Solent Bird Disturbance Monitoring 2019-2020

Final

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EXECUTIVE SUMMARY

This report provides results from bird disturbance field work undertaken during the winters of 2018/19 and 2019/20, comparing visitor behaviour, bird numbers and bird responses in relation to the presence of rangers. The data forms the second monitoring period for mitigation around the Solent, the need for which was identified as part of the Solent Bird Aware Initiative. Rangers are a key component of a package of mitigation measures relating to recreation pressure from new housing. The winter of 2018/19 was the fourth winter that rangers have been deployed around the Solent, and their work has involved showing people birds and raising awareness among visitors of the conservation issues affecting them.

Ten survey locations were selected by the Bird Aware Solent Ranger Focus Group, which were matched with the areas targeted for Ranger effort over the winter of 2018/19. A total of seven paired visits were planned to each of the survey locations. Paired visits were on subsequent days with the timing adjusted on the second day to match the tide state of the previous day. Survey visits focussed on a set recording area and recorded (over a period of 105 minutes) the level of human activity (as a 'diary'), the numbers of birds present and the response of birds present.

Emsworth, East Head and Ryde, Hill Head East Head and Hurst point were the busiest locations in terms of the number of visitors, while Newtown and Portchester were the quietest. Dog walking was the most frequently recorded activity, with the highest numbers of dogs at Emsworth, East Head and Ryde.

As was found during the first monitoring study in 2016/17, there was no significant difference in the number of diary entries logged when rangers were present compared to when they were absent, suggesting the presence of rangers did not result in people avoiding sites.

Rangers were found to interact with relatively high proportions of visitors to sites, typically speaking to around 25-30% of visitors except on sites where visitor numbers were very high. Very few examples of visitors modifying their behaviour (e.g. by putting their dog on a lead) after speaking to a ranger were noted, however this was difficult to determine in the field. The proportion of dogs off-lead were however significantly lower when rangers were present.

The presence of a ranger was not found to result in changes to the numbers of birds within the count area at the end of each monitoring survey visit (as might be expected if the presence of the ranger was reducing birds from being flushed out of the area). Overall, the number of events where birds were flushed was however significantly lower when rangers were present, as was the total number of waders and waterfowl disturbed.

The relationships between visitor numbers / activities and bird disturbance are evidently complex, and the local conditions and access arrangements at the site level as well as factors such as bird habituation to humans are likely to be having a large effect in terms of how effective rangers can be at influencing visitor behaviour. For example Ryde, Emsworth and East Head all stood out as having high numbers of dogs but relatively low rates of flushing and these were all sites where the rangers were only able to interact with lower numbers of visitors. Conversely, Lepe and Hill Head had relatively high rates of flushing despite relatively lower numbers of visitors and dogs.

Some suggestion of a long-term effect of the ranger programme may be present in the results for Ryde and Newtown which both had relatively high rates of birds being flushed in 2016/2017 but

relatively low rates in 2018/2020 whilst visitor levels were broadly comparable between the monitoring surveys.

Overall, the results show a continued slight positive effects of ranger presence.

Recommendations are made to:

- Review the monitoring approach to reduce and simplify the amount of data recorded;
- Review the ranger deployment strategy to ensure that rangers are deployed to sites where there is a disproportionate amount of disturbance; and
- Implement recommendations made in the first monitoring report to set site targets and increase the reach of rangers through use of temporary signage / fencing which may influence visitor behaviour without needing a ranger interaction.

1. Introduction

This report sets out the findings of field studies undertaken between November 2018 and February 2020 which sought to compare visitor behaviour, bird numbers and the response of birds depending on the presence of Bird Aware Solent Rangers. The study was undertaken as part of the Solent Bird Aware Initiative.

Three Special Protection Areas (SPAs) are present along the Solent shoreline, all of which are designated for their wintering bird interest. An existing high population and level of expected housing growth in the region (particularly along the coastal strip) prompted concerns regarding the potential for adverse effects on the European Sites from increased recreational pressure. To address these concerns, an interim mitigation strategy was produced in 2014, and finalised in 2017 (Liley & Panter, 2017). One of the key mitigation measures has been for the establishment of a team of rangers to advise recreational users of sites on the Solent on how to avoid bird disturbance.

The aim of this report is to present the findings of the second ranger programme monitoring period to test its effectiveness and inform any decisions relating to ranger effort, locations targeted and approaches used.

A full background and summary of the studies that led to the development of mitigation and monitoring strategies for the Solent are set out in the first year monitoring report (Liley & Panter, 2017).

2. Methods

2.1 Survey Locations

Ten survey locations were selected by the Bird Aware Solent Ranger Focus Group, which were matched with the areas targeted for Ranger effort over the winter of 2018/19. The survey locations are set out in Table 1 with further details of each provided in Appendix A. As with the areas targeted in the previous monitoring (winter 2016/17), the survey points fell into two groups:

- Open mudflats where birds feed, spread out at low tide (four survey points);
- Mudflat and adjacent saltmarsh/islands/banks where birds roost (six survey points);

Table 1: Overview of Survey Locations

Location	Habitats Present	Surveyed in 2016/17?	Tides states at which to survey
Areas of open mudflat / sandflat where birds feed			
Hurst Point	Mudflats, sandflats	N	Low / falling / rising
Newtown	Mudflat, lagoon, saltmarsh	Y	
Portchester	Mudflats	Y	
Ryde	Sandflat	Y	
Areas of mudflat and saltmarsh where birds feed and gather to roost			
Bunny Meadows	Saltmarsh, mudflat, shingle beach	Y	High / rising / falling
East Head	Mudflats, saltmarsh, sand dune, shingle spit	Y	
Emsworth	Shingle beach and mudflats	N	
Hill Head	Stony and sandy beach	N	
Lepe	Stony and sandy beach	N	
Oyster Beds, Hayling	Mudflat, lagoons, saltmarsh	Y	

Figure 1: Site Locations

The presence of a ranger would be expected to be most effective at the roost sites – in these locations the birds are typically concentrated in very specific locations and therefore it should be easier for rangers to target visitors most likely to cause disturbance.

The areas of open mudflat will be perhaps more challenging for rangers to be successful, and within the four locations a range of access types and levels of access is to be expected.

2.2 Survey visits and effort

A total of seven paired visits were planned to each of the survey locations.

Visits were paired with the intention of one visit in each pair coinciding with a ranger being present and the other visit being at a time when rangers were not present, allowing direct comparison between the two. The paired visits were undertaken on subsequent days with the timing on the second day matched to ensure the tide state was comparable (i.e. on the second day surveys usually started around an hour later) ensuring a close match for each pair in terms of tide.

Pairs were also consistent in the type of day, such that both days of the pair were either weekdays or at a weekend. The two visits within each pair were undertaken by the same surveyor (to ensure the visits are matched as carefully as possible) and the order within each pair (in terms of ranger present

vs not present) was varied (i.e. ensuring that for around half of the pairs the first visit of the pair was when a ranger was not present).

Survey visits were predominantly spread across the period late November 2018 – end March 2019 except for Newtown and Ryde which were surveyed Between November 2019 and February 2020. Just under a quarter of all surveys were at weekends (i.e. one visit on a Saturday and one on a Sunday).

Visits were targeted to avoid poor weather (as this would affect both bird behaviour, visibility and the presence of visitors). Due to unforeseen circumstances, including the availability of rangers, weather and surveyor illness, not all locations received seven valid paired visits (a 'valid pair' being paired visits that were reasonably matched and where a ranger was present for one of the visits but not the other). The number of valid pairs for each site are summarised in Table 2.

Table 2: Total Number of Valid Paired Visits

Location	No. valid paired visits
Bunny Meadows	6
East Head	7
Emsworth	7 (6)*
Oyster Beds, Hayling	**6**
Hill Head	4
Hurst Point	4
Lepe	6
Newtown	**7**
Portchester	2
Ryde	**7**

*due to very high visitor numbers during one of the paired visits, visitor numbers were click-counted and this data can only be used for some of the analyses.

2.3 Field survey methods

Each visit to a survey location lasted two hours and entailed the following:

- Bird Counts: A count of birds present at the start and end of the survey period;
- Diary: A log of all recreational events (potential disturbance events) observed during the c.1hr 45 period between the two bird counts;
- Disturbance Events: A record of the response of selected bird species to each of the disturbance events.

Recording was focussed around a fixed recording area within which birds were counted and behavioural data were collected. The recording areas extended to a maximum of 500m from the view point (500m providing a reasonable distance at which data could be collected with sufficient accuracy). The mapped recording areas only included areas where there was a clear sight line and (within 500m) visible to the recorder from the fixed watch point. Each fixed watch point was also at a point where any disturbance caused by the presence of the surveyor was minimised/avoided. At each location, this recording area varied in size and shape.

Where sites had been surveyed in the previous monitoring survey, the same recording areas were used to allow direct comparisons to be drawn.

The viewpoints are mapped for all sites and detailed accounts of each location are provided in Appendix A, and details of the dates, times and weather conditions for all visits are listed in Appendix B.

2.3.1 Bird Counts

At the start and end of each two-hour survey, a count of the birds present within the fixed recording area was conducted. The count recorded all gulls, waders, terns, wildfowl and herons/egrets present within the pre-defined recording area.

2.3.2 Diary

All recreational events during the 1 hour and 45 minutes following the first bird count were recorded in the diary. Each row in the diary corresponded to an event and was assigned a letter which was used to cross-reference the disturbance events. For each entry in the diary details were recorded that included:

- Activity (categorised to standard codes – see Table 3);
- Group size;
- Zone of activity (intertidal / on water/ above MHWM);
- Length of time present; and
- Notes on behaviour.

The Diary logged events that took place both within and outside the recording area, given that events beyond the survey limit could still result in disturbance to birds found within the 500m area.

For activities that did not fall within the pre-determined categories or were in some way unusual, additional notes were recorded in the field. Subsequent checks and (as necessary) further classification were then carried out once all data were compiled. In line with the previous monitoring report (Liley & Panter, 2017), events that involved multiple activities were classified to a single activity, selecting the one most likely to be in the closest proximity to the birds or most disturbing, as follows:

- A cyclist and a horse-rider together were classified as horse riding
- A dog walker and a cyclist together were classified as dog walking
- A walker and a cyclist together were classified as walking
- A cyclist and a jogger together were classified as jogging
- A lone observation of a dog off-lead without an owner visible was classified as dog walking

Table 3: Standardised Diary Events

Type	Event
Land-based / Intertidal:	Dog walking
	Bait digger (person standing on mud flats using shovel/fork to dig)
	Cockle raking (person standing on mud and using a hand rake to pull out cockles)

	Cycling (mountain bike, beach bike, road bike etc.)
	Jogger
	Fishing (from shore)
	Walking / rambling (without dog)
	Kids playing (with or without parents)
	Picnic/Sitting on beach/Sitting on bench etc
	Motor vehicle (ATV, car, campervan or similar)
	Birdwatching/wildlife watching (e.g. seals)
	Horse riding
	Metal detecting
	Person accessing boat or water (e.g. windsurfers walking across mudflat)
Water Based	Windsurfing (on water)
	Kitesurfing (on water)
	Canoeing (on water)
	Jet ski (on water)
	Water skiing (on water)
	Rowing boat (on water)
	Rib or similar fast small boat (on water)
	Small sailing boat (e.g. Laser / dinghy) (on water)
	Moderate – large sailing boat, not running motor (on water)
	Large boat on outboard motor (on water)
	Person working on boat (boat stationary)
	Paddle-boarding (on water)
	Bait harvesting or similar from boat (e.g. dragging for bait)
Airborne	Airborne (general category encompassing drones, planes etc.)
Natural Events	Raptor / predator
Other	

2.3.3 Disturbance events

Any diarised event was listed as a potential disturbance event if:

- It coincided with birds being present within the count area;
- It occurred within 200m of birds within the recording area; or
- Birds were noted to be disturbed (i.e. seen to become alert, change position or were flushed).

For each potential disturbance event the response of birds was recorded. This approach was taken to ensure that potential disturbance events that resulted in no response were recorded as well as events that did.

Data recorded included a simple categorisation of bird behaviour as feeding (F) or roosting (R) preening / loafing (L), and one of five response categories: ‘Alert’, ‘Walk/Swim’, ‘Short Flight (less than 50m)’ ‘Major Flight’ or ‘No Response’.

For each activity/event where disturbance occurred, the maximum distance from the birds to the event was recorded, as the straight-line distance from the source of disturbance to the birds. If there was no response from the birds, then the minimum distance from each species present to the disturbance

event was recorded (i.e. how close the disturbance event was to the birds). If the observation involved a tight flock or an individual, then this distance is relatively easy to measure. If the birds were scattered over a wide area and all were disturbed, then the distance was based on the closest individual (if no response) or the furthest individual (if a behavioural response). To ensure consistency in recording distances the field surveyors used a range of measures including aerial photographs (with distances to key landmarks shown), pacing out distances etc.

2.3.4 Additional information

Data such as tidal state, weather and any details specific to the visit were recorded during each bird count.

2.4 Limitations

Due to surveyor illness and unforeseen circumstances, visits to all locations could not be spread fully across the planned survey period of November 2018 to March 2019 and achieving 7 paired visits to each location was not possible. In the case of Newtown and Ryde, surveys had to be undertaken between November 2019 and February 2020.

Dates were provided by surveyors and Rangers to plan and carry out surveys but a number of factors meant that it was not possible to achieve 7 paired visits for all sites. The weather played a key role.

Due to very large numbers of visitors on certain visits, surveyors were unable to reliably track all activities, group departure times and ranger interactions. During these periods, attention was focussed on recording disturbance events which are considered to have been consistently recorded. At Emsworth visitor numbers were particularly high. Over the weekend of 23rd/24th February 2019, 1580 walkers/dog walkers were counted and therefore a click-counter was used as it was not feasible to record individual diary events for such high visitor numbers. Data for this paired visit could not therefore be used for certain analyses, however other comparisons have been used where appropriate.

No distinction between dogs on and off lead was made at East Head, Emsworth, Oyster Beds or Portchester.

For the East Head, Emsworth, Oyster Beds and Portchester locations, potential disturbance events that did not result in disturbance, and numbers of birds responding to disturbance events were not separately recorded, and accordingly these sites have not been included in the analysis of these events.

2.5 Data presentation and analysis

Analyses replicated those undertaken for the previous monitoring report which focussed on the paired data, where the valid pairs allowed a direct comparison of results with and without a ranger present. Paired comparisons typically took the form of Wilcoxon paired rank tests.

For some of the species-specific observations, several behavioural responses were recorded, because the birds within a single flock did not all behave in the same way (e.g. some might become alert while others were categorised as showing a walk/swim response). Where this occurred, analyses were based on the most extreme response, i.e. if some birds responded with a major flight

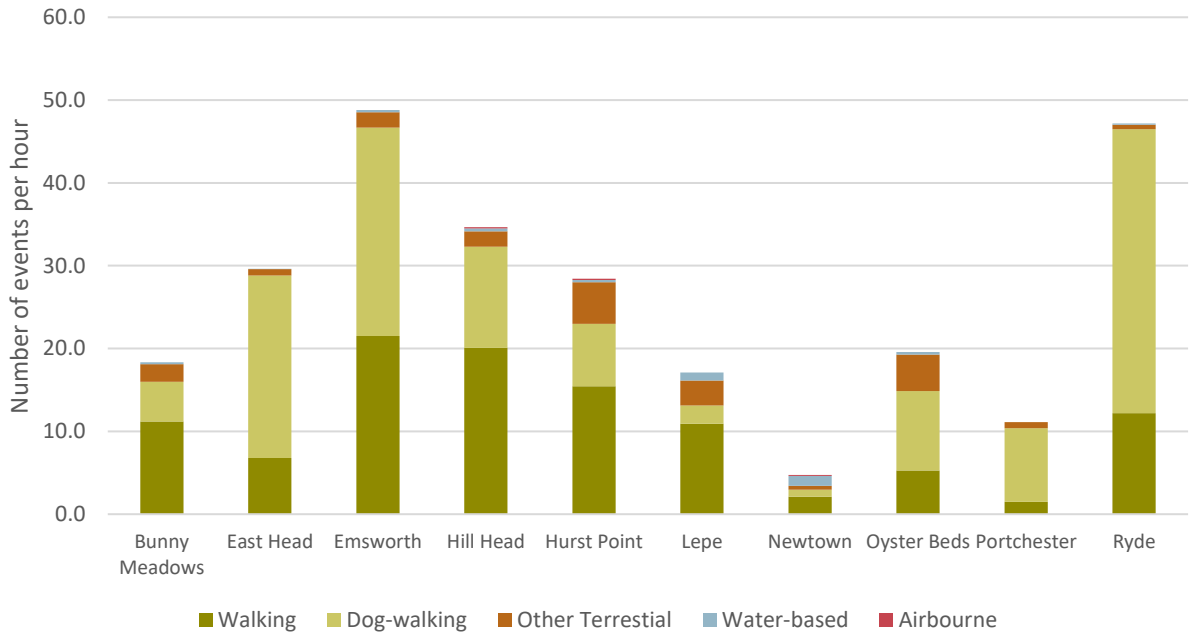
and some with a minor flight, the single coding would be major flight. While this approach ensures a precautionary assessment of the response of birds, it should also be noted that in many of the observations where multiple responses were recorded, the most extreme response was displayed by only a minority of the flock.

