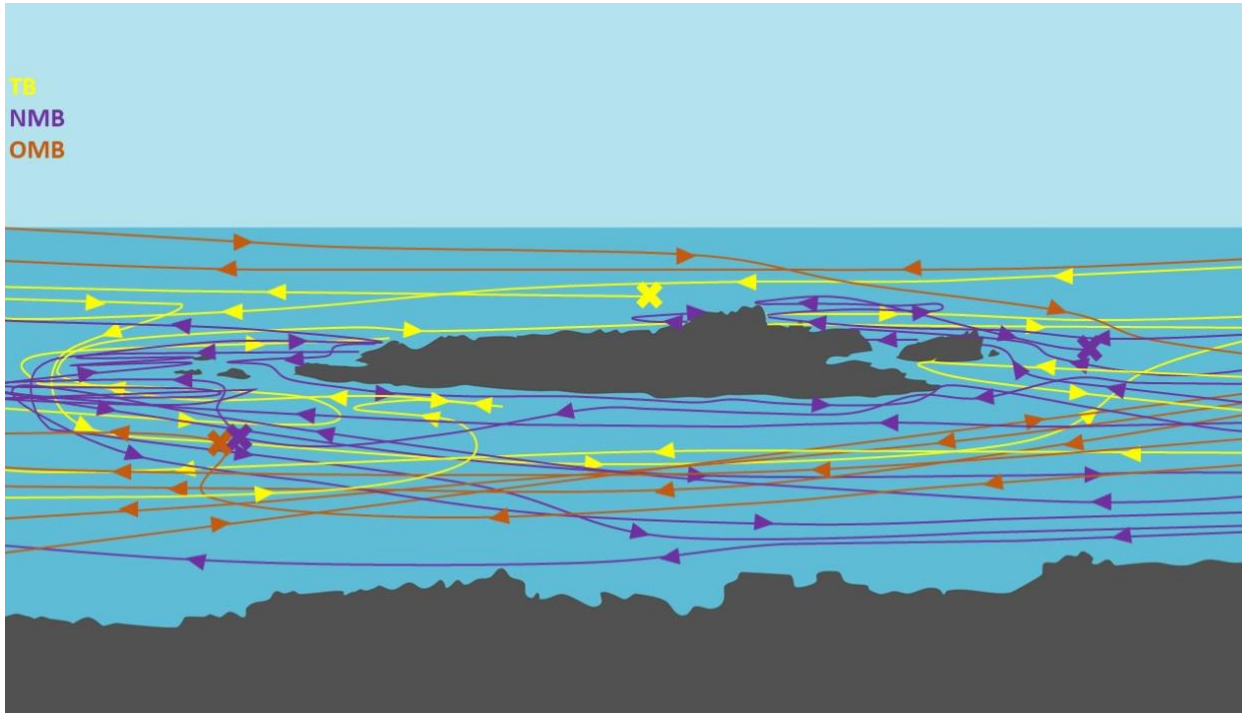


Figure 4. Image showing human activity tracks occurring during a single two hour survey at Mounts Bay. Tracks were recorded through continuous video surveillance throughout survey. There was a total of 30 different activities recorded throughout the two hour period including commercial tripper boats, kayaks, fishing vessels, private motorised vessels, helicopters and fixed wing aircraft (air-based tracks not shown in image).

All sites showed high rates of disturbance with events occurring on average every 14 minutes (St Ives 2), every 20 minutes (St Ives 1), every 27 minutes (Mounts Bay) and every 29 minutes (Newquay). Across all sites, an average of 14 seals reacted to a human activity per hour (Table 3).

Table 3 Rates of disturbance occurring at four sites around the Cornish coast (June-August 2019)

Site	# Surveys	# Hours	# Events	Events/hr	L1 Reactions	L2 Reactions	L3 Reactions	Total Reactions	Reactions/hr
Newquay	21	42	88	2.1	265	37	41	343	8.2
Mounts Bay	18	36	79	2.2	159	11	16	186	5.2
St Ives 1	15	30	92	3.1	554	128	52	734	24.5
St Ives 2	16	32	133	4.2	604	34	55	693	21.7
All sites	70	140	392	2.8	1582	210	164	1956	14.0

Type of Activity

There was a range of different types of human activity recorded within the survey area of all four sites. They included activities such as commercial tripper boats and recreational activities visiting the area intentionally to view the seals, as well as passive activities passing through the area such as fishing boats and air-based activities. Activities included motorised vessels, non-motorised vessels, swimmers, land-based and air-based sources (Figure 5).

