Hurlstone Point Harbour Porpoise

Monitoring Project

Vanessa Lloyd, February 2023

Contents

1. Introduction

1.1 Background

The harbour porpoise *Phocoeana phocoena* is the most frequently sighted cetacean in UK waters, yet there remains a conservation need to assess both the abundance and distribution of this species.

Declines in harbour porpoise numbers have been reported in various regions of the North East Atlantic, North Sea and Baltic (Evans & Prior, 2012). The species is exposed to a variety of anthropogenic threats; including bycatch in fishing gear, most notably in gillnets, prey depletion, pollution that can affect the health of animals, and acoustic and physical disturbance (IAMMWG *et al.*, 2015).

Harbour porpoise are a protected species under Annex II of the Conservation of Habitats and Species Regulations 2017 (as amended) and hence are fully protected in UK waters. In addition, they are designated features for five Special Areas of Conservation (SAC) in the UK; the closest SAC to Somerset in which harbour porpoise are a primary reason for selection is the Bristol Channel Approaches (Evans & Prior, 2012; IAMMWG *et al.*, 2015).

The current approach to conserving harbour porpoise in UK seas consists of a five-step plan for assessing and maintaining their Favourable Conservation Status (FCS) (Natural England, 2021). Key commitments towards this plan involve the monitoring and surveillance of cetacean populations through participation in Small Cetacean Abundance in the European Atlantic and North Sea (SCANS) surveys which are broad scale, low resolution transect surveys completed every 10 years in July since 1994 (Evans & Prior, 2012; Natural England, 2021). In addition, a range of techniques and guidelines aim to reduce identified threats, e.g. pingers to alert animals to fishing nets and bubble curtains to minimise noise from offshore construction (Natural England, 2021). Despite the UK having these key commitments to monitor population size and trends of harbour porpoise, the overall reliance on broad-scale snapshot surveys has both spatial and seasonal limitations. The inclusion of small-scale regional data for inshore areas is identified as being essential to monitoring cetacean populations and it enables consideration of seasonal movements to local areas that may be important for harbour porpoise (Dolman *et al.*, 2013; Lacy & Hammond, 2020). Completing long-term dedicated surveys at small-scale sites is therefore vital in providing valuable information for conservation and management decisions to be made locally and can also provide insights into localised marine environment changes (Shucksmith *et al*., 2009).

The Somerset coast is not a well-known location for spotting marine mammals, however with historical records of the occasional harbour porpoise around Porlock Weir, the Sea Watch Foundation regarded it an area of the UK that needed monitoring (pers. comm. Gibas, 2012). In 2013 a volunteer Somerset Regional Coordinator role was created to collate sightings, complete

regular surveys, and raise awareness of the marine mammal species along this stretch of coastline.

Following nearly 10 years of this role, the Somerset Regional Coordinator for Sea Watch has partnered with several organisations including Somerset Wildlife Trust, Exmoor National Park Authority and National Trust running cetacean surveys and training and engaging the local community with the importance of the local marine life. Surveys completed for marine mammals used the standard Sea Watch Foundation survey form which records time spent observing, also known as effort and environmental data every 15 minutes. The number of effort surveys along the Somerset coast more than doubled in 2021 compared to 2014 and the number of survey locations has increased, from 4 in 2014 to a total of 14 locations surveyed in 2021 (Lloyd, 2021). The yearly reports for Somerset Sea Watch (Lloyd, 2019; 2020; & 2021) have highlighted that the highest number of sightings of harbour porpoise from both effort and casual sightings are recorded at Hurlstone point, with occasional sightings throughout the year further into the Bristol Channel and Severn estuary. The site at Hurlstone Point has relatively shallow seas and strong current flows which are features associated with good foraging and feeding opportunities as well as good habitat for calf rearing (Evans & Prior, 2012). The most recorded behaviour at Hurlstone Point was suspected feeding, and sightings of juveniles and calves were recorded in the summer months (Lloyd, 2019; 2020; & 2021).