3. Results

3.1 Levels of Human Activity

A total of 5013 diary events were observed. Figure 2 provides a summary of these diary events grouped by broad categories. From this it can be seen that Emsworth and Ryde were the busiest sites with regards to numbers of diary events. Terrestrial activities accounted for the vast majority of diary events, with dog-walking being the most popular (51% of all diary events). Ryde was particularly notable for the large absolute number of dog walkers using the location, and in proportional terms Ryde, Portchester and East Head stand out for having dog walking account for more than 70% of the activity. Water-based activities made up only a very small proportion of the overall activity at any location (2% overall) but were notably more frequent at Lepe (6% of events) and Newtown (25% of events). Generally less than 15% of observations fell within the 'Other Terrestrial' category (which encompassed everything other than walking or dog-walking), except at Hurst Point & Lepe where cycling was more frequent, and Oyster Beds where cycling and bird watching were more frequent.

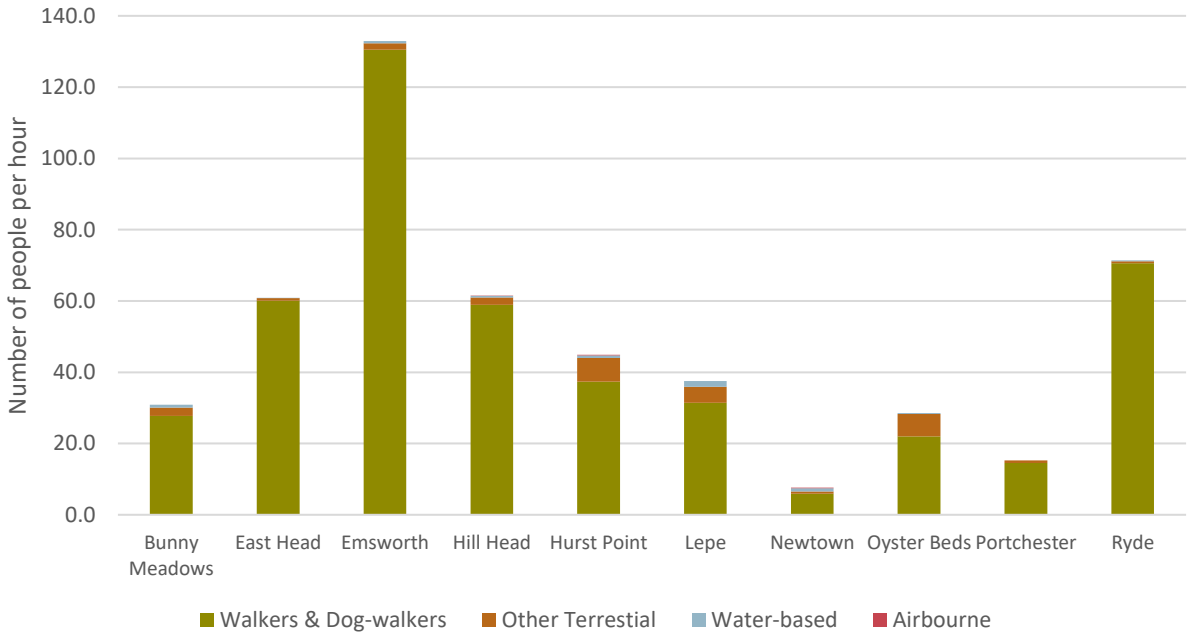
Figure 2: Diary data – Events per hour grouped by activity type.



The number of individual diary events for Emsworth shown in Figure 2 does not include any events from the busiest two visits as due to the very high visitor numbers these were click counted. To illustrate the overall numbers of visitors between sites, a comparison of the total numbers of people engaged in each broad activity type is set out in

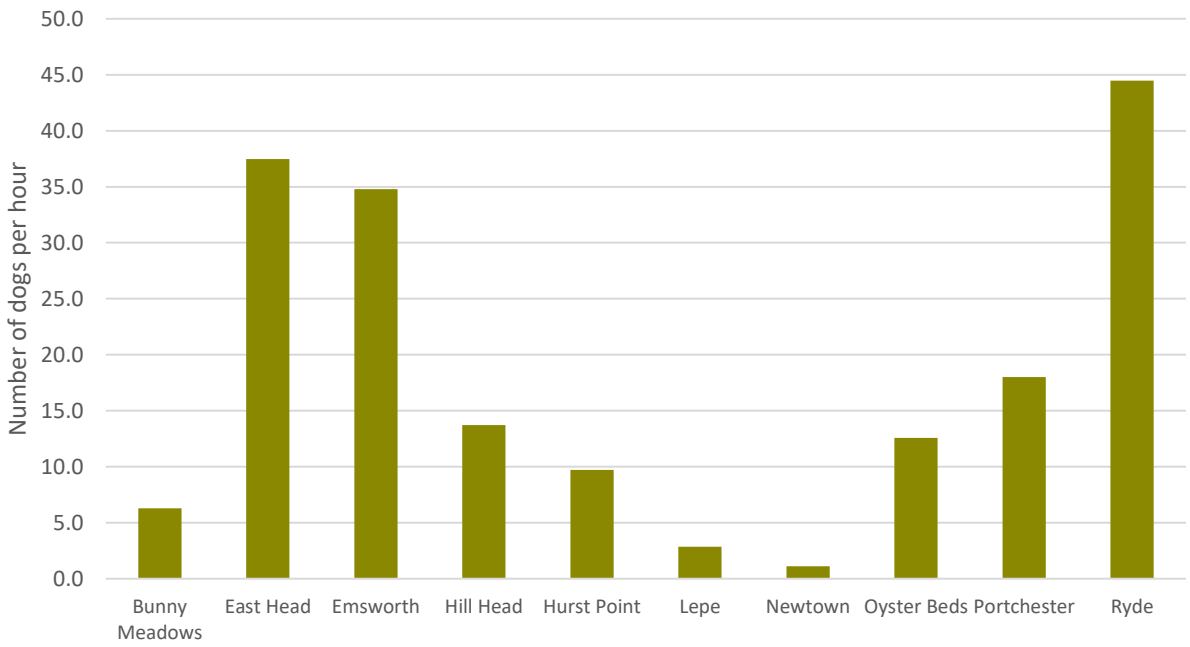
Figure 3. From this it can be seen that overall, Emsworth had the highest number of visitors – almout twice as many as Ryde, the next highest.

Figure 3: Total numbers of people per hour engaged in each activity



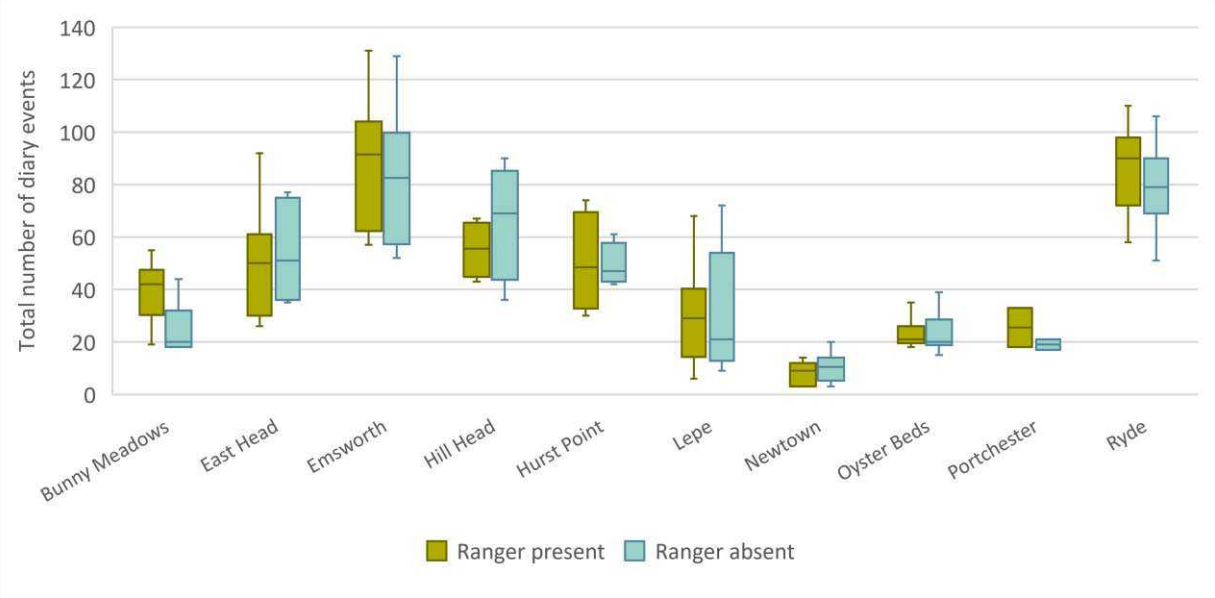
As might be expected, the proportion of walkers and dog-walkers varied between the sites, illustrated by Figure 4, which shows that while Emsworth had the highest number of visitors per hour, Ryde and East Head both had higher numbers of dogs per hour.

Figure 4: Total number of dogs per hour at each location



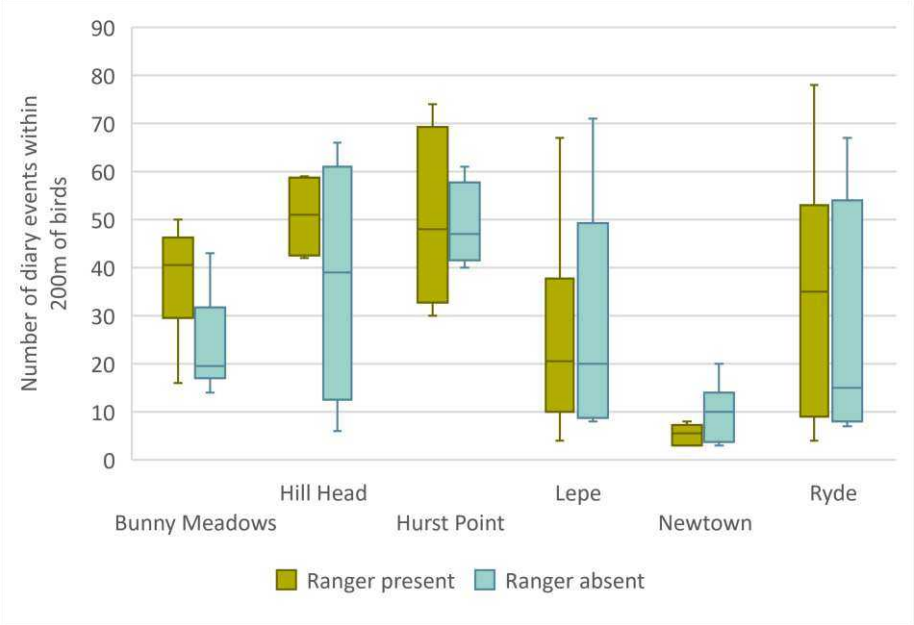
There was no significant difference in the number of diary entries (see Figure 5) in and around the 500m study areas when a ranger was present compared to when they were absent (Wilcoxon N= 112, p=0.1306) This indicates that the presence of the ranger did not affect the overall level of human/disturbance activity.

Figure 5: Total number of diary events



(Note that individual diary events were not recorded at Emsworth on one of the paired visits – refer to limitations).Box-plots throughout this report show the spread of the 25th and 75th percentiles (coloured boxes) with the median shown as a horizontal line, the vertical lines show the upper and lower limits of the data with any outlying points shown as circles.

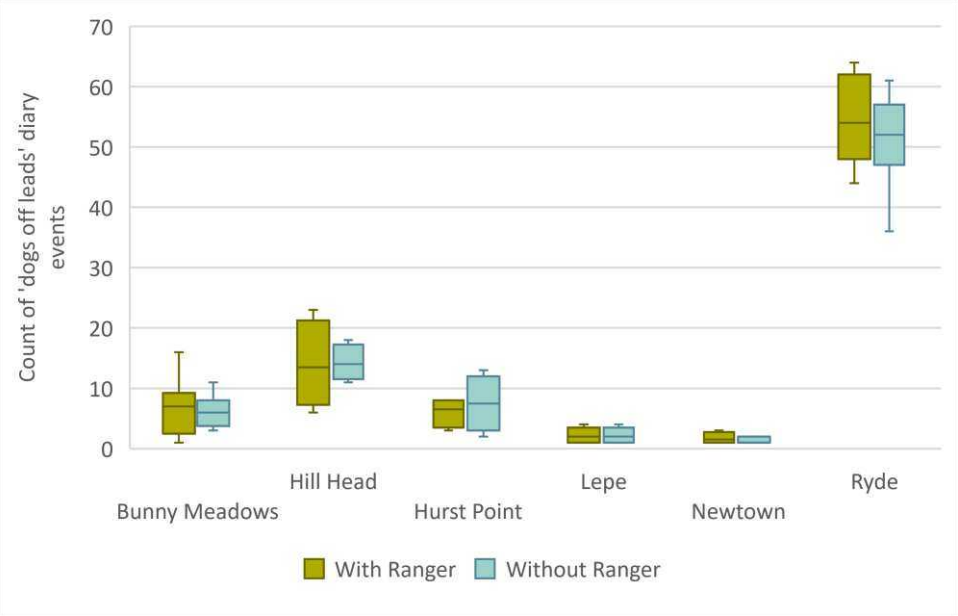
Figure 6: Total number of diary events within 200m of birds



(The presence of birds within 200m were not consistently recorded for all potential disturbance events at East Head, Emsworth, Oyster Beds or Portchester, and they have therefore not been included in this analysis)

Overall, there was no significant difference in the number of diary events within 200m of birds when a ranger was present compared to when they were absent (Wilcoxon N= 64, p=0.2000).