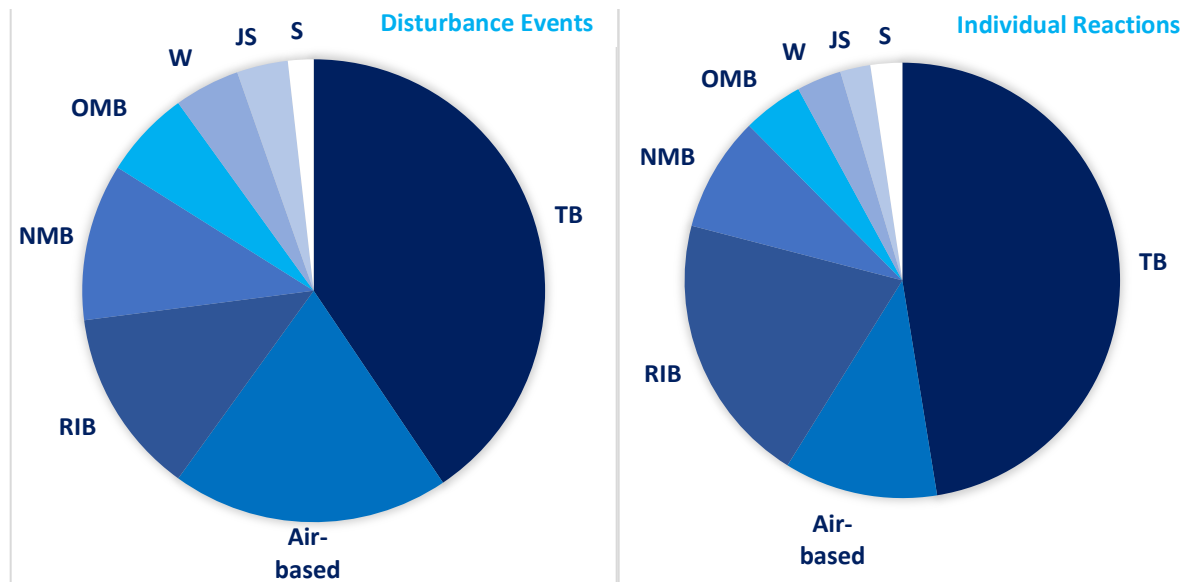


Figure 5 Percentage of disturbance events (left) and individual seal reactions (right) caused by different types of human activity at all four sites surveyed around the Cornish coast (June – August 2019). TB - tourism-based commercially operated motorised vessels; Air-based - All stimuli originating from a source above the haul out; RIB - Rigid Inflatable Boats; NMB - Non-motorised boats or vessels; OMB – Other motorised boats and vessels; W - Walkers and land-based activities; JS – Jet skis; S - Water-based human activity not involving a vessel.

Across all sites, commercial tripper boats caused the largest proportion of both disturbance events (40.6%) and number of individual seal reactions (47.4%) (Figure 5) Although the majority of RIBs were also commercially operated tours, these were categorised separately due to engine noise and speed capability. The two other categories that caused a large proportion of disturbance events and individual seal reactions were air-based sources (19.4%, 11.4%) and RIBs (13%, 20.2%).