An investigation into the abundance of harbour porpoise off the Somerset coast by Dingle (2014) demonstrated a mean of 1.123 sightings per visit at Hurlstone point recorded over a 12-month period. There was a significantly higher number of sightings per visit in summer (2.83 individuals). With a mean of over 1 for other seasons; this implies the harbour porpoise population is resident with an increase in summer, either due to increased visibility or migratory individuals entering the Bristol Channel. A mean of 0.4 sightings per effort survey hour was recorded at Hurlstone Point in 2021 (Lloyd, 2021) compared to a mean of 0.03 sightings per hour elsewhere along the Somerset coast. There are several other studies that highlight the fact that although harbour porpoise are very mobile and wide-ranging, they frequently also show site fidelity. Radio-tracking studies in inner Danish waters have demonstrated that harbour porpoise regularly use the same locations (Evans & Prior, 2012). In addition, distinctively marked individuals have also been observed repeatedly through the season and/or from year to year in the same sites at locations in Shetland and Pembrokeshire (Evans, 1997; Pierpoint, 2008).

1.2 Photo-Identification

Photo-identification (photo-ID) and mark-recapture methods can be utilised with land-based effort surveys and can provide information on group structure, ranging patterns and site fidelity, as well as population size and a variety of life history parameters of cetaceans (Davies *et al*., 2001). It also has the benefit of being cost-effective and non-intrusive (Hammond *et al*., 1990). The mark-recapture method makes use of naturally occurring, and sometimes human-induced, unique markings enabling identification of individual animals. The Peoples Porpoise Project (Dunn, 2019) successfully collated a photographic catalogue of 101 harbour porpoise at four different sites

around the Pembrokeshire coast over a two-year period. 30 individuals were sighted on more than one occasion.

Photographic data provides an opportunity for collaborations among multiple research groups by shared access to identification catalogues enabling matching of individuals among all potential study sites (Davies *et al.,* 2001). Photo-ID methods have been used successfully as part of the Sea Watch Foundation Cardigan Bay bottlenose dolphin monitoring project to evaluate dolphin movements, abundance estimates and distribution within and between two SAC (Lohrengel *et al*., 2018).

During surveys at Hurlstone point, photos have identified two harbour porpoises with distinctive markings on their dorsal fins shown in Figure 1 and 2. The two harbour porpoise in Figure 2 were again sighted at Hurlstone Point in July 2021 (Figure 3).

Figure 1. Marked harbour porpoise HP_001_090718 (a) and HP_002_Wonder_170720 (b) with a calf. Photo credit B. Gibbs.

Figure 2. Marked and recaptured harbour porpoise HP_002_Wonder_170720. Photo credit G. Pashley.

1.3 Conservation Issues

An increase in records of boat traffic and other water users has also been noted along the Somerset coast (Lloyd, 2021). Some of these include the use of small, motorised vessels for sea angling, along with sail boats and recreational speed crafts such as jet skis, and ribs. Harbour porpoises use their acoustic capability to navigate in their underwater environment, and to locate and identify suitable prey which makes them highly susceptible to effects of sound. The effects can range from mild disturbance and behavioural changes to auditory impairment, and even death (Richardson *et al.,* 1995; Southall *et al.,* 2007). A study by Wisniewska *et al*., (2018) demonstrated that high rates of vessel noise coincided with interrupted foraging and cessation of echolocation, leading to significantly fewer prey capture attempts. Due to their size and inability to store substantial amounts of energy, porpoises must feed almost continuously throughout the day to meet high energy demands (Santos *et al*., 2008). Even moderate anthropogenic disturbance may have severe long-term fitness consequences (Wisniewska *et al*., 2016).

Within the inner Bristol Channel and Severn Estuary, the harbour porpoise faces further challenges from ongoing proposals for the development of a tidal barrage (Morris, 2022) and tidal lagoons (Hayward, 2021). At least three significant negative impacts from tidal power have been identified for marine mammals; increased risk of collisions, reductions in listening space and other issues relating to noise and disturbance, such as displacement from important habitats (Wildlife and Countryside Link, 2020). Without continuous monitoring of the population using the area around Hurlstone point, there may not be appropriate management of the impact of such developments and anthropogenic disturbances on local harbour porpoise populations within the inner Bristol Channel.