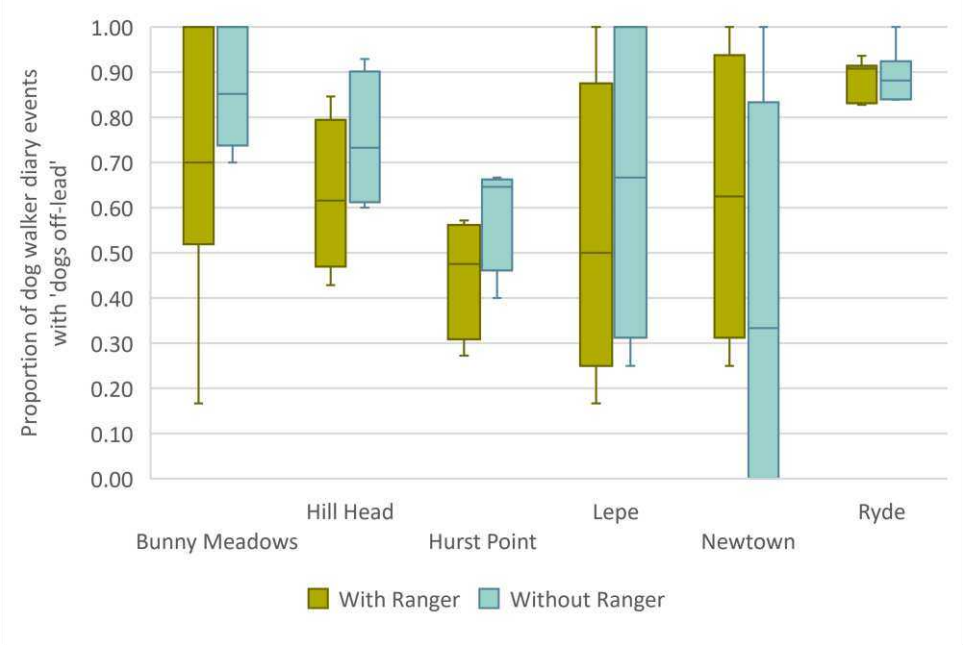
Figure 7: Total number of 'dog off lead' events



(Note - dogs on/off leads were not recorded separately for East Head, Emsworth, Oyster Beds or Portchester, and they have therefore not been included in this analysis)

There was no significant difference in the overall numbers of dogs off leads when a ranger present compared to when they were absent (Figure 7), however when considered as a proportion of the total number of dogs (Figure 8), a significant difference was detected (Wilcoxon N = 68, p=0.0004). This suggests that at certain sites, dogs were being kept or put on leads more frequently when rangers were present.

Figure 8: Proportion of dogs off lead



(Note - dogs on/off leads were not recorded separately for East Head, Emsworth, Oyster Beds or Portchester, and they have therefore not been included in this analysis)

3.2 Interactions with rangers

For each diary entry, a note was made as to whether the ranger spoke to (had a conversation with rather than just exchange of greetings on passing) the person/group of people. Where the exchange resulted in a notable change in behaviour this was also recorded. For sites where summary diary information was collected, this included a count of the number of ranger interactions. It is noted that these interaction data are estimates, as it is difficult to interpret behavioural change particularly as it may not occur immediately. Also, as in the previous monitoring period, rangers were not specifically asking people to modify their behaviour (e.g. by requesting that they put their dogs on a lead). Rangers were rather aiming to raise general awareness of the issue of bird disturbance with the hope that this might encourage people to modify their behaviour and activities in certain situations to reduce disturbance to birds.

A total of 5215 visitors were recorded to be present during periods when rangers were present. This includes people engaged in water and land-based activities. Table 4 & Table 5 set out the number and proportion of ranger interactions and occasions when this resulted in a clear (and more or less immediate) change in visitor behaviour.

Table 4: Number (%) of Visitors Noted to Interact with Ranger

Location	No interaction with Ranger	Spoke to Ranger	Total
Bunny Meadows	333 (78%)	92 (22%)	425
East Head	555 (76%)	180 (24%)	735
Emsworth	1363 (85%)	241 (15%)	1604
Hill Head	308 (69%)	139 (31%)	447
Hurst Point	228 (73%)	83 (27%)	311
Lepe	277 (72%)	107 (28%)	384
Newtown	47 (46%)	55 (54%)	102
Oyster Beds	97 (47%)	108 (53%)	205
Portchester	52 (73%)	19 (27%)	71
Ryde	830 (89%)	101 (11%)	931
Grand Total	**4090 (78%)**	**1125 (22%)**	**5215**

Table 5: Number (%) of Ranger Interactions Noted to Result in Behavioural Change

Location	No behaviour change	Changed behaviour	Total
Bunny Meadows	91 (99%)	1 (1%)	92
East Head	180 (100%)	(0%)	180
Emsworth	241 (100%)	(0%)	241
Hill Head	138 (99%)	1 (1%)	139
Hurst Point	81 (98%)	2 (2%)	83
Lepe	107 (100%)	(0%)	107
Newtown	52 (95%)	3 (5%)	55
Oyster Beds	108 (100%)	(0%)	108
Portchester	19 (100%)	(0%)	19
Ryde	101 (100%)	(0%)	101
Grand Total	**1118 (99%)**	**7 (1%)**	**1125**

Overall, just under a quarter (22%) of visitors were seen to engage with the ranger, although this varied considerably between locations. As might be expected, more visitors interacted with rangers at busier sites than at quieter sites (

Figure 9). The proportion of visitors that interacted with the rangers was however generally lower for sites with higher visitor numbers reflecting that there will be an upper limit on the rate at which a ranger can interact with visitors.

In terms of changed behaviour, there were only very few observations identifying this to have occurred, which equated to 1% of the total number of visitors that were seen to interact with the ranger.

Figure 9: Scatterplot showing the number of visitors recorded against the number seen to interact with the ranger.

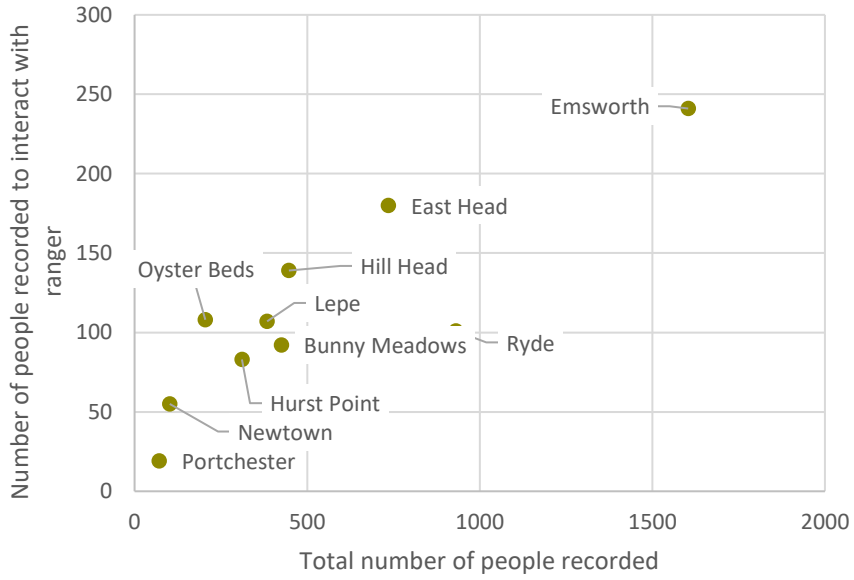
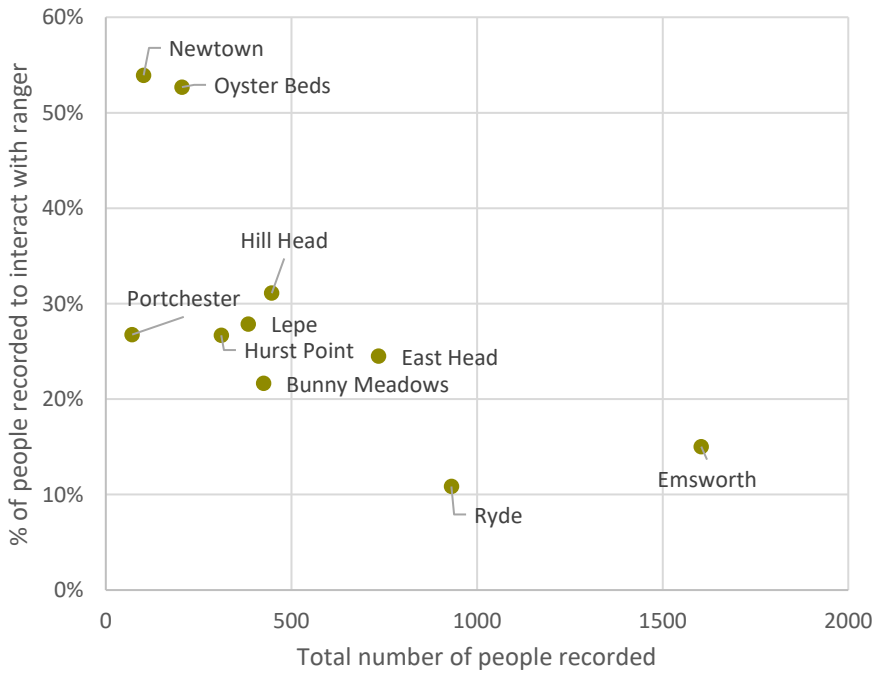


Figure 10: Scatterplot showing the % of visitors recorded to interact with the ranger

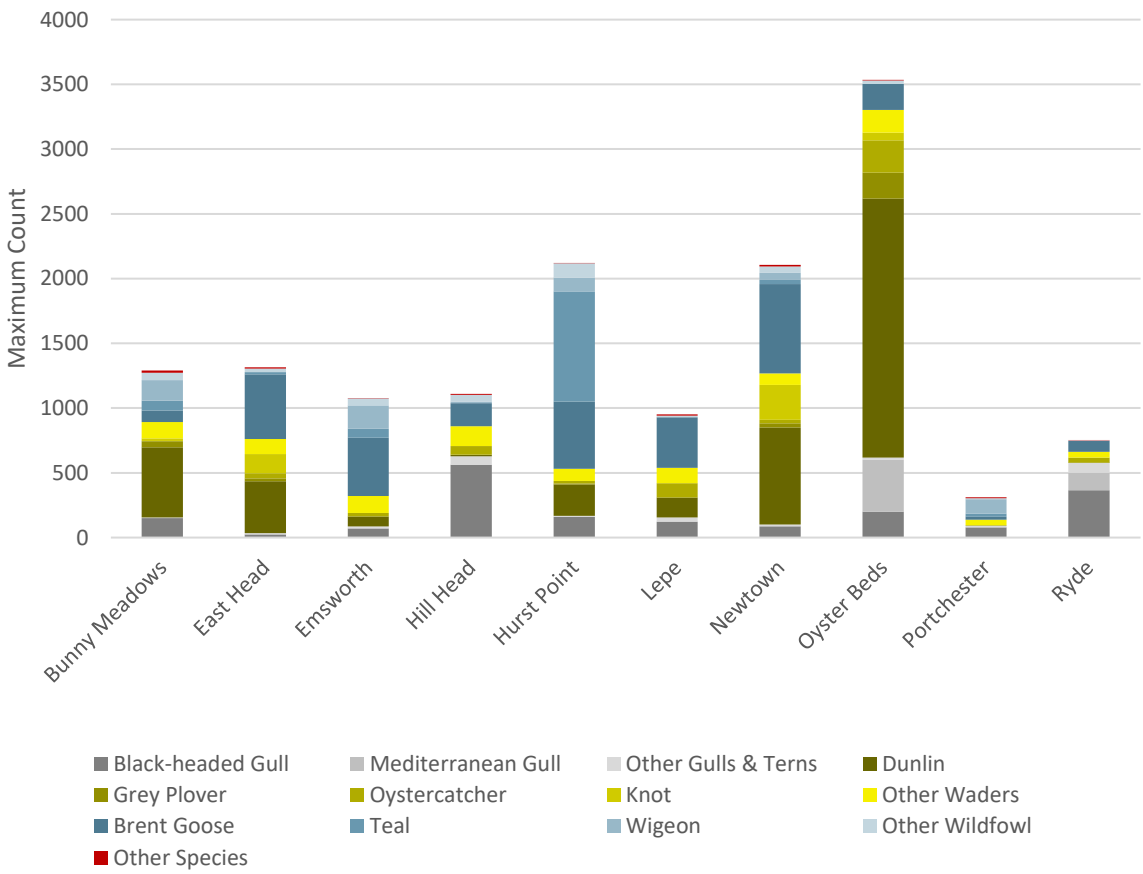


3.3 Numbers of birds present

A total of 19 species of wader, 14 species of wildfowl and nine species of gulls and terns were recorded with a further eight 'other' species recorded, which included grebes, herons, egrets, cormorants and passerines.

Bird count results are shown in Figure 11, with full details provided in Appendix E. Hayling Oyster Beds was found to have the highest overall counts, with Portchester returning the lowest counts. Waders, in particular Dunlin, formed the largest proportion of the birds counted at Oyster Beds. Hurst Point, and to a lesser extent Newtown and Emsworth were found to be the sites which supported the most wildfowl, with Teal and Brent Goose being the most frequently occurring species. Gulls/terns and 'other' species comprised a relatively small proportion of the numbers counted, with the exception of Ryde where gulls accounted for the majority of counted birds.

Figure 11: Maximum bird counts



For individual species the graph shows maxima, for groups of species the maximum value for each species at each site are summed. Gulls are shown as shades of grey, waders as green and wildfowl as blue.

There were no significant differences in the count maximum number of birds by species present at the end of the session when a ranger was present compared to when they were absent (All birds:

Wilcoxon N=112, p=0.8833, Waders: Wilcoxon N = 112, p=0.4090, Wildfowl: Wilcoxon N=112, p=0.5774).

Total maximum bird counts at the end of the survey period are shown in Figure 12 (all birds), Figure 13 (waders) and Figure 14 (wildfowl). Oyster Beds had several thousand waders (mostly Dunlin) on two occasions, other than this, bird counts were generally in the low to mid hundreds.

Figure 12: Box-plot of the total maximum bird count at the end of the survey period

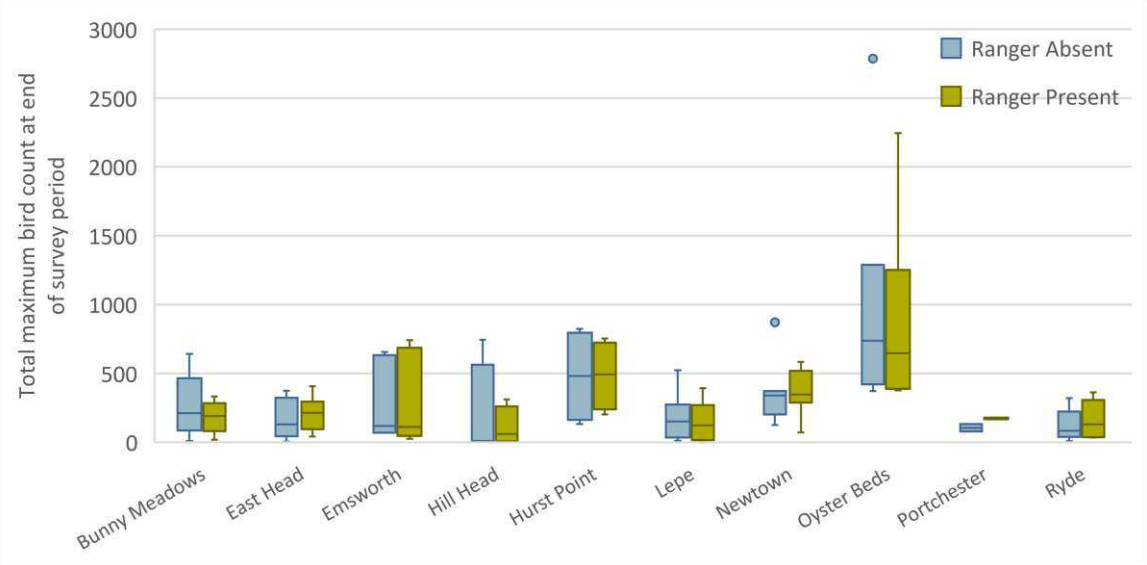


Figure 13: Boxplot of the total maximum count of waders at the end of the survey period