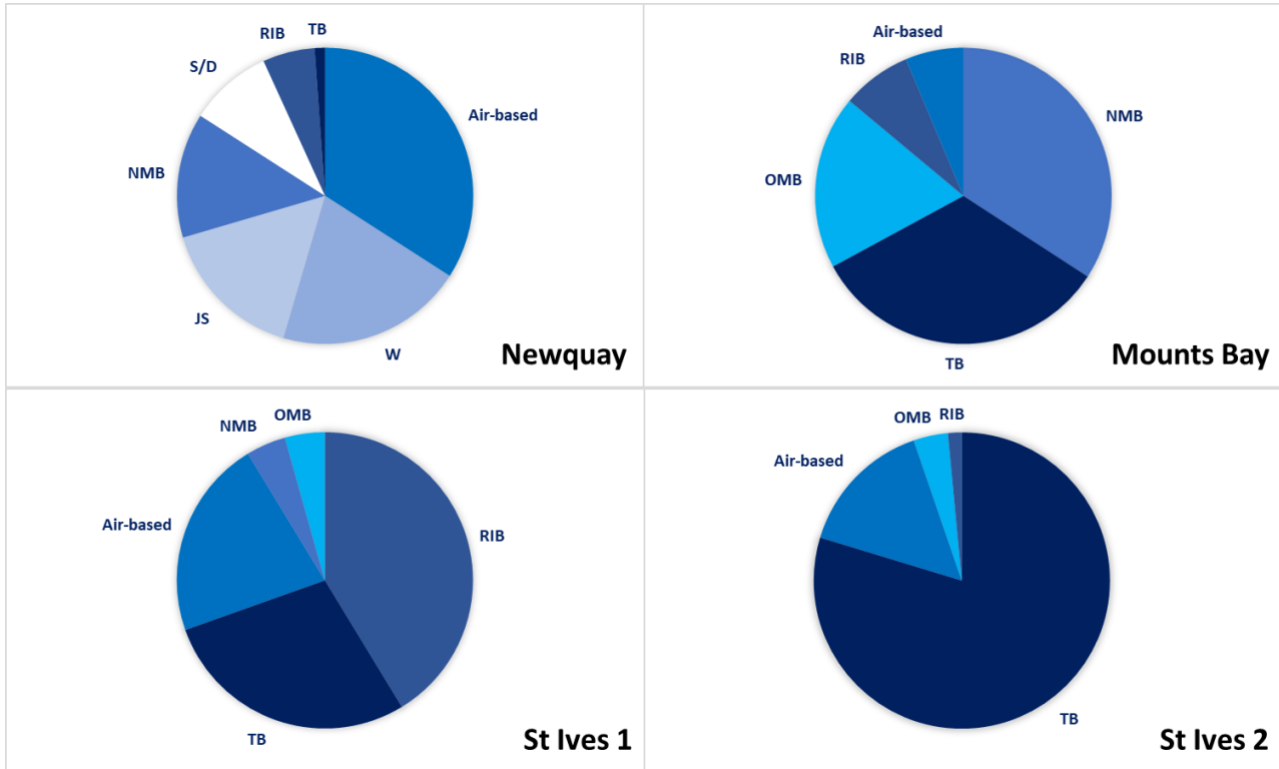


Figure 6 Site by site breakdown of percentage of disturbance events and individual seal reactions caused by different types of human activity at four different sites on the Cornish coast (June – August 2019). TB - tourism-based commercially operated motorised vessels; Air-based - All stimuli originating from a source above the haul out; RIB - Rigid Inflatable Boats; NMB - Non-motorised boats or vessels; OMB – Other motorised boats and vessels; W - Walkers and land-based activities; JS – Jet skis; S - Water-based human activity not involving a vessel.

At each survey site, there were multiple different types of human activity recorded that resulted in disturbance events. However, each site varied greatly from each other and had different dominant causes (Figure 6).

Newquay had the largest variation of human activity causing disturbance (n=7) In contrast to the other three sites, there was very little disturbance caused by commercial tripper boats (1.1%) and RIBs (5.7%) with the majority of disturbance events resulting from air-based sources (34.1%) and walkers on the nearby clifftop (20.5%). NMBs and jet skis were also considered to cause a considerable percentage of disturbance (13.6%, 15.9%). It was also the only site to experience disturbance caused by swimmers, snorkellers and divers.

Both commercial tripper boats and NMBs were shown to cause the most disturbance at Mounts Bay (32.9%, 32.9%). This site had the largest percentage of disturbance caused by OMBs (19%) across the four sites.

At St Ives 1, RIBs caused over a third of disturbance events (41.3%) with commercial tripper boats and air-based sources also causing large proportions of the total amount (28.3%, 21.7%). St Ives 2 had the least variation of human activities causing disturbance (n=4) and was dominated by disturbance events being caused by commercial tripper boats over any other activity (79.7%).