1.4 Aims and Objectives

To address the current knowledge gaps regarding the population of harbour porpoise at Hurlstone point, the 6 month pilot monitoring project aimed to:

- Continue and increase survey effort to estimate harbour porpoise abundance and evaluate habitat use at Hurlstone Point.
- Collect photo-ID images of harbour porpoise to establish a catalogue within the study area which can be used at other sites within the Bristol Channel and Severn Estuary.
- To gather evidence of any recreational vessel activity within the study area which may be impacting the harbour porpoise using the site.

2. Materials and Methods

2.1 Study Area

Hurlstone Point is a headland between Porlock Weir and Minehead in the Exmoor National Park on the coast of Somerset, England. Hurlstone Point lies between Porlock Bay and Blue Anchor Bay in the Bristol Channel, grid reference SS 89971 49191. The waters around Hurlstone point do not currently have any local, national, or international designations.

The site location is shown in Figure 3. The 1km survey area represents the distance a DSLR camera fitted with a 500 to 600mm zoom lens will be capable of capturing a clear photograph of a harbour porpoise and the 5km survey area is the range for sightings by the surveyor in favourable survey conditions (Beaufort sea state scale[1] of 0 to 3, as described in the key on the Sea Watch Foundation effort survey form (Appendix B), and visibility >7km) when using 8x42 binoculars.