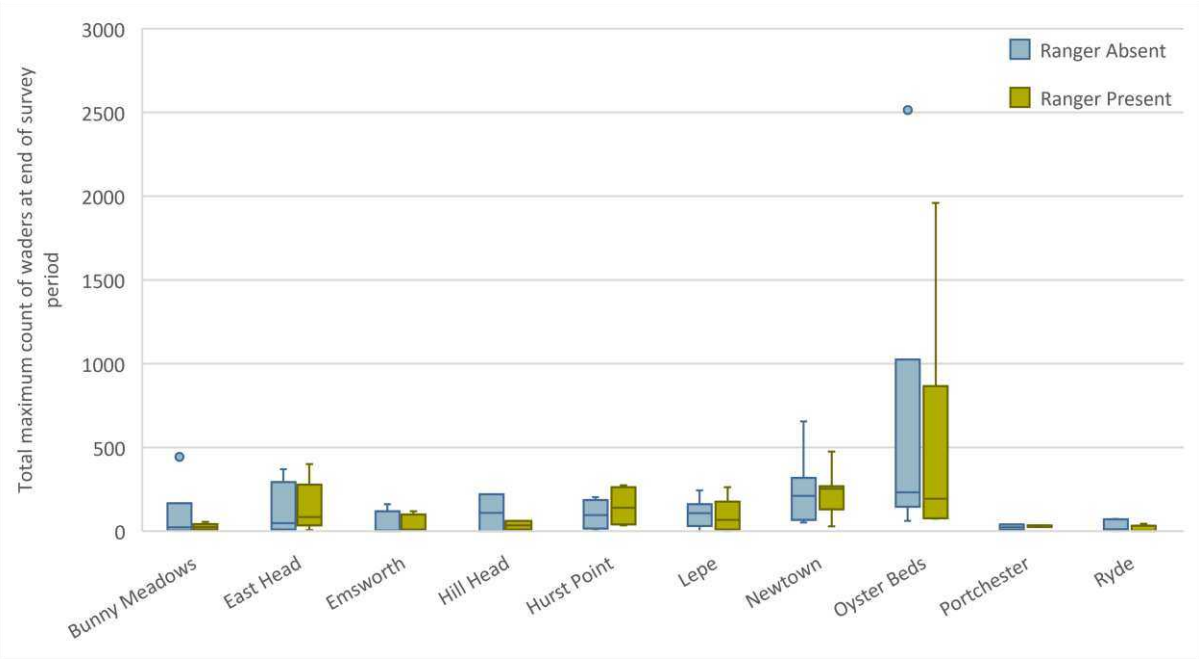
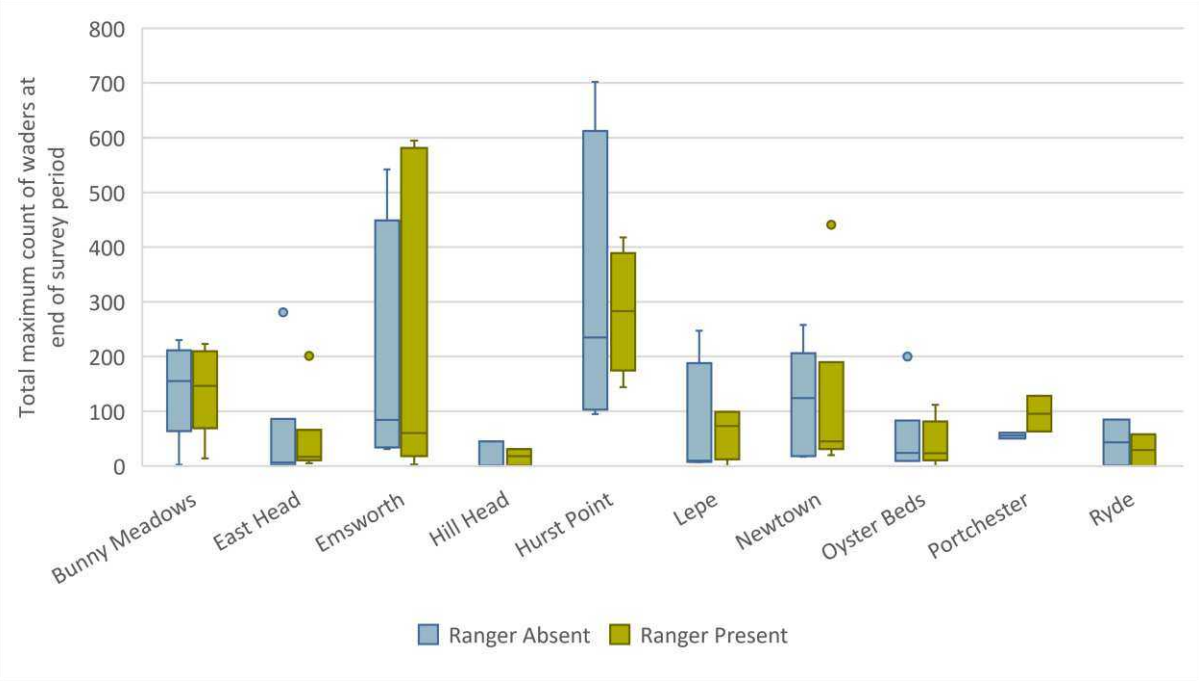


Figure 14: Boxplot of the total maximum count of wildfowl at the end of the survey period



3.4 Numbers of birds in relation to the numbers of people

In order to identify whether rangers were reducing the impact of people on birds, correlations between bird variables and visitor variables were assessed. If the number of birds is adversely affected by disturbance, it would be expected for there to be a negative correlation between these variables. Equally, if rangers were reducing the impact of people on birds, it would be expected that any correlations observed in the absence of rangers would be less obvious when they were present.

Figure 15 sets out a number of example scatterplots comparing different bird variables against visitor variables, with and without rangers. Visually, the number of waders and wildfowl appear lower at higher values of all three visitor variables (number of people, number of dogs and number of diary events) when the ranger is absent. In the presence of a ranger, the plots are suggestive that for some locations the number of waders and wildfowl are less negatively affected by higher visitor variables, although this was not supported by correlation testing.

Correlation coefficients are shown in

Table 6. These show significant negative correlations for all variables relating to waders, with the exception of the number of diary events in the absence of rangers. None of the correlations relating to the number of wildfowl were significant, with the exception of the negative correlation of the number of dogs in the presence of rangers. Overall, no consistent patterns relating to ranger presence are revealed.

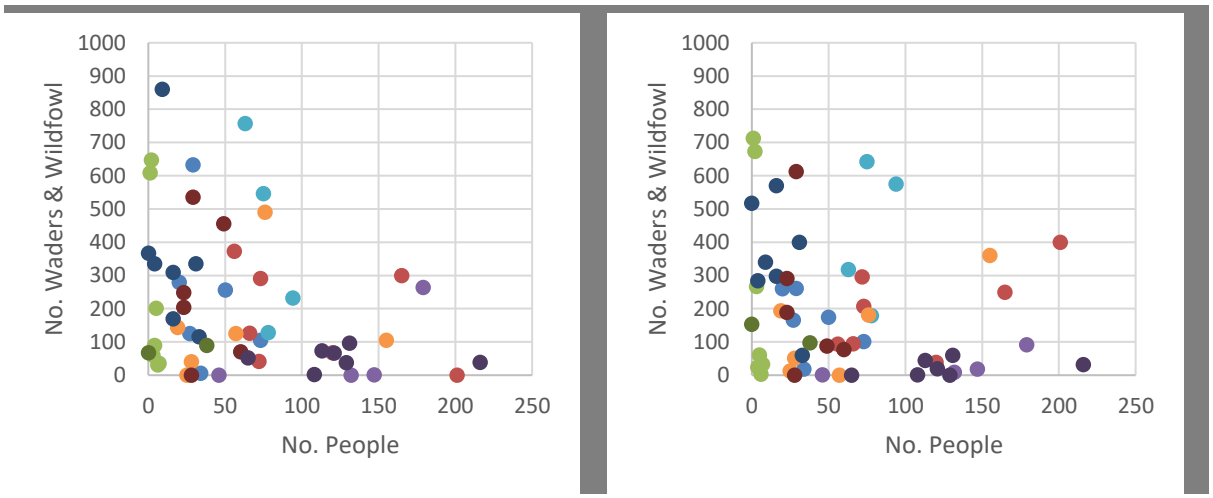
Table 6: Rank Spearman correlation coefficients for selected bird and visitor variables

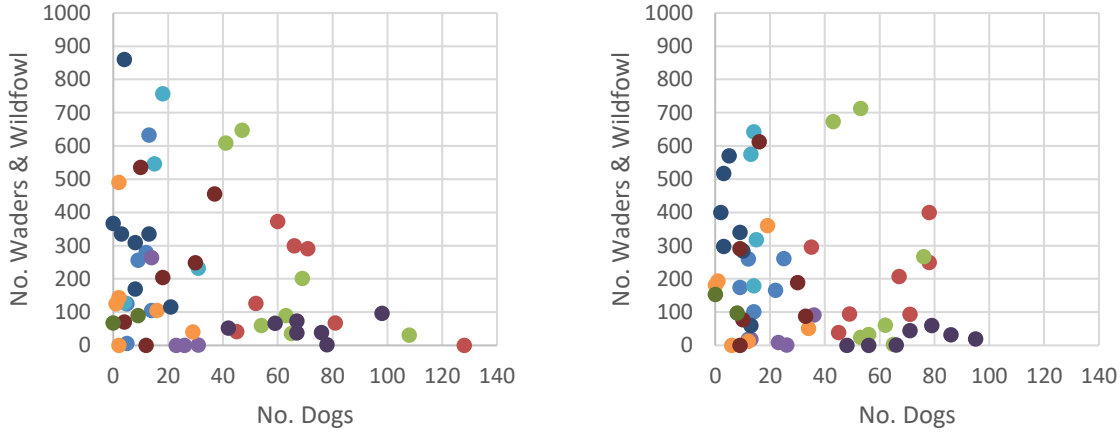
Ranger	Bird Variable	Visitor Variable	rho	p
Present	Total Waders at end of count	No. People	-0.3764	**0.004**
Absent	Total Waders at end of count	No. People	-0.3579	**0.007**
Present	Total Waders at end of count	No. dogs	-0.3148	**0.018**
Absent	Total Waders at end of count	No. dogs	-0.2671	**0.047**
Present	Total Waders at end of count	No. Diary Events	0.0762	0.579
Absent	Total Waders at end of count	No. Diary Events	-0.0435	0.753
Present	Total Wildfowl at end of count	No. People	-0.1733	0.201
Absent	Total Wildfowl at end of count	No. People	-0.2293	0.089
Present	Total Wildfowl at end of count	No. dogs	-0.3273	**0.014**
Absent	Total Wildfowl at end of count	No. dogs	-0.2632	0.050
Present	Total Wildfowl at end of count	No. Diary Events	0.1415	0.303
Absent	Total Wildfowl at end of count	No. Diary Events	0.1447	0.291

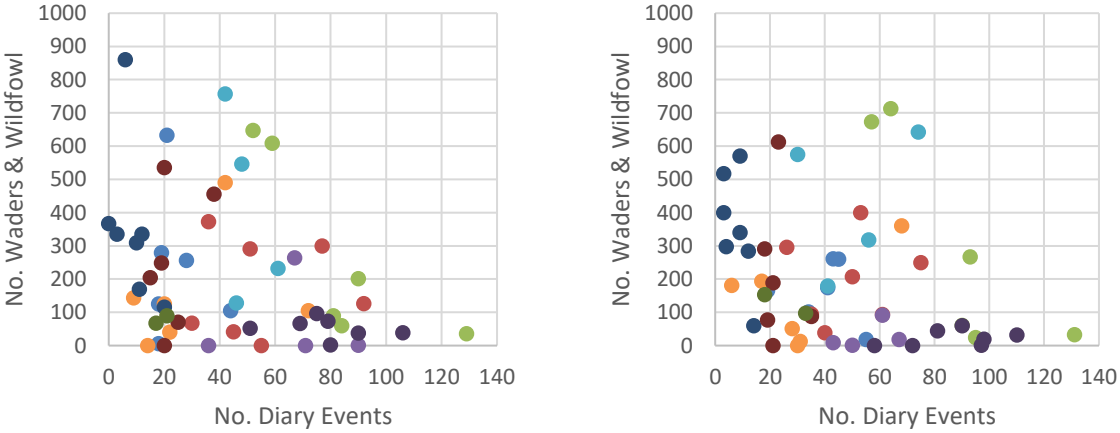
p-values in bold are significant at $p<0.05$

Figure 15: Numbers of wildfowl and waders (at the end of the count) and different access variables with and without ranger presence

Ranger Absent Ranger present


No. Waders & Wildfowl
No. People
No. Waders & Wildfowl
No. People


No. Waders & Wildfowl
No. Dogs
No. Waders & Wildfowl
No. Dogs


No. Waders & Wildfowl
No. Diary Events
No. Waders & Wildfowl
No. Diary Events

Bunny Meadows East Head Emsworth Hill Head Hurst Point
Lepe Newtown Oyster Beds Portchester Ryde

(Note that for clarity, outlier points are not displayed in the above graphs)

3.5 Behavioural Reponses of birds

3.5.1 Disturbance events

Across the six sites at which all disturbance events were recorded (Bunny Meadows, Hill Head, Hurst Point, Lepe, Newtown & Ryde), a total of 2905 diary entries were made of which 2072 were 'potential disturbance events' (i.e. events which either caused disturbance or occurred within 200m of birds present within the count area).

These potential disturbance events generated 10,640 observations of bird response (for all species[1]) for the six sites where all species-specific observations were recorded (at East Head, Emsworth, Oyster Beds and Portchester, individual species responses to events which did not result in disturbance were not recorded.)

Considering waders and wildfowl in isolation, a total of 9485 observations were made, of which the vast majority (94%) resulted in no response and 3% of observations resulted in a major flight response.

There were significant differences in the proportion of observations resulting in a particular response when rangers were present compared to when they were absent (Chi^2=25.958, df = 4, p = <0.0001). Analysing the residuals indicates the differences in Major Flight response makes the greatest contribution to this difference: fewer Major Flight responses were recorded when the ranger was present.

Table 7: Number (%) of species-specific disturbance response observations (wildfowl and waders).

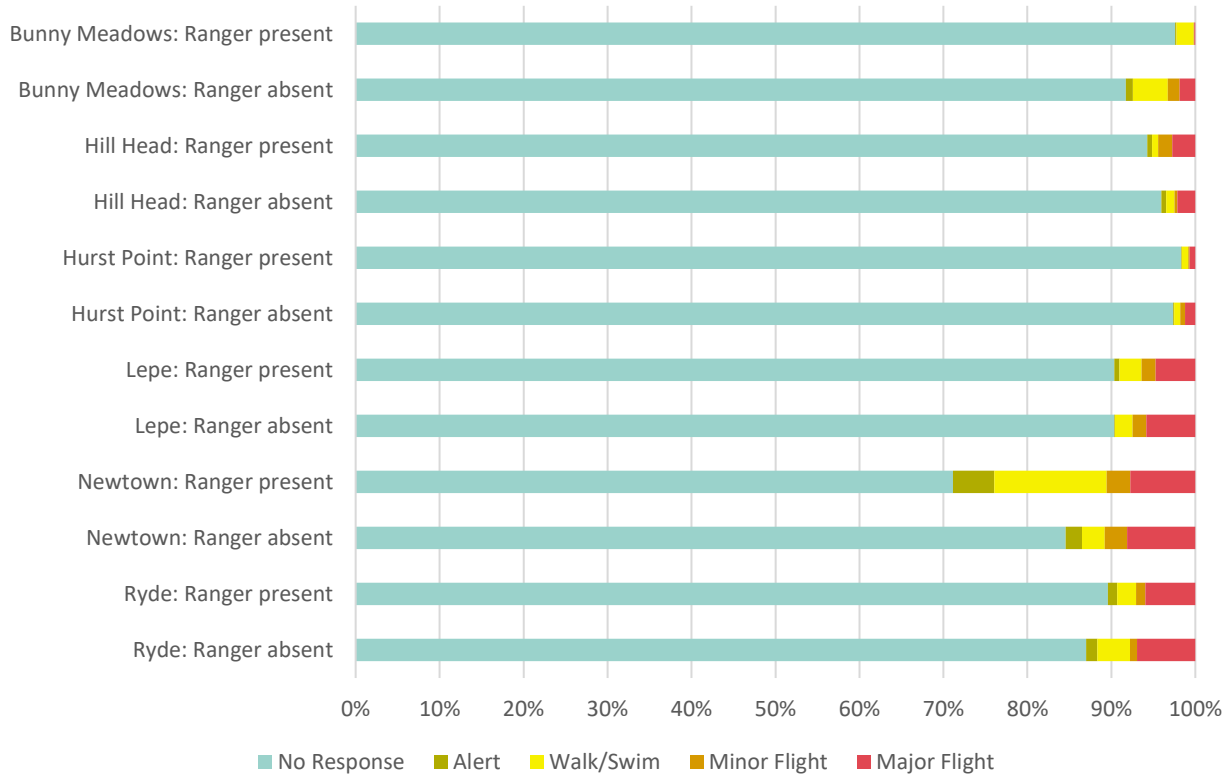
Response	Ranger Present	Ranger Absent	Total
No Response	4604 (95%)	4321 (93%)	8925 (94%)
Alert	20 (0%)	26 (1%)	46 (0%)
Walk/Swim	95 (2%)	104 (2%)	199 (2%)
Minor Flight	37 (1%)	55 (1%)	92 (1%)
Major Flight	93 (2%)	156 (3%)	249 (3%)
Total	**4849 (100%)**	**4662 (100%)**	**9511 (100%)**

(Analysis based on the most extreme response for groups of birds which exhibited multiple responses. Data from Bunny Meadows, Hill Head, Hurst Point, Lepe, Newtown & Ryde only)

[1] Each species response was recorded separately, hence more observations than events

Figure 16 shows the responses of birds at each location both with and without a ranger being present. At most of the locations (Hill Head & Newtown being the exceptions), the presence of a ranger appeared to reduce the proportion of potential disturbance events leading to behavioural responses. At Hill Head and Newtown the reverse was the case, and the presence of a ranger resulted in a higher proportion of disturbance responses (use of proportional data does however need to be treated with caution, as for both these sites, the actual number of disturbance events was lower when the ranger was present).