Monthly comparisons

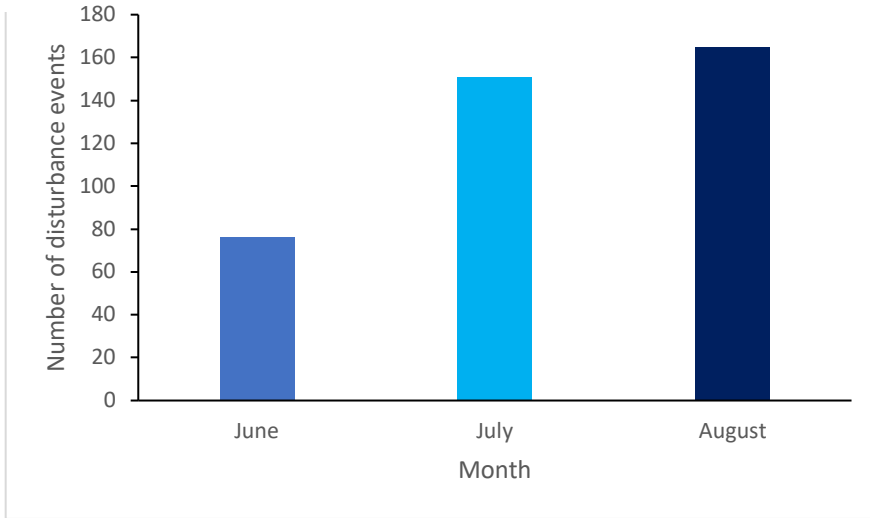


Figure 7 Number of disturbance events caused by human activity each month (June-August 2019)

June showed a lower number of disturbance events over the 3 months (n=76) and August showed the highest (n=165) (Figure 7). There was also a high number of disturbance events recorded in July (n=151), almost double June the number recorded in June.

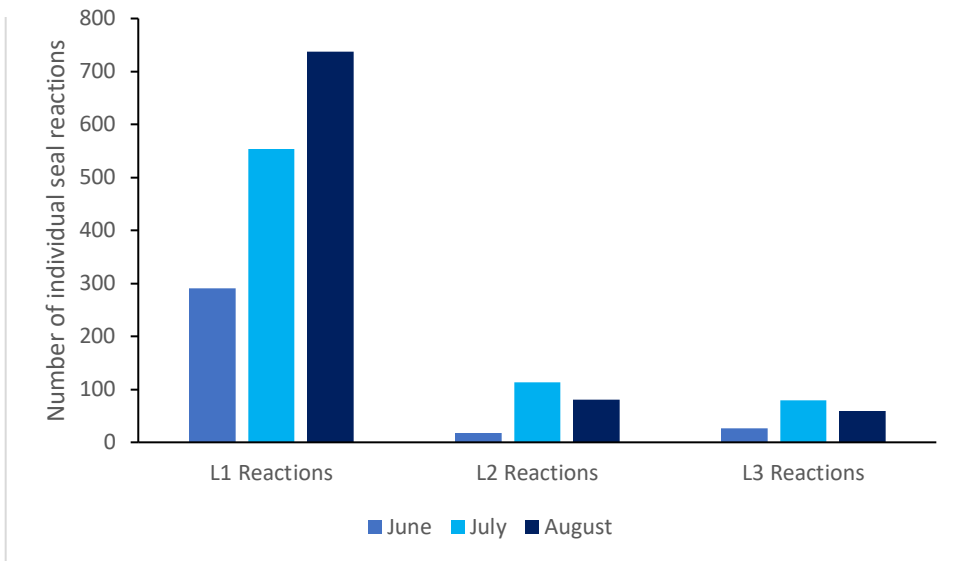


Figure 8 Number of individual seal reactions caused by human activity each month (June-August 2019), categorised by disturbance level.

All three months recorded level 1 responses as the most frequent reaction from individual seals, increasing from June through to August. In contrast level 2 and level 3 responses were seen to be higher in July than in June and August (Figure 8).

Discussion

Disturbance was recorded at all four sites surveyed around the coast of Cornwall with 392 total events occurring (Table 3). However, rates of disturbance varied between sites with higher numbers of events and individual seal reactions recorded at both St Ives sites than Newquay and Mounts Bay (Figure 3).

The reason for such high numbers of individual seal reactions may be as a result of the higher number of disturbance events that occurred but potentially could be due to higher numbers of seals present during those events, increasing the number of animals likely to react. Other studies have recorded that group size of seal haul-outs does affect the intensity of disturbance events (Cowling *et al.*, 2015; Whiteside *et al.*, 2016). This is because an individual may not initially notice a human activity, only reacting when a neighbouring animal triggers or detects it and reacts.