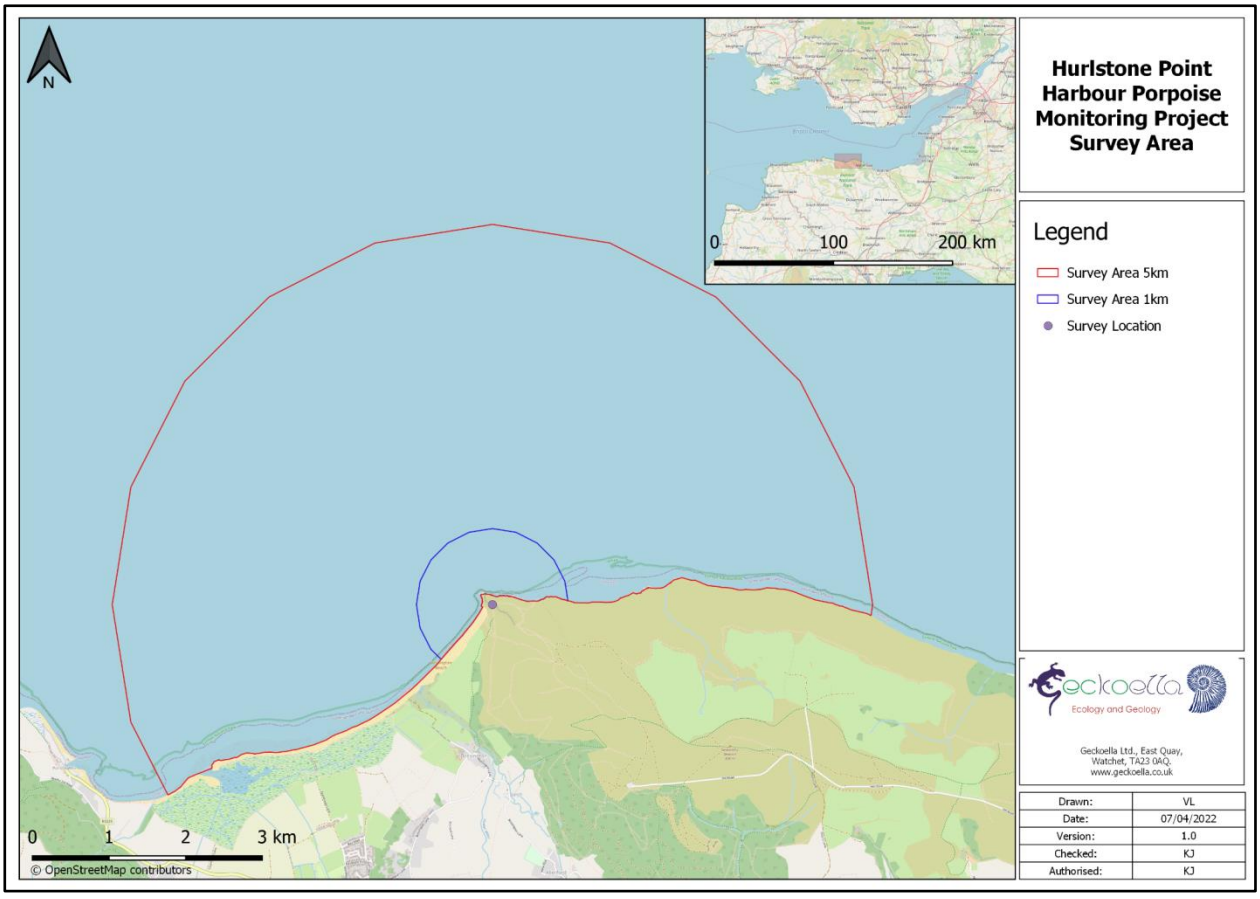

Figure 3. Hurlstone Point harbour porpoise monitoring project survey area

[1] Beaufort sea state scale is an empirical measure that relates wind speed to observed conditions at sea.

2.2 Field Methods

2.2.1 Land-Based Watches

Land-based watches were completed between 7th May 2022 and 15th October 2022 from the headland at Hurlstone Point 50m above sea level. Surveys aimed to span different times of day and tidal states, with 2-hour observations between 08:30 – 10:30, 12:00 – 14:00 and 15:30 -17:30. The surveys were distributed across all seasons except winter. Due to the time limit of 6 months for the monitoring project, winter was avoided due to increased probability of unfavourable weather conditions. The surveys aimed to complete 156 hours of effort in total.

2.2.2 Effort and Environmental Conditions

Standardised Sea Watch Foundation effort survey forms (Appendix B) were used to record time spent actively searching for marine mammals, also known as effort, and environmental data at 15-minute intervals. Survey effort was conducted during daylight hours in favourable weather conditions; wind speed of 13 knots or less, Beaufort sea state of 0 to 3, and visibility >7km. Swell height, glare and boat activity were also recorded.

2.2.3 Sightings data

Standardised Sea Watch Foundation sightings forms (Appendix B) were used to record any sightings. A sighting is defined as each observation of an individual or a group of animals. For each sighting, species identification, bearing, estimated distance, group size, number of juveniles/calves, direction of travel and any associated behaviour would be recorded. A sighting end time was recorded once the individual or group was not sighted for 5 minutes.

2.2.5 Vessel Data

Any water users were recorded within 5km of the observer's location, noting down vessel type, distance from shore, and any interaction with marine mammals. The vessel types were recorded on the effort survey form as codes listed within the key on the Sea Watch Foundation effort form (Appendix B).

2.2.4 Photo-Identification

Photographs were taken with a range of DSLR cameras fitted with zoom lenses ranging from 500mm and 24-600mm to 150-600mm. Photographs aimed to capture both sides of the individual's dorsal fin to identify any distinctive marks. As well as individual distinguishing marks

on the animal, photo-ID can be used for determining group size, composition, skin conditions and marks of anthropogenic origin such as propeller marks.

2.3 Data Analysis

2.3.1 Sighting rates

Sighting rates were calculated using sightings per unit effort (SPUE[2]). Sightings were differentiated into three groups, those in the absence of vessels, those in the presence of unmotorised vessels and those in the presence of motorised vessels and the mean sighting rates were calculated.

2.3.2 Vessel disturbance

Start and end times of sightings were used to determine if there was a difference in time spent observed within 5km of Hurlstone point in the presence or absence of vessels. Sightings were differentiated into three groups, those in the absence of vessels, those in the presence of unmotorised vessels and those in the presence of motorised vessels and the mean number of minutes were calculated.

2.3.3 Photo-Identification

Photos were graded with a quality rating (Q) from the lowest Q1 to the highest Q6, considering focus, exposure, angle, and proportion of the frame occupied by the body of the animal (Bertulli *et al.,* 2015). The Q-value of each image was independent of the marks visible on each individual. Only images rated Q>5 were considered for analysis and included within the photo-ID catalogue.