Figure 16: Response of birds at each location.



(Data from Bunny Meadows, Hill Head, Hurst Point, Lepe, Newtown & Ryde only)

3.5.2 Rates of flight responses

Flight Responses and Visitor Variables

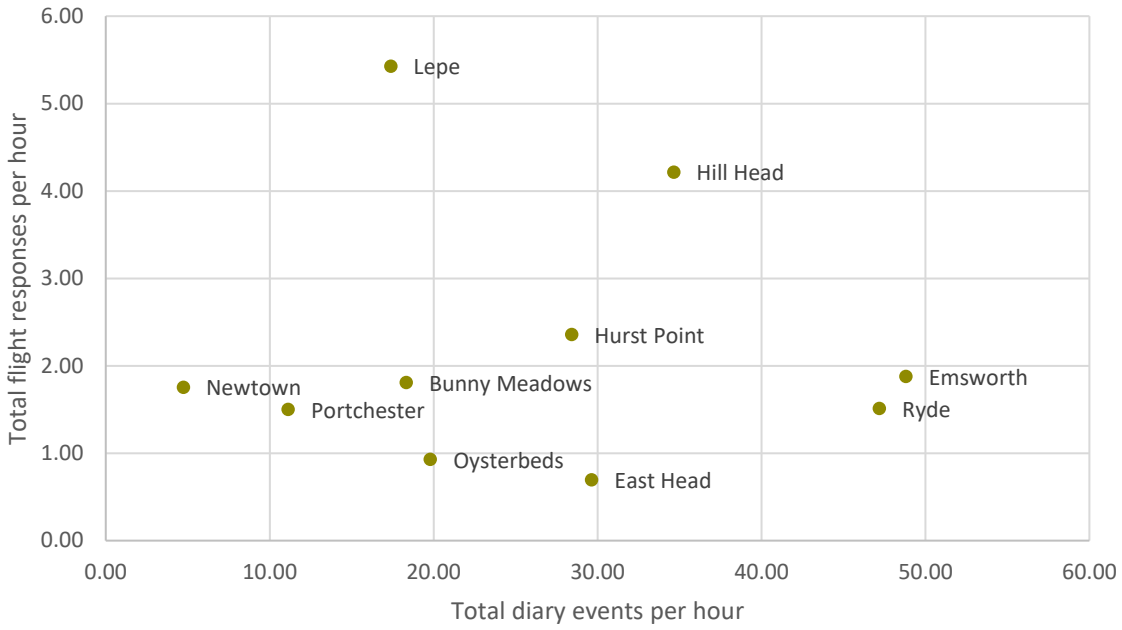
Given the different geography and accessibility of the locations studied, the sites with the most visitors are not necessarily where the most disturbance events would occur. By plotting the number of flight responses (Major Flight and Minor Flight) per hour ('rate of flushing') against selected visitor variables, any differences between the sites can be highlighted. Figure 17 shows the rate of birds being flushed in relation to total diary events, the number of dogs, the number of visitors and the number of potential disturbance events.

No strong correlations appear visually evident; however, the plots do highlight that:

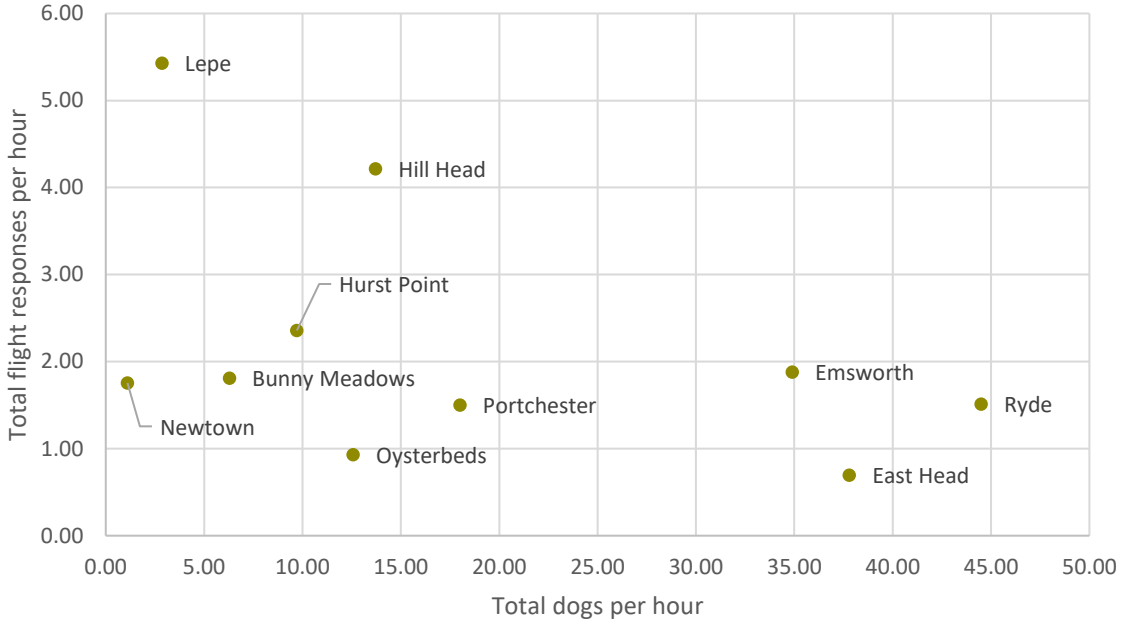
- Lepe and Hill Head stand out as having relatively high rates of flushing given their comparatively low visitor variables;
- Ryde and Emsworth had the highest rates of diary events but this did not translate into having particularly high rates of flight responses;
- Ryde, Emsworth and East Head stand out as having the highest numbers of dogs, but a relatively low rate of flushing;
- Lepe stands out as having a relatively low number of dogs, but high rates of flushing.

Figure 17: Rates of combined flight responses vs selected measures of disturbance:

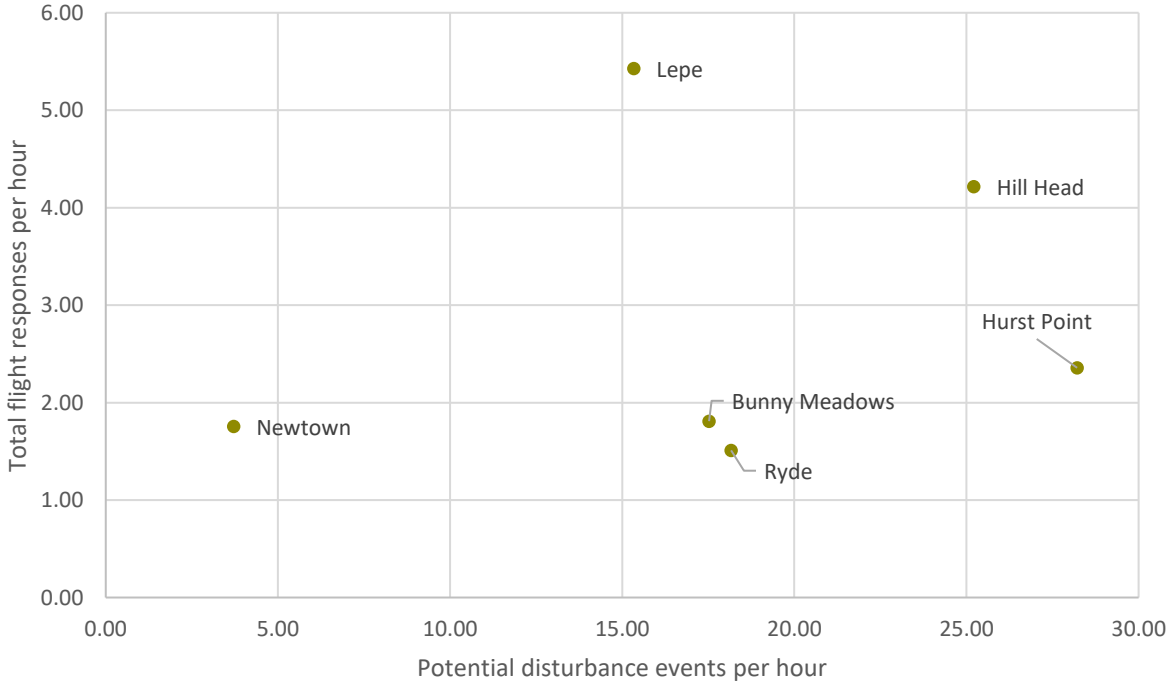
A: Total Diary Events



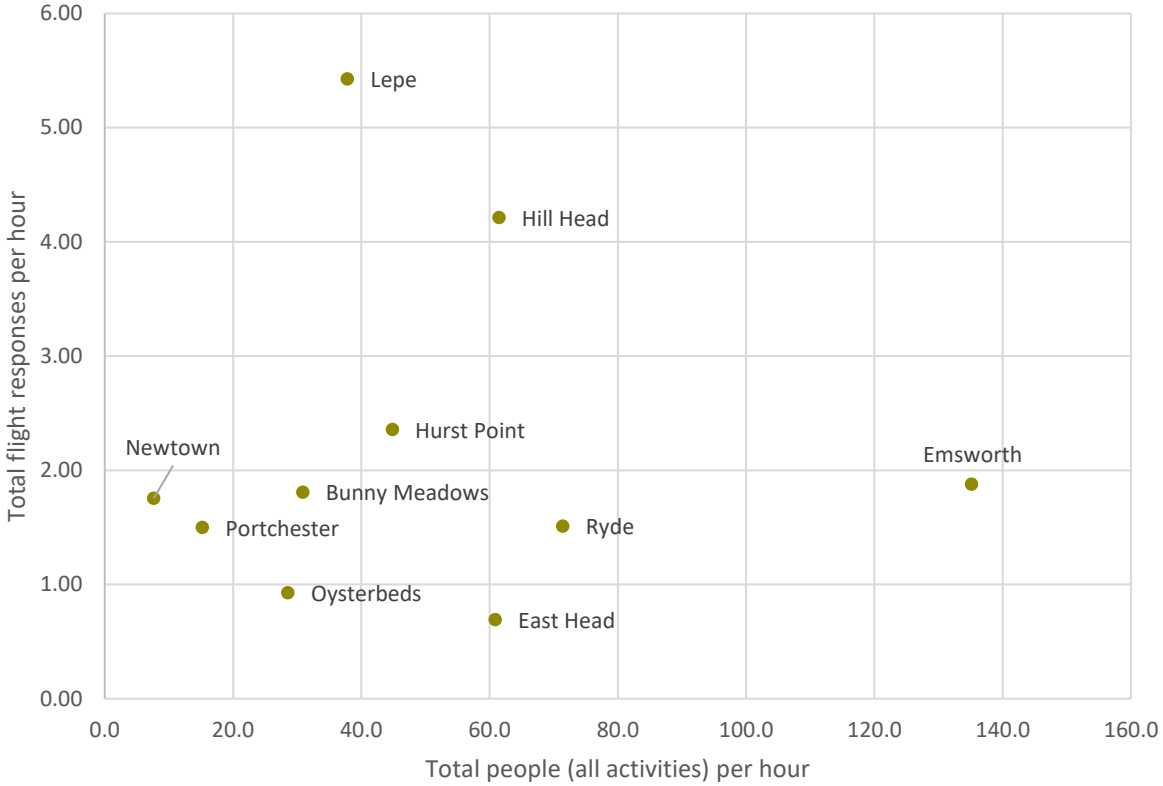
B: Total number of dogs



C: Potential disturbance events



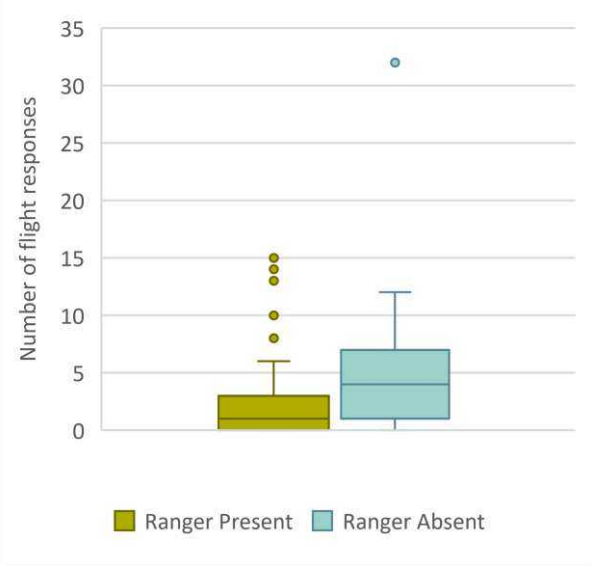
D: Total people (all activities)



Flight Responses and Ranger presence

Figure 18 compares the number of flight responses when a ranger was present to when a ranger was absent (combined for all locations) in order to examine the effect of the ranger on reducing the most severe bird disturbance.

Figure 18: Number of flight responses in relation to Ranger presence

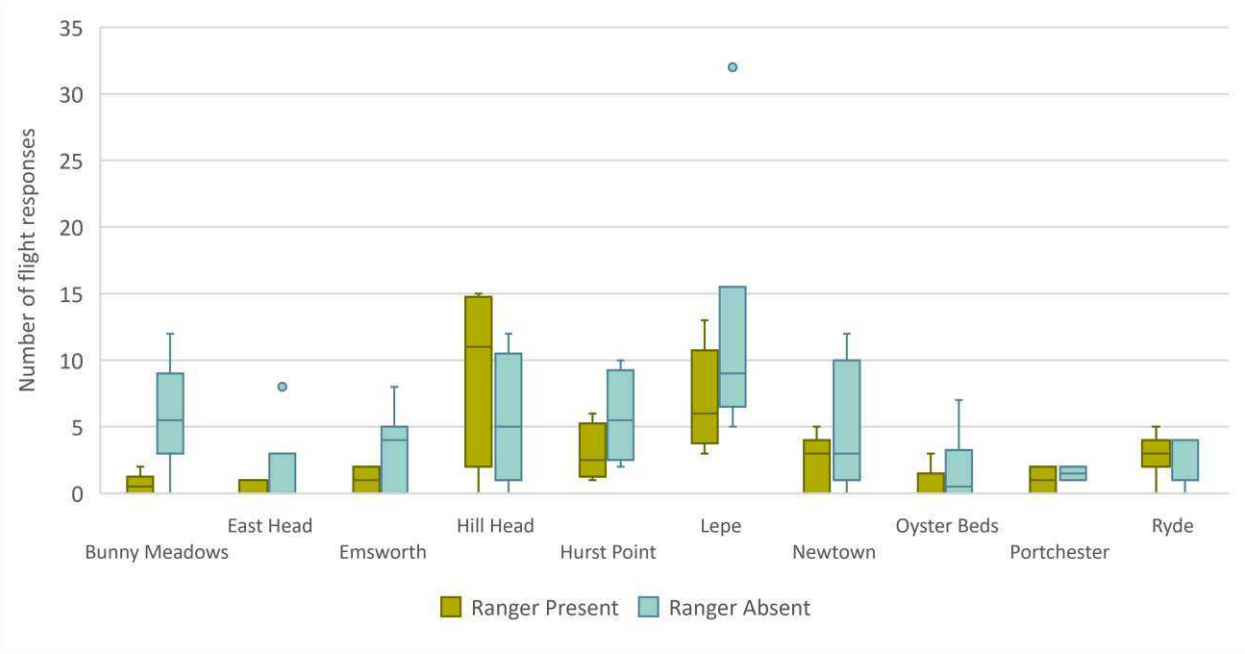


The mean number of flight responses were found to be significantly lower (Wilcoxon N = 56, p=0.003) on occasions when the ranger was present (mean of 2.6) compared to when the ranger was absent (mean of 4.5). In terms of the actual number of birds involved in the flight responses, a mean of 27.9 birds were flushed when the ranger was present compared to 131 when rangers were absent.