The higher amount of disturbance events occurring at St Ives 1 and St Ives 2 could also be attributed to the frequency of human activities entering the seal haul-out area. This could be a result of the number of boats operating about of the adjacent harbour as well as the number of trips they make each day (Osterreider *et al.*, 2017). As commercially operated tripper boats and RIBs were shown as the dominant type of human activity causing disturbance events at these sites, it would indicate that these areas are regularly visited by a large number of different operators. Additionally, observations of each vessel during surveys revealed that many of these operators made multiple trips during a single survey period of 2 hours. RIBs showed the highest proportion (41.3%) of disturbance events at St Ives 1 (Figure 6). This could suggest that the speed and access that these vessels enabled multiple visits throughout the day. RIBs also caused 48.1% of individual seal reactions at St Ives 1 which could be a result of speed and proximity of approach, engine noise and minimum distance from the seals once present (Tripovich *et al.*, 2012). This is also true of the commercial tripper boats (TBs) at St Ives 2. Other studies have found that these factors can have a significant effect on disturbance response rate in pinnipeds (Andersen *et al.*, 2012; Hoover-Miller *et al.*, 2013; Pavez *et al.*, 2015; Karpovich *et al.*, 2015). These elements will be explored further once the entirety of the monitoring project is completed.

Noise level may be associated with the high rates of disturbance caused by motorised vessels such as commercially operated tourist boats (TBs) and Rigid Inflatable Boats (RIBs) and has potential to be a contributing factor in the impact of air-based sources such as fixed wing aircrafts and helicopters, which caused the majority of disturbance events at Newquay (34.1%). This may be attributable to this location being within approximately 12km of a commercial airport and RAF base. High noise levels linked with these activities have the potential to affect more seals as sound can reach the entire haul out rather than isolated areas (Kelly *et al.*, 1988; Born *et al.*, 1999; Pavez *et al.*, 2015; Tripovich *et al.*, 2012; Arona *et al.*, 2018). In contrast, activities associated with lower noise levels such as NMBs caused over a third (34.2%) of the Mounts Bay disturbance events. This activity group includes activities such as kayaks and stand-up paddle boards (SUPs), which have multiple characteristics that can increase sensitivity to eliciting disturbance responses (Henry & Hammill, 2001; Karpovich *et al.*, 2015; Cates & Acevedo-Gutiérrez, 2017). This includes the ability to approach animals at a closer distance, as well as quieter and slower having the potential to mimic predator behaviour. NMBs lack audible cues or warnings, which may result in surprising animals at a closer distance, initiating responses with greater intensity and immediacy (Suryan & Harvey, 1999; Johnson & Acevedo-Gutiérrez, 2007; Cates & Acevedo-Gutiérrez, 2017). This is also true of swimmers, snorkellers and divers (Stafford-Bell *et al.*, 2012).

The low proportion or absence of NMB caused disturbance events at the two St Ives sites could suggest that NMB don't cause seal disturbance there but instead relates to the accessibility of the site. Both haul-outs are situated either further away from potential launch areas and/or may have geographical characteristics making them less suitable for kayakers, such as strong currents.

The Newquay site showed high amounts of disturbance events caused by walkers (W) and jet skis (JS) (Figure 6). Disturbance from land-based sources was unique to this site as it is the only site that is situated within 50m of a mainland coastal path as well as being easily accessible to climb down to. This results in seals responding to movement or sound from land-based walkers as well as from water-based activities. Jets skis were mostly observed to travel or stop much further away than the currently recommend guidelines from WiSe (50m). However, it is possible than the high level of noise (similar to that of RIBs) may trigger disturbance from further distances than recommended guidelines. This could also vary dependent on environmental factors such as wind speed and direction (Born *et al.*, 1999; Jansen *et al.*, 2015). This would indicate than current guidelines may require altering and that every seal haul-out site may need specific 'best practice' guidelines. Furthermore, understanding and recognition of seal behaviour could be a better indicator for activities to focus on to prevent high level disturbance from occurring.

Most seal disturbance events occurred in July and August (n=165, 151)(Figure 7). This corresponds to the peak tourist season and school summer holiday period in Cornwall when larger numbers of people visit the area, engaging in recreational and commercial activities concentrated around the coastal environment (GBTS, 2018). Although there was a higher total number of individual seal reactions in August (n=876), July showed a higher number of Level 2 and 3 reactions (Figure 8). This could be a result of environmental factors such as better weather, lower wind speeds and calmer seas reducing overall ambient sound levels. This would increase human visits to the seal haul-out areas as well as increasing the likelihood of noise causing more extreme disturbance responses from the seals (Born *et al.*, 1999; Boren *et al.*, 2002; Andersen *et al.*, 2012; Granquist & Sigurjonsdottir, 2014; Jansen *et al.*, 2015). To be sure, this needs to be further explored when the all project surveying is complete, following the second year of surveys in 2020.