2.4 Limitations

The findings of this monitoring project are specific to Hurlstone Point due to its oceanographic features and therefore the behaviours exhibited in the presence and absence of vessels are site-specific and surveys would need to be replicated at other locations. Surveys were only completed from May 2022 to October 2022 and therefore assumptions cannot be made that the results will be the same for the remaining months not surveyed. Hurlstone Point may be used less frequently during the winter season as harbour porpoise tend to spend winter offshore and migrate seasonally to feeding and calving grounds (Evans & Prior, 2012).

[2] Sightings per unit effort (SPUE) is calculated by the number of sightings divided by the number of effort survey hours.

Effort hours were not consistent over each month and the target of completing 156 hours of survey effort was not reached due to volunteer availability and unfavourable weather conditions. Therefore, the sighting rates would be under-recorded and would not represent an accurate estimate of population size.

There are also limitations with conducting land-based surveys, including the probability of harbour porpoise not being detected, particularly at a distance from the observer and not being able to determine their behaviour when underwater. In addition, different observers may interpret behaviour differently and observers may count the same individual more than once. This was mitigated by providing a training session for the observers prior to the surveys in May. Land watches are conducted from a static location, and this limits the ability to accurately determine the abundance of harbour porpoise using the area.

Utilisation of photo-ID methods for abundance estimates are limited by the low rate of re-sightings. This monitoring project was also limited by the availability of camera equipment to all observers; therefore the number of harbour porpoise would be under-recorded and would not represent an accurate estimate of population size and structure.

3. Results

3.1 Effort and Sightings

A total of 6 volunteers spent a total of 137.5 hours collecting effort-related data between May 2022 and October 2022 at Hurlstone Point. The number of effort hours per month are shown in Figure 1.

In total there were 40 sightings of harbour porpoise and a total of 67 individual animals counted. A mean of 2 individuals were seen at each sighting, and 43% of the sightings recorded 1 juvenile or calf present. All the juvenile/calf sightings were recorded within the summer months (June-August). The most common behaviour displayed by harbour porpoise during observations was ‘suspected feeding’ which was recorded in 54% of all sightings, further supporting the view that Hurlstone point is an important feeding ground for the species.

A total of 33 sightings of grey seals *Halichoerus grypus* were recorded. All the grey seal sightings were of lone individuals.

Harbour porpoise sighting rates were calculated for the total effort time spent per month and these are shown in Figure 1 together with effort hours per month. Sighting rates were the highest within the summer months of July and August.