This effect was not found to be consistent across all sites.

Figure 19 sets out the same data grouped by location, which shows that for Hill Head the number of flight responses appeared to be greater when the ranger was present. However, none of the differences between the number of flight responses with a ranger present or absent were found to be significant at the individual site level, likely due in part to the small sample sizes (N between 2 & 7).

Figure 19: Number of flight responses by location in relation not Ranger presence

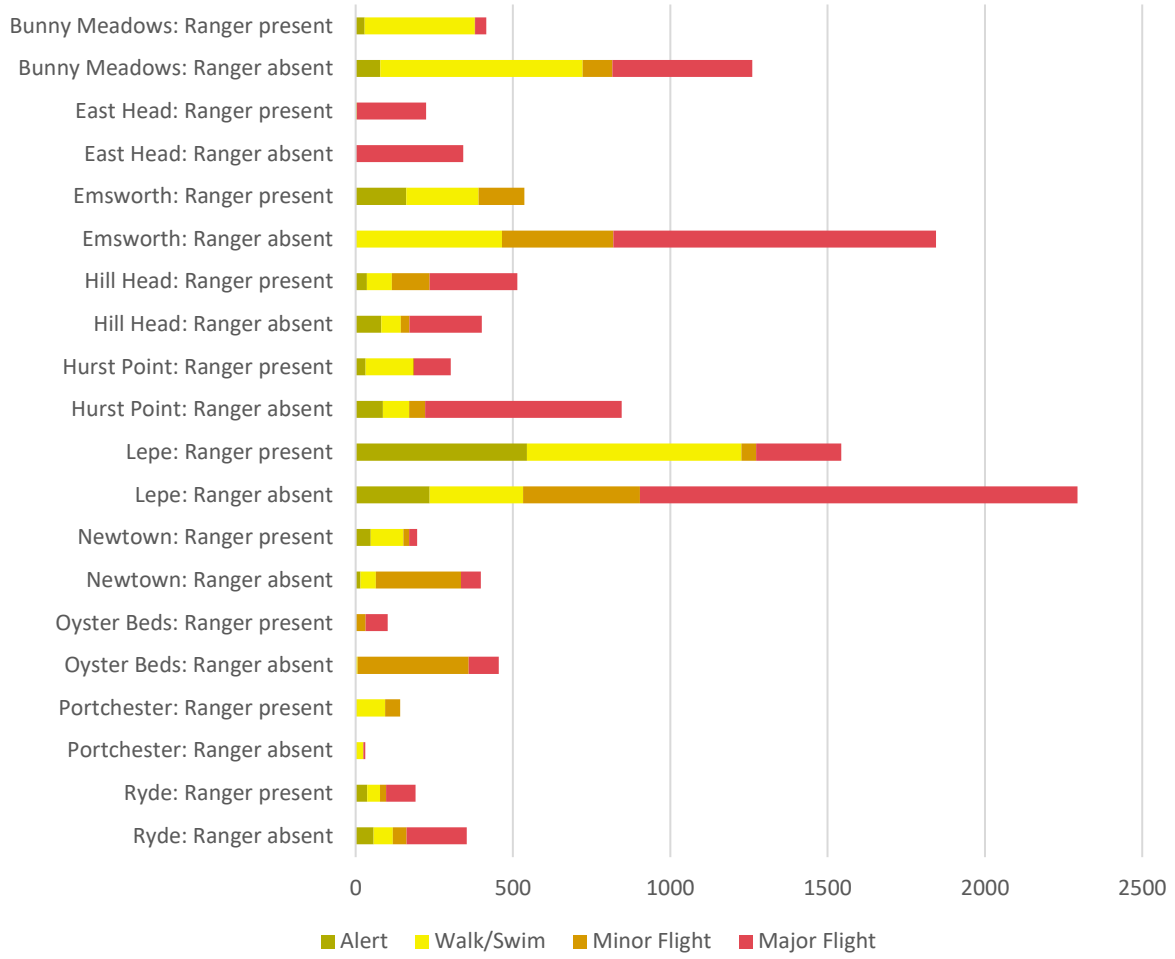


3.5.3 Behavioural responses and number of birds

Another measure of the level of disturbance of birds is the actual number of birds involved in each response: this is set out for all response types for all locations in Figure 20. The plot shows that fewer birds made some response to a disturbance event when a ranger was present than when absent at all locations except Hill Head and Portchester.

Overall, the difference between the number of birds responding was found to be significant (Wilcoxon N = 56, p=0.004) on occasions when the ranger was present (mean of 74.8) compared to when the ranger was absent (mean of 172). None of the differences were found to be significant at the individual site level, likely due in part to the small sample sizes (Wilcoxon, N between 2 & 7).

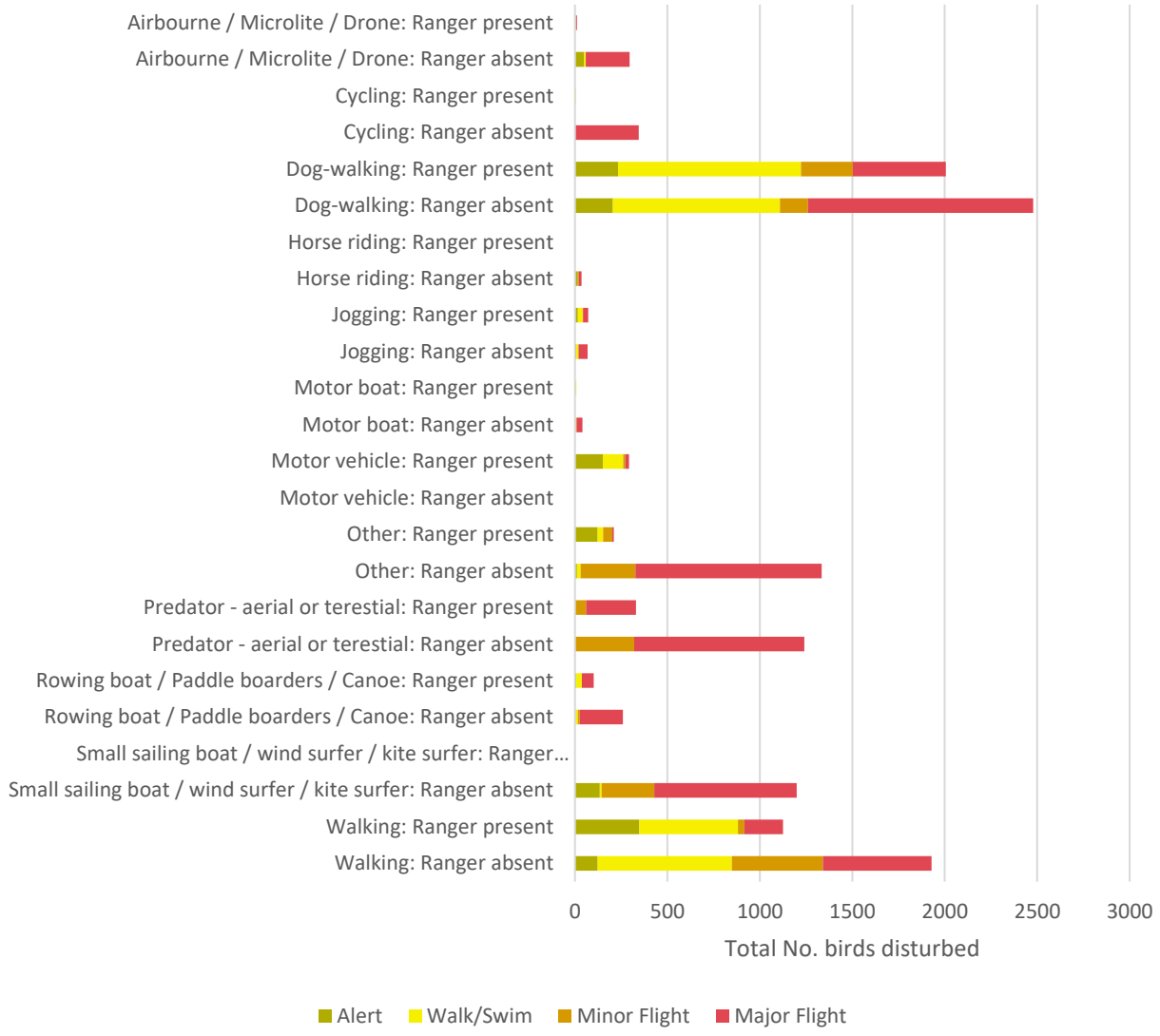
Figure 20: Total numbers of birds involved in each response category



3.5.4 Behavioural responses and activity

Figure 21 shows the behavioural responses in relation to the different activity types recorded. All activities appeared to result in more birds being disturbed when rangers were not present with the exception of motor vehicles and joggers. For some activities (such as walking and jogging) this could potentially be due to the presence of the Ranger as people engaged in these have potential to interact with the Ranger or otherwise be aware of their presence. However, differences in disturbance in relation to certain activity types are unlikely to be a result of the Ranger: most water-based activities would not encounter the Ranger and predator events are likely to be entirely independent.

Figure 21: Total Number of birds displaying behavioural responses by disturbance type

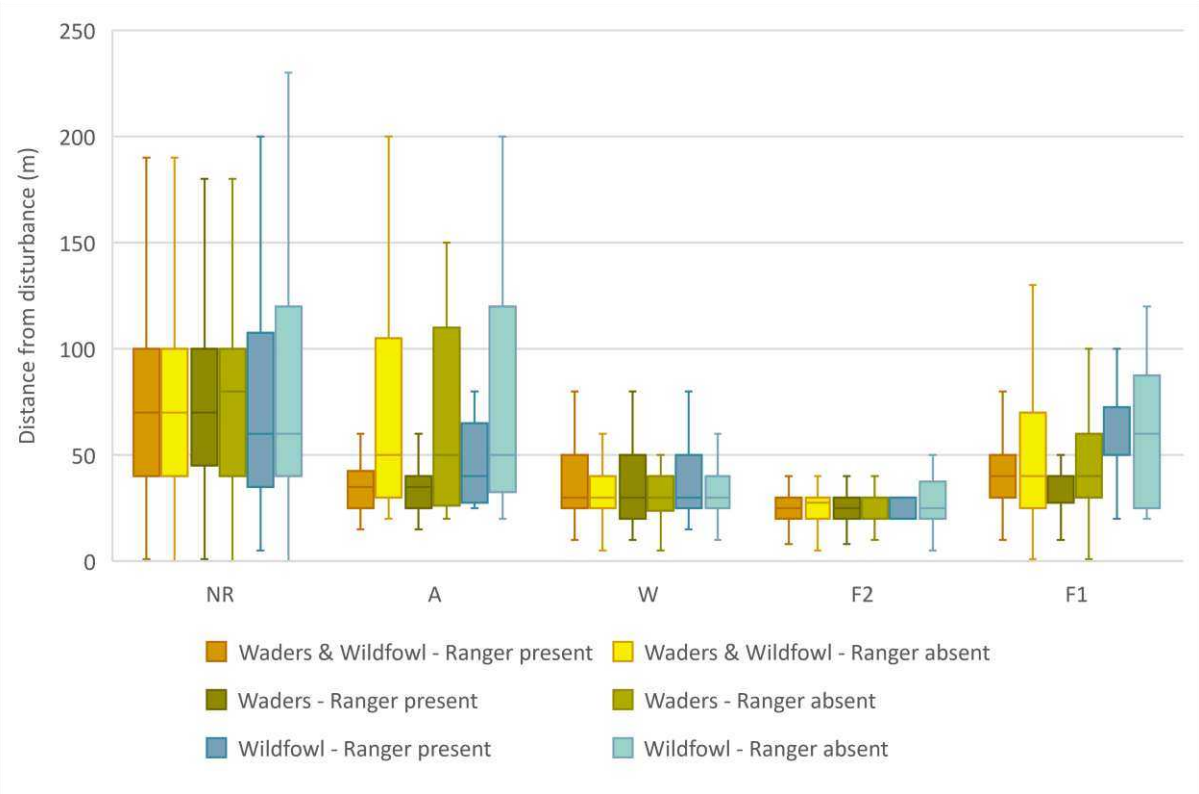


3.5.5 Distances at which birds respond

Birds generally responded to events that were relatively close to them – see

Figure 22. For birds that exhibited no disturbance response, the median distance (for waders and wildfowl combined) was 70m, i.e. half of the observations where there was no response involved people within 70m of the birds. The median distance at which birds became alert was 40m, and the same for major flight responses. There were no clear differences in the distance at which disturbance occurred in the presence or absence of a ranger.

Figure 22: Distances at which birds respond grouped by response type



4. Discussion

4.1 General

The results presented in this report comprise the findings of the second monitoring period looking at the effect of rangers on bird disturbance on the Solent. The first monitoring period was undertaken in the winter of 2016/2017 (Liley & Panter, 2017), and similar survey work was undertaken in the winter of 2009/2010 (Liley, et al., 2010) prior to the commencement of the ranger deployment programme.

This section of the report sets out the findings of the 2018/2020 survey in comparison with the previous survey results and highlights the key findings.

4.2 Comparison with previous surveys

A summary of selected variables for sites covered by all three studies is set out in Table 8.

Levels of Human Activity

The overall relative proportions of activity types remained similar between the two monitoring periods: terrestrial activities accounted for the majority of observations (98% in both 2016/17 and 2018/2020) and dog walking was the most frequently recorded event (54% in 2016/17 and 46% in 2018/2020).

The overall level of human activity, measured by events per hour, was notably different between the recording periods for some of the sites, although not in a consistent direction. In particular the number of diary events was higher at Oyster Beds and Ryde in 2018/2020 compared to 2016/2017, but lower at Newtown and Portchester.

Neither the 2016/17 nor this present study detected significant differences in the total number of diary events, or total number of dogs off-lead when a ranger was present compared to when the ranger was absent. However, when ‘dogs off-lead’ was considered as a proportion of the number of dogs recorded, the 2018/2020 data did show a significant difference when rangers were present (this measure was not calculated in relation to the 2016/2017 data).

Interactions with Rangers

The overall proportion of visitors interacting with rangers was very similar between monitoring periods: 20% in 2016/2017 and 22% in 2018/2020. The proportion of these interactions that led of a detected behavioural change also remained the same at 1%.