Summary

In summary, throughout the 3 months of surveying, there was a high number of disturbance events and individual seal reactions recorded at all four sites around the coast of Cornwall, however there was considerable variation between sites. Both St Ives sites experienced the most amount of disturbance with events occurring at a rate of every 14 minutes (St Ives 2) and every 20 minutes (St Ives 1). Although lower rates were seen at Newquay (every 27 minutes) and Mounts Bay (every 29 minutes), disturbance was still occurring multiple times each hour, indicating signs of chronic disturbance with potentially serious implications for the individual seals involved. Commercial tripper boats were identified as the main cause of disturbance at three sites, however only initiated a very small percentage (1.1%) of disturbance events at Newquay.

CSGRT and CMCCG recommend that to reduce disturbance rates in Cornwall, sensitive seal sites become 'seal awareness zones', where both engagement and education of local tour operators and communities occur to share, spread and increase 'best practice' behaviour. All operators providing services that involve wildlife watching or regularly pass sensitive seal sites should undertake training for all guides and skippers to ensure that advice and guidelines are made clear to prevent disturbance and agree to following a voluntary code of conduct (Strong & Morris, 2010). Guides can also confidently explain to customers why best practice wildlife watching is needed. This, in the long term, will work towards protecting and conserving the seals, on which their business relies. Each course should be geared towards the specific area that is being visited as many aspects of the seals behaviour and response will be site specific (Scarpaci *et al.*, 2004; Hoover-Miller *et al.*, 2013; Redpath *et al.*, 2013). Businesses that provide services such as hire equipment (self-drive boats, kayaks, SUPs etc.) should also partake in this and provide sufficient information to their patrons. Failure to implement voluntary codes may need more effective management such as changes to licensing or introduction of local byelaws for seal awareness zones to ensure best-practice and reduce chronic disturbance.

Air-based operators need to be made aware of this report, to discuss how disturbance incidents arising as a result of their activity can be reduced.

Guidelines on responsible wildlife watching need to be made freely available to members of the public by engaging local businesses in the tourist sector to distribute educational material to their patrons.

Both CSGRT and CMCCG continue to monitor the issue of wildlife disturbance with limited resources. This systematic human activity and seal interaction project will continue into 2020, after which further detailed analysis will be conducted. Additional research and monitoring are required to assess trends and any increase in impact of the tourist industry on marine life, but for this to occur, more funding is needed. If disturbance monitoring is successfully in place, the research obtained from it will provide confidential operator-specific feedback about their activities and other stakeholders in all areas with accurate information. This can be used to gain the support needed to develop and implement effective site-specific management plans, with the aim of successfully reducing wildlife disturbance. Without this, there is a strong possibility that disturbance levels of seals will increase, resulting in negative impacts on the species, the wider marine environment through reduced ecosystem services, as well as jeopardising local communities of people, businesses and tourism-based economies.

Recommendations

- Stakeholder engagement should be carried out with groups such as wildlife watching boat operators, water activity hire companies and recreational water users to provide information on appropriate wildlife watching conduct. This includes areas to avoid and education on wildlife behavior and signs of disturbance.
- Educational resources should be used including effective signage in sensitive areas and informative reading material and infographics to highlight the issue of disturbance to members of the public.
- A national voluntary code of conduct should be put in place for all operators to reduce disturbance levels. This should include a requirement to partake in accredited training, such as the WiSe course.
- If the initial voluntary approach proves ineffective, statutory measures should be taken. For example implementation of licensing for tourist based vessels from key harbour sites to control volume of boat tour operators working out of hotspot areas. This will avoid high increases in activity levels that have potential to raise disturbance rates further.
- Marine protected areas (MPAs) should be reviewed to assess effective management measures for key species. Where appropriate any sensitive seal sites in or adjacent to existing Sites of Special Scientific Interest (SSSIs) could be formally reviewed by Natural England with a view to increasing statutory protection for our globally rare grey seals at the locations.
- Adequate funding is required to continue research on tourism-based human activity levels and interactions with wildlife. This will enable further assessment of disturbance levels as well as efficacy of any management strategies implemented

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