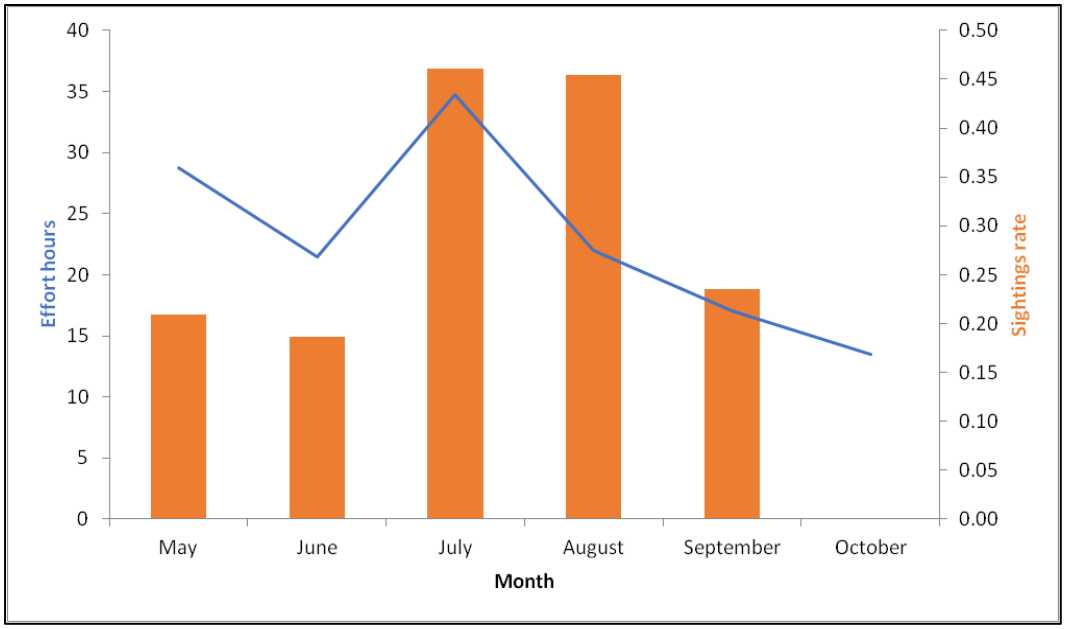

Figure 1. Sightings rates (SPUE) and effort hours per month.

3.3 Vessel Disturbance

There was a total of 129 vessels recorded within 5km of the survey site. The type of vessel with the highest number of observations were yachts, followed by fishing boats. The number and type of vessels observed over the 6 month monitoring project is shown in Figure 2.

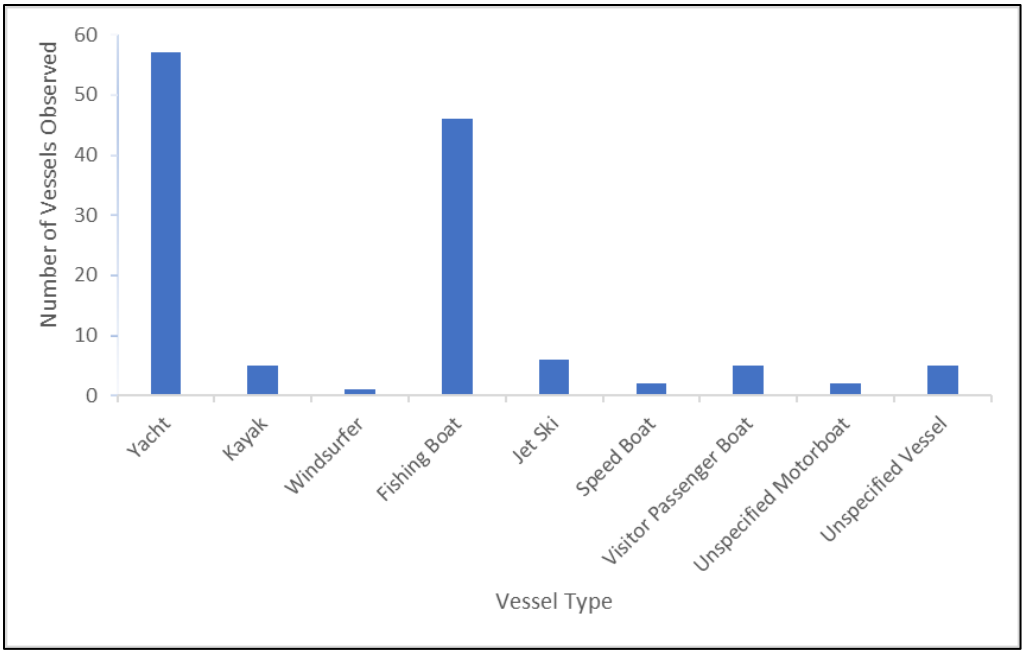

Figure 2. Number and type of vessels observed during the 6 month monitoring project.

Yacht, kayak and windsurfer were categorised into unmotorised vessels, and the remaining vessels were categorised into motorised vessels.

Sighting rates were calculated for the total effort time spent (137.5 hours), in the absence of vessels and in the presence of motorised and unmotorised vessels (Table 1). The sighting rates were lower in the presence of motorised vehicles (0.17 SPUE) compared to unmotorised vehicles (0.25 SPUE).

Table 1. Sighting rates (SPUE) of harbour porpoise for total effort and in presence or absence of vessels within 5km

	Total effort	Absence of vessels	Presence of motorised vessels	Presence of unmotorised vessels
Sightings rate	0.29	0.3	0.17	0.25

The mean time (minutes) harbour porpoise sightings were observed in the absence and presence of vessels, and the presence of motorised vessels and presence of unmotorised vessels are shown in Table 2. The mean time spent observing harbour porpoise in the absence of vessels was over 13 minutes longer than in the presence of vessels. The mean time spent observing harbour porpoise shows a smaller difference of nearly 2 minutes more in the presence of unmotorised vessels compared to motorised vessels.