Table 8: Summary comparison between monitoring periods

Location	Diary Events /hr			Walkers /hr		Dog-walkers /hr		Dogs / hr (% off-lead)			No. flight events per hour			No. species	
	2009/ 2010	2016/ 2017	2018/ 2020	2016/ 2017	2018/ 2020	2016/ 2017	2018/ 2020	2009/ 2010	2016/ 2017	2018/ 2020	2009/ 2010	2016/ 2017	2018/ 2020	2016/ 2017	2018/ 2020
Bunny Meadows	-	18.1	18.3	9.6	11.2	5.3	4.8	-	6.5 (21%)	6.3 (80%)	-	1.5	1.8	25	26
East Head	-	34.2	29.6	12.2	-	20	-	-	29.4 (13%)	37.8 (-)	-	1.3	1.8	29	26
Oyster Beds, Hayling	-	12.8	19.6	3.3	5.3	5.6	9.6	-	7.1 (12%)	12.6 (-)	-	1.6	0.9	27	25
Newtown	3.0	7.1	4.7	3.5	2.1	1.6	0.9	1.0	1.9 (33%)	1.1 (63%)	0.6	3.7	1.8	31	30
Portchester	-	29.5	11.1	4.2	1.5	22	8.9	-	39 (7%)	18 (-)	-	1.3	1.5	24	14
Ryde	23.9	38.3	47.2	10	12.2	26.6	34.3	25.6	35.3 (10%)	44.5 (89%)	3.7	3.5	1.5	15	13

Numbers of Birds Present

Overall, a very similar total number of species were recorded between the two monitoring periods, with a total of 52 species in 2016/2017 and 50 in 2018/2020, with similar proportions of waders, wildfowl and gulls/terns each time. On a site level, a notable difference is apparent for Portchester where only 14 species were recorded in 2018/2020 compared to 24 in 2016/2017. This is considered likely to be due to the relatively low number of survey visits to Portchester in 2018/2020 rather than represent a true trend.

Broadly similar patterns in the relative numbers and proportions of different species groups was observed between monitoring years, with Oyster Beds continuing to have the highest maximum counts primarily for its waders. Bird counts at Ryde remained amongst the lowest, and were dominated by gulls/terns in both monitoring periods. Some differences between the overall numbers are apparent: with the exception of Bunny Meadows, the total maximum counts at all site in 2018/2020 were lower than for 2016/2017. This was particularly evident at Oyster Beds, where the total maximum count in 2016/17 was twice that in 2018/2020 (7197 and 3534 respectively).

Numbers of Birds in Relation to Visitor Levels

In the 2016/17 data, significant negative correlations were found between the number of wildfowl at the end of a survey visit and several different visitor variables, whereas for waders, there were no significant correlations. In 2018/2020 this finding was broadly reversed, with significant negative correlations found for waders, but not for wildfowl.

No clear patterns were detected in either monitoring period that suggest the presence of rangers result in a weakening of negative correlations between the amount of visitor activity and the number of birds at the end of the survey visit.

Behavioural Responses of Birds

The proportions of the different bird response types to potential disturbance events showed slight differences between the two monitoring surveys: in 2016/2017 90% of birds showed no response to a potential disturbance event whereas in 2018/2020 this increased slightly to 94%. The proportion of Walk/Swim and Major Flight responses showed a corresponding decrease, with both at 4% in 2016/2017, falling to 2% and 3% respectively in 2018/2020.

The presence of a ranger was found to result in a significant difference (reduction) in the proportion of birds displaying a response in both monitoring periods. In 2016/2017 the main difference was in the relative proportion of birds categorised as alert, whereas in 2018/2020 the main difference was the proportion of Major Flight responses.

Rates of Flight Responses and Visitor Activity

No significant correlations were found between any of the selected measures of visitor activity (total number of diary events, number of dogs, number of people and number of potential disturbance events) and the rate at which waders and wildfowl were flushed. This was also the case for the 2016/2017 data.

Differences between sites were however highlighted, but these were not found to be consistent between years. For example:

- Ryde: in 2016/2017, Ryde stood out as having a relatively high level of visitor activity and high rates of waders and wildfowl being flushed: in 2018/2020 high levels of visitor activity were again recorded, but the rate of waders and wildfowl being flushed was amongst the lowest.
- Newtown: in 2016/2017, Newtown was one of the least busy locations, yet had a comparatively high

rate of waders and wildlife being flushed; in 2018/2020 Newtown remained one of the quietest locations and also had low rates of flushing.

These findings suggest that there may have been a long-term effect on the behaviour of visitors at these locations resulting in a reduction in the rate of disturbance of wildfowl and waders. This does need to be treated with some caution as particularly at Ryde, where there was a very low proportion of waders and wildfowl the differences could be just the result of there being only a small number of events rather than changes in visitor behaviour. Changes in rates of disturbance could also be affected by factors such as bird habituation to human presence, although given the long-term use of these sites by people and broadly similar levels of use over the monitoring period, habituation is likely to have already occurred.

In 2018/2020, the number of flight responses and number of birds responding to disturbance (all responses) was found to be significantly lower when a ranger was present compared to when they were absent, although this was not consistent across the individual sites, and at a site level the effects were not found to be significant.

4.3 Key findings

The key objective of the monitoring is to determine whether the ranger programme results in a measurable reduction in the disturbance of waders and wildfowl by visitors to coastal sites on the Solent.

In terms of how rangers affect visitor behaviour, it would be hoped that they would have both a short and a long-term effect on visitor behaviour. The short-term effect would be the modification of their behaviour either immediately after having been approached by the ranger, or as a result of being aware that rangers were present (through seeing the ranger, signage or marked-up vehicles). The desirable long-term effect is that once visitors have either interacted with rangers or been made aware of their presence, they would modify their behaviour on all subsequent visits, not just on visits when rangers were present. If this long-term effect were to be occurring, over time it would tend to mask any short-term effect as it would reduce the differences in behaviour (and bird responses) between when rangers are present and when they are absent.

Short-term Effect of Rangers

A number of the variables measured in the 2018/2020 monitoring surveys provide evidence of visitor behaviour being modified when rangers are present. Specifically:

- Dogs off-lead: there was a significant difference (reduction) in the proportion of dogs off-lead when rangers were present.
- Disturbance responses: there were significant differences (reduction) in three different measures of disturbance when rangers were present:
  - the proportion of birds showing a response to disturbance events (this was also significant for the 2016/2017 monitoring data);
  - the number of flight responses; and
  - the total number of birds disturbed.

Long-term Effect of Rangers

Some suggestion of a long-term effect may be present in the results for Ryde and Newtown which both had relatively high rates of birds being flushed in 2016/2017 but relatively low rates in 2018/2020 whilst visitor levels were broadly comparable between the monitoring surveys.

Incidental Observations of Ranger Effectiveness

Some notable incidental observations from surveyors on the effect of rangers were made. These included noting that at Oyster Beds one set of dog walkers put their dog on a lead on seeing the ranger was present (without interacting with the ranger) – the previous day these same people had been present but had had their dog off-lead. At Hill Head, the ranger was noted to intercept a dog walker with their dog off-lead on the beach, which resulted in the dog walker moving up to the footpath and likely preventing a group of mixed waders being flushed. Similarly, at Newtown, a group flying a drone near the boardwalk stopped doing so after talking with the ranger.

4.4 General commentary and recommendations for future monitoring

There are many variables which may affect the distribution of birds, the presence and behaviour of visitors and the activities they engage in, and while the paired approach to data collection will control for many of these, the variability of the findings between sites and between years means caution must be applied to the interpretation of the results. The key findings should therefore be regarded as indicative of the direction of travel rather than as conclusive proof.

As highlighted in the 2017 monitoring report, a problem with the monitoring results presented is the large amount of data collected, making it difficult to pull out the key metrics for each site. It is recommended that the monitoring approach be simplified to collect the most pertinent data only. Simplifying the data collection would help reduce the 'surveyor overload' which occurred at the busiest sites. For example:

- data on the individual distances between birds and disturbance events appears to have little bearing on ranger effectiveness, but is time consuming to record;
- data on numbers of ranger interactions could be recorded by the ranger.

It may be appropriate to review the ranger strategy to ensure that rangers are deployed to sites where there is a disproportionate amount of disturbance, and that the positioning of signage and the ranger is targeted to where they might be most effective. For example, Lepe and Hill Head both had relatively high rates of flushing given the visitor levels: there might be merit in modifying the ranger strategy at these sites to aim to address this. Where visitor numbers are low, it may prove more cost effective to implement other measures such as improved signage (including specific temporary signage – see below).

Recommendations were made in the first monitoring report (Liley & Panter, 2017) for individual site targets to be set relating to visitor number in particular locations, visitor behaviour (e.g. fewer dogs off-leads in key areas) or bird behaviour (e.g. fewer birds being flushed). It was also suggested that the reach and effectiveness of the rangers could be increased through deploying temporary signs and fencing which may influence visitor behaviour without needing direct ranger interaction. If these measures are implemented, the monitoring approach should be reviewed to include measures of the success of these additional interventions.

5. References

Bird Aware Solent, 2017. *Solent Recreation Mitigation Strategy,* s.l.: Solent Recreation Mitigation Partnership.

Liley , D. & Panter, C., 2017. *First year results of monitoring bird disturbance in the presence/absence of rangers on the Solent.,* s.l.: Footprint Ecology.

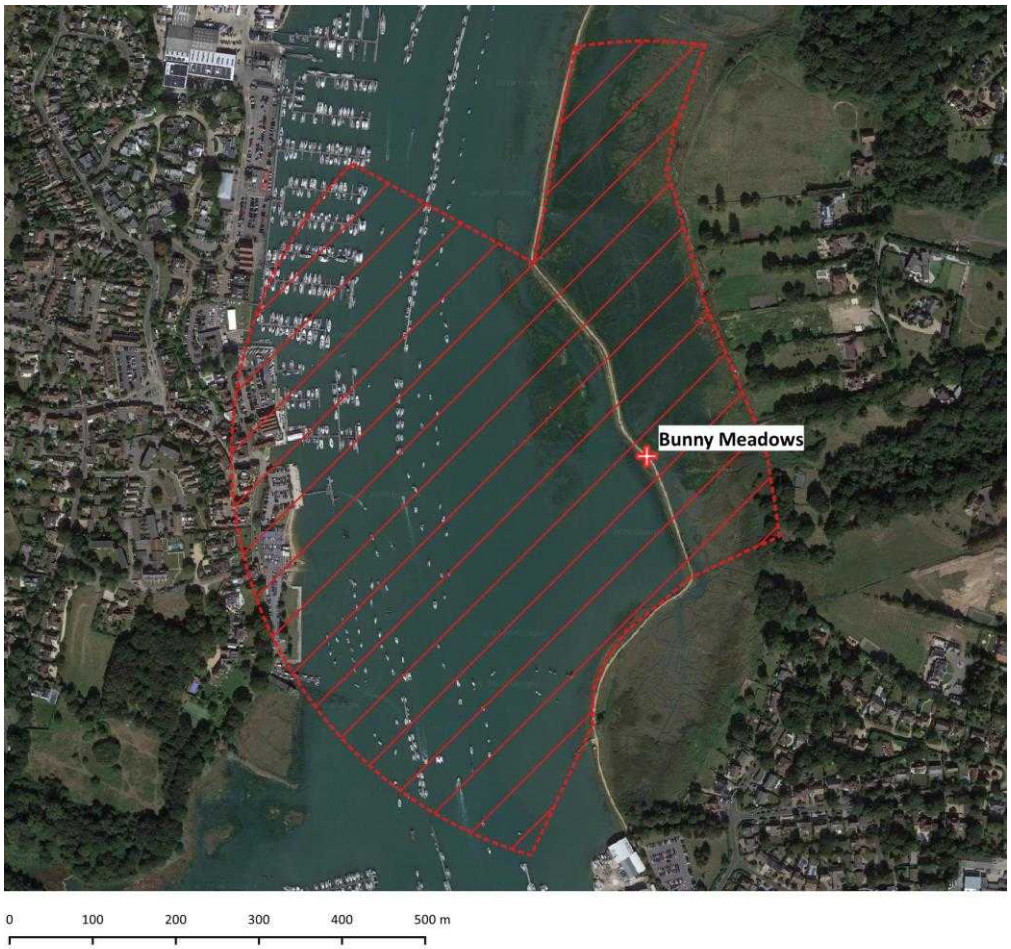
Liley, D., Stillman, R. & Fearnley, H., 2010. *The Solent Disturbance and Mitigation Project Phase II. Results of Bird Disturbance Fieldwork, 2009/10.,* s.l.: Footprint Ecology / Solent Forum.

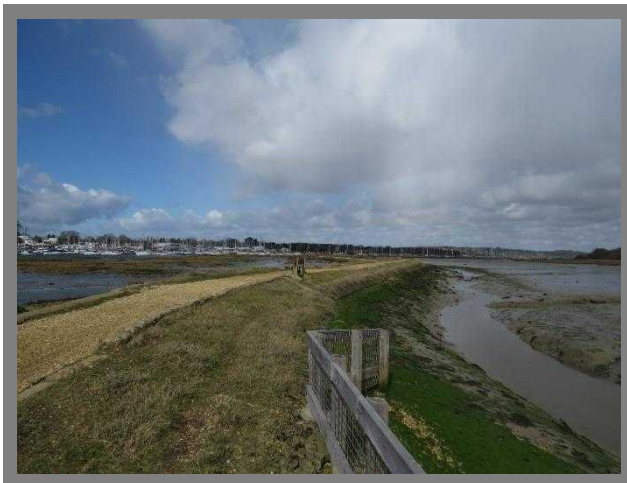
APPENDICES

A. Summary of Survey Sites

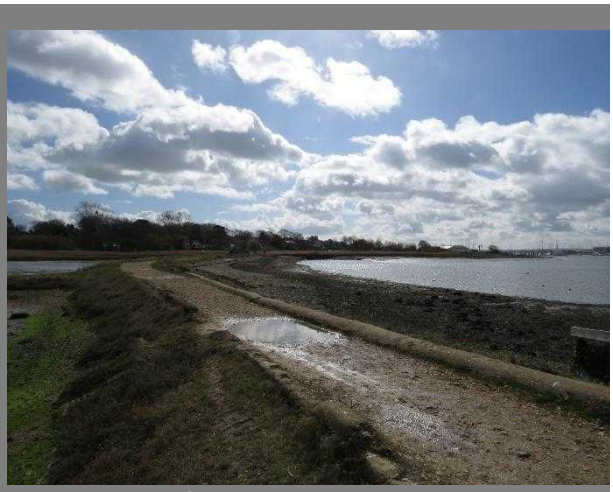
Bunny Meadows	
Site overview	Intertidal habitat on eastern banks of River Hamble which forms part of the Hook-with-Warsash Local Nature Reserve. Intertidal zone is relatively narrow, bounded to the east by large gardens and to the west by the main river channel. VP is on raised shingle path running south-north through mudflats and saltmarsh.
Grid Reference for vantage point	SU 48890 06780
Key habitats present	Saltmarsh, mudflats, shingle beach
Number of valid visits	12
Total dogs per hour	6.3
Total Walkers & Dogwalkers per hour	27.8
Diary events per hour	18.3
Flight responses per hour (all species)	1.8
Top 5 bird species (max counts)	Dunlin (540), Wigeon (160), Teal (76), Brent Goose (89) and Black-headed Gull (151).
% Waders foraging	62%
% Wildfowl foraging	84%
Number of species recorded during bird counts	26
Number of visits with some rain (%)	17%
Notes on bird use	Counts dominated by foraging waders and wildfowl. Key species of waders comprised Dunlin, Redshank, Grey Plover and Black-tailed Godwit. Key wildfowl species found on the site comprise Wigeon, Teal and Brent Goose.
Notes on access	Narrow but firm shingle path bisects survey area (part of Solent Way), with muddy puddles formed in wet weather. Boardwalk connects main path with gardens to east (submerged at high tide).
Access infrastructure	Free car park at Passage Lane at southern edge of survey area. Ranger mentioned that there is a bird interpretation board to the north of VP and a further advisory sign c. 300m south of VP warning of dangers from strong currents / tidal eddies to dogs.
Survey notes	Frequent boat movements (north -south) were recorded on some visits through western part of survey area (c. 400m distance). Impractical to record this traffic whilst still observing effect of events in areas closer to

	birds. High tide roost for Grey Plover, Brent Goose, Golden Plover, Black-tailed Godwit etc. present just beyond the 500m survey area, with additional waders likely to be hidden in vegetation towards outer limit of survey area. Also, very busy at times with people, and likely that on these occasional low-level disturbance events may have been overlooked.