Table 2. Mean time observed in minutes of harbour porpoise sightings in absence of vessels, presence of motorised vessels and presence of unmotorised vessels.

	Absence of Vessels	Presence of Vessels	Presence of Motorised Vessels	Presence of Unmotorised Vessels
Mean time observed (minutes)	22.6	9.1	7.8	10.3

3.3 Photo-Identification

A total of 29 individuals were photographed with two identified with distinctive markings on their dorsal fins, one with spot markings on its flank and one with a white line mark at the base of its dorsal fin. These four harbour porpoise were included in the photo-ID catalogue (Appendix A). Harbour porpoise 005 was recorded during two surveys on 2nd July and 4th August. Photos were taken at 15 out of the 18 surveys completed with sightings of harbour porpoise.

4. Conclusions and Recommendations

The results of this monitoring project highlight that the area around Hurlstone Point is an important feeding area, particularly around the summer months for calves and juveniles. The photo-ID technique resulted in a high number of good quality photographs (Q>5) of harbour porpoise dorsal fins. As expected only a small number of individuals had distinctive markings, however one harbour porpoise (005) was resighted during three sightings on two different days. With an increase in survey effort and availability of the correct equipment to all observers, this technique can provide a cost-effective technique to determine abundance estimates.

In the presence of vessels, the reduction of time harbour porpoise were observed is a particular concern as this could be linked to a change in behaviour and result in reduced feeding time in the area around Hurlstone Point. Although time observed was not much different between motorised and unmotorised vessels, the presence of any vessel is potentially significantly impacting the time spent feeding. Although unmotorised vessels are not disturbing them through noise, the proximity to the animals may significantly reduce the amount of time they are feeding. There is a potential considerable difference in sightings rates caused by noise disturbance with a lower sighting rate in the presence of motorised vessels compared to in the presence of unmotorised vessels. The results indicate that both motorised and unmotorised vessels are potentially having an impact on the sightings of harbour porpoise at Hurlstone Point and further research is required to determine whether the increased underwater noise and disturbance is considerably reducing the quality of Hurlstone Point as a foraging habitat. Observers have noted fishing vessels, visitor passenger boats and jet skis travelling through the foraging grounds close around the point on several occasions. Detailed research into the pathways of these motorised vessels and the behaviour of the harbour porpoise in response to the disturbance is justified at this location.

This monitoring project indicates that the vessel number and type are having a potential impact on the sightings rate and behaviour of harbour porpoise at Hurlstone Point. Further monitoring of harbour porpoise behaviour and vessel disturbance is justified at this area and the following research techniques are recommended at this site:

- Monitoring surfacing rates; the number of times the same harbour porpoise surfaces within 1 minute, to assess behaviour change in the presence and absence of vessels
- Monitoring of vessel behaviour, speed, and distance to the animals, including mapping of the vessels in relation to harbour porpoise sighting locations
- Video recordings to aid analysis of behaviour of harbour porpoise and vessels.
- Statistical analysis to test the hypothesis that there is no significant difference in the number of individuals or surfacing rates of harbour porpoise in the presence and absence of vessels.

Outcomes of this research could potentially lead to mitigation initiatives such as vessel exclusion zones for speed craft such as jet skis, or speed restriction zones, where vessels are prohibited

from travelling at speeds exceeding 5 or 10 knots. In addition, this research could support the designation of these zones to be published on marine charts to ensure further awareness of the presence of these protected species amongst recreational craft users.

Continuing the photo-ID methods along with increased survey effort would contribute to providing valuable photographic data for analysis of abundance and population structure of harbour porpoise at Hurlstone Point. In addition, this can involve the local community as volunteers, allowing them to become better informed and participate in marine mammal research and conservation.

In addition to harbour porpoise data there were a high number of grey seal sightings and photographic data was collated. It is recommended that data is continued to be recorded of this species and shared with the Seal Research Trust who have an extensive photo-ID catalogue.

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Appendix A – Photo-ID catalogue

<table>
<tr><th colspan="2">HP_004</th></tr>
<tr><td>RIGHT</td><td>LEFT</td></tr>
<tr><td>  </td><td>(No photo available yet)</td></tr>
<tr><td>Description: Adult with white line mark at base of right side of dorsal fin

Location:
Hurlstone Point

Similar porpoises:</td><td>First Seen: 07/05/22

Last Seen: 07/05/22

Number of sightings: 1</td></tr>
</table>

HP_005	
RIGHT	LEFT
	
Description: Adult with small notch in centre of back edge of dorsal fin. Sighted with a juvenile **Location:** Hurlstone Point **Similar porpoises:**	**First Seen: 02/07/22** **Last Seen: 04/08/22** **Number of sightings: 3**

HP_006	
RIGHT	LEFT
(No photo available yet)	
Description: Adult with white spots on left flank. Sighted with a juvenile. **Location:** Hurlstone Point **Similar porpoises:**	**First Seen: 09/07/22** **Last Seen: 09/07/22** **Number of sightings: 1**

HP_007	
RIGHT	LEFT
	(No photo available yet)
Description: Several notches along the back edge of the dorsal fin **Location:** Hurlstone Point **Similar porpoises:**	**First Seen:** 20/08/22 **Last Seen:** 20/08/22 **Number of sightings:** 1

Appendix B – Sea Watch Foundation Effort and Sightings Form

LAND-BASED EFFORT & SIGHTINGS RECORDING FORM

sea watch FOUNDATION

Day/Month/Year ..... Site Name ..... Latitude ..... ° ..... ' N Longitude ..... ° ..... ' W ☐ E ☐

Obs. Name/Address ..... E-mail: ..... Tel: .....

Effort and Environmental Data: make a new record every 15 minutes or when there is a break in effort.

Please return to somersetseawatch@gmail.com

Effort Time (GMT or BST?) Start	End	Sea state	Swell height	Glare/Lighting	Visibility	Active Vessels within 5km	Additional notes

Sightings: make a new record for each sighting – start a new form if necessary.

Sighting Time First seen	Last seen	Species	Confidence	Group size	Number of calves	Number of juveniles	Bearing	Distance	Behaviour	Associated seabirds

DATA DEFINITIONS: *Use categories provided below where possible.* *Continue on separate sheet if necessary*

Sea State: 0 = mirror calm; 1 = slight ripples, no foam crests; 2 = small wavelets, glassy crests, but no whitecaps; 3 = large wavelets, crests begin to break, few whitecaps; 4 = longer waves, many whitecaps; 5 = moderate waves of longer form, some spray; 6 = large waves, whitecaps everywhere, frequent spray; 7 = sea heaps up, white foam blows in streaks; 8 = long, high waves edges breaking, foam blows in streaks; 9 = high waves, sea begins to roll, dense foam streaks. **Swell Height**: Light = <1m; Moderate = 1-2 m; Heavy = >2 m **Visibility**: < 1km; 1-5 km; 6-10km; >10km **Glare/Lighting**: 0 = no glare, excellent lighting; 1 = mild glare, good lighting; 1= moderate glare, moderate lighting; 3= strong glare, poor lighting. **Boat Activity**: NB = No boats, VE = unspecified vessel, YA = yacht, RB= Row boat/kayak, JS = Jet skit, SPB = speed boat, VPB = visitor passenger boat, MB = motorboat (unspecified), FI = fishing boat, FE = ferry, LS = large ship, SV = seismic vessel, WA = warship. **Species Confidence**: Definite; Probable; Possible **Group size**: give range from minimum to maximum estimate. **Calves/Juveniles**: Estimate numbers of smaller-sized animals relative to adult body size: calves < half adult size; juveniles > half adult size. **Bearing and Distance** should be at point of closest approach. **Behaviour**: Surfacing; Normal Swim; Fast Swim; Blow; Feeding; Leap/Breach; Tail Slap; Bow-ride; Rest/Milling; Sexual; Aggression. **Associated seabirds**: record only birds that are closely associated with cetaceans.