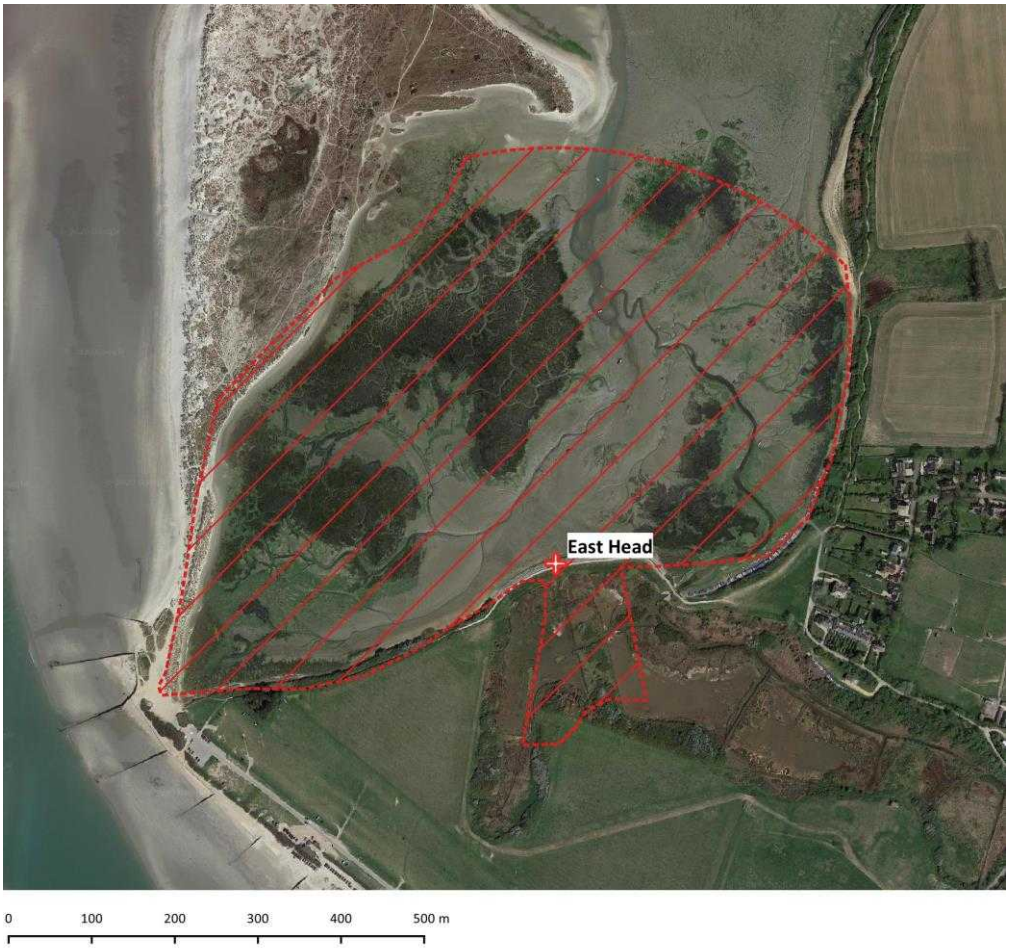


Looking north-west from VP



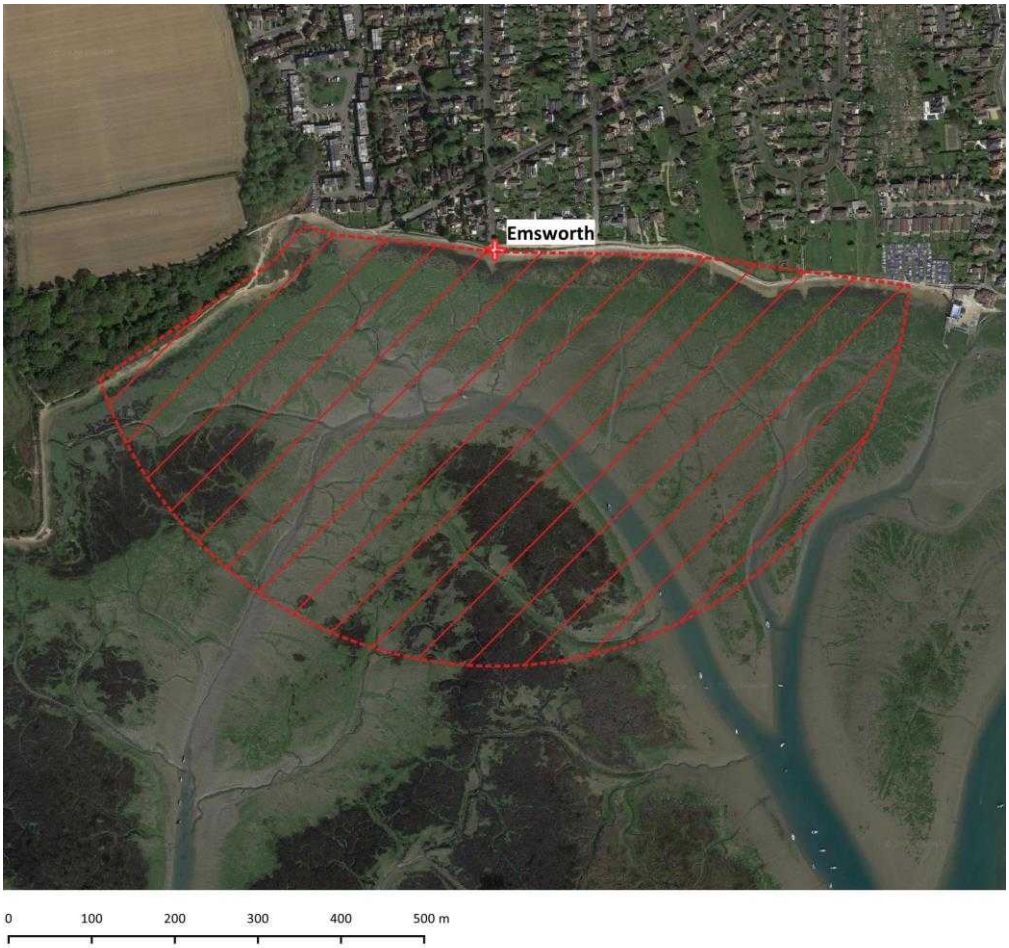
Looking south from VP

East Head	
Site overview	A c.1km sand dune/shingle spit on the eastern side of the Chichester Harbour entrance.
Grid Reference for vantage point	SZ 77013 98608
Key habitats present	Mudflats, saltmarsh, sand dune, shingle spit
Number of valid visits	14
Total dogs per hour	37.8
Total Walkers & Dogwalkers per hour	60.1
Diary events per hour	29.6
Flight responses per hour (all species)	0.7
Top 5 bird species (max counts)	Brent Goose (500), Dunlin (400), Lapwing (200), Knot (150) and Oystercatcher (40).
% Waders foraging	21%
% Wildfowl foraging	33%
Number of species recorded during bird counts	29
Number of visits with some rain (%)	21%
Notes on bird use	Site supports roosting waders, predominantly Dunlin but also including Redshank, Oystercatcher, Knot, Curlew, Grey and Golden Plover. Wildfowl predominantly comprise Brent Geese, but also includes Red-breasted Merganser, Teal and Shelduck.
Notes on access	Site is almost totally open access, although some areas of dune are roped off (which deters some people, though not all, and dogs were seen to freely roam in these areas).
Access infrastructure	Large car park, with variable charges, toilets and National Trust signage / interpretation boards.
Survey notes	VP allowed views across Snowhill Creek to the path along the east side of East Head. Impractical to survey and accurately record all disturbance events, due to high numbers of visitors, especially at weekends and both people and birds being fairly widely distributed.



View from VP towards the end of East Head

Emsworth	
Site overview	Straight east-west frontage of Emsworth town.
Grid Reference for vantage point	SU 74151 05341
Key habitats present	Mudflats, shingle beach, saltmarsh
Number of valid visits	14
Total dogs per hour	34.9
Total Walkers & Dogwalkers per hour	131.9
Diary events per hour	48.8 (note that this excludes the busiest survey visit – see limitations)
Flight responses per hour (all species)	1.9
Top 5 bird species (max counts)	Brent Goose (450), Wigeon (180), Black-tailed Godwit (110), Black-headed Gull (70) and Teal (70).
% Waders foraging	100%
% Wildfowl foraging	83%
Number of species recorded during bird counts	22
Number of visits with some rain (%)	29%
Notes on bird use	Area used for foraging predominantly by wildfowl (mainly Brent Geese and Wigeon) but also lower numbers of waders (predominantly Black-tailed Godwit together with Dunlin, Redshank and Oystercatcher).
Notes on access	Site is totally open with firm path along sea wall (muddy in places).
Access infrastructure	Free street parking. Signage comprises informal nature notes and Birdaware information.
Survey notes	Many Wigeon and Teal are out of view in the creeks when tide is low, therefore likely to be under-recorded. Also, a large percentage of people who pass the VP do not go past the ranger.



View from VP west towards Nore Barn Wood on a rising tide.

Hill Head	
Site overview	Largely stony beach, though some sand shoals are revealed at low tide. A path with beach huts lies just above the beach, beyond which is a bank and road, then residential areas.
Grid Reference for vantage point	SU 53623 02316
Key habitats present	Sand & gravel foreshore
Number of valid visits	8
Total dogs per hour	13.7
Total Walkers & Dogwalkers per hour	58.9
Diary events per hour	34.6
Flight responses per hour (all species)	4.2
Top 5 bird species (max counts)	Black-headed Gull (560), Oystercatcher (68), Turnstone (63), Brent Goose (178) and Gadwall (45)
% Waders foraging	89%
% Wildfowl foraging	80%
Number of species recorded during bird counts	24
Number of visits with some rain (%)	13%
Notes on bird use	Intertidal area supports foraging waders, predominantly Oystercatcher, Turnstone and Ringed Plover. Foraging wildfowl were also recorded, predominantly Brent Geese and Gadwall. Also supports large numbers of Black-headed Gull.
Notes on access	Concrete path along shore for entire length of survey area. No access restrictions as such, but signage (pictured below) highlights the impact of disturbance and asks visitors to keep their distance from birds and keep their dogs under control.
Access infrastructure	Free car park by Hill Head Sailing Club, 40m west of VP. Further parking further west along Meon Shore. Council interpretation board for Meon Shore situated near to VP.
Survey notes	Visibility of intertidal areas south and east of the VP is excellent, however, there was no view of the shore or inshore waters to the west and north-west.

The VP and view to the SSE

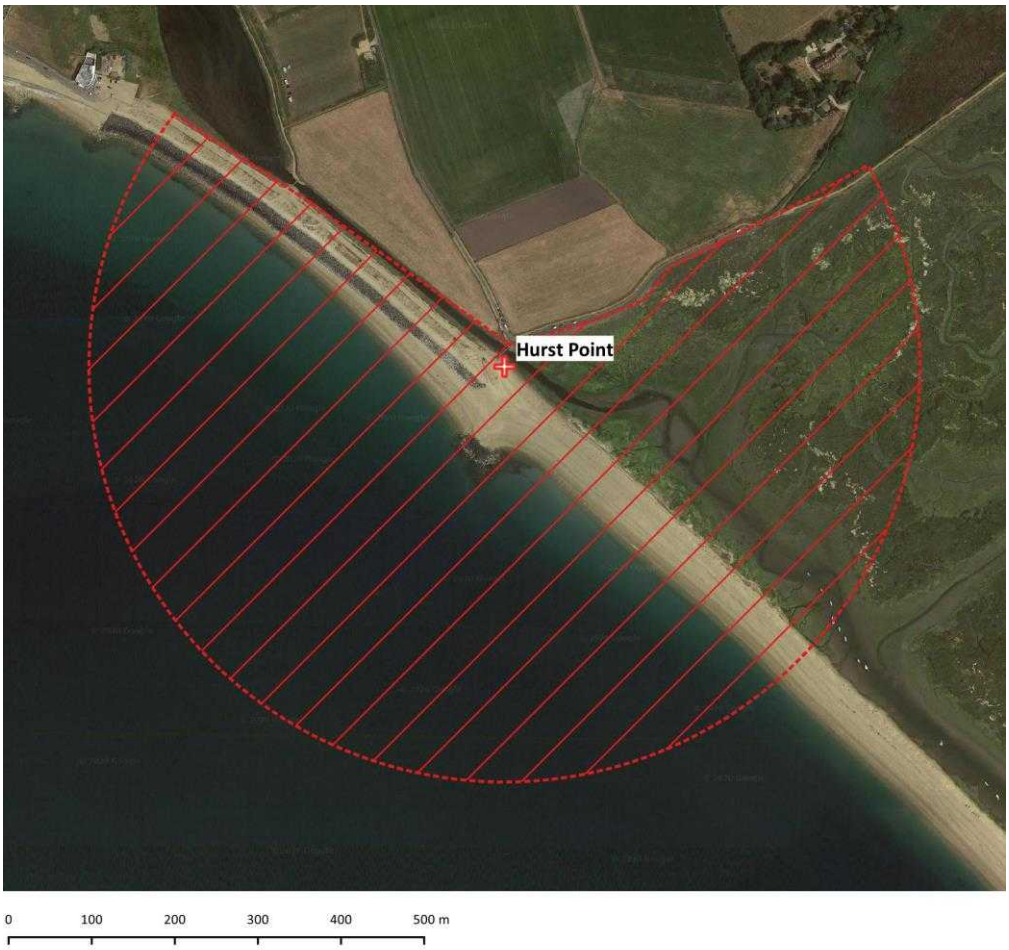
Looking ESE from VP (Brent Geese pictured)

Looking SW from VP

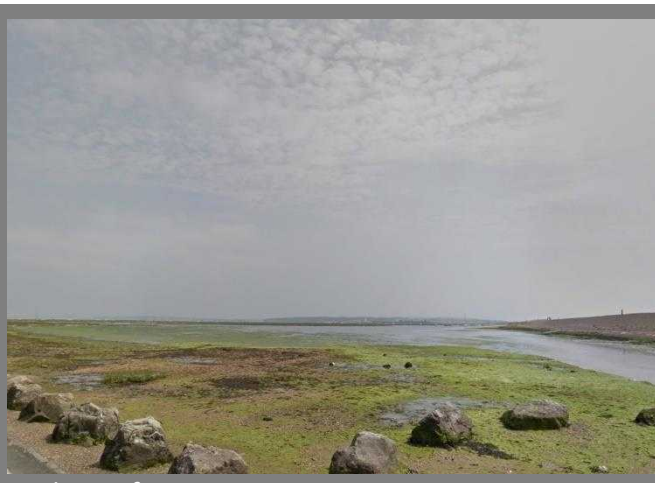
Interpretation sign, situated near the VP

Hurst Point	
Site overview	Hurst Spit is a shingle bank at the easternmost point of Christchurch Bay. VP is on inland side of beach, overlooking extensive mud flats, saltmarsh / Spartina swards between Saltgrass Lane and the shingle beach. Farmland (coastal & floodplain grazing marsh) lies to the north of Saltgrass Lane.
Grid Reference for vantage point	SZ 29990 90785
Key habitats present	Mudflats, saltmarsh, *Spartina* swards, grazing marsh
Number of valid visits	8
Total dogs per hour	9.7
Total Walkers & Dogwalkers per hour	37.4
Diary events per hour	28.4
Flight responses per hour (all species)	2.4
Top 5 bird species (max counts)	Brent Goose (520), Teal (850), Dunlin (240), Black-headed Gull (160), Mute Swan (37)
% Waders foraging	93%
% Wildfowl foraging	38%
Number of species recorded during bird counts	28
Number of visits with some rain (%)	25%
Notes on bird use	Counts dominated by wildfowl, predominantly Brent Geese, Teal and Mute Swan which were recorded foraging / loafing, together with large numbers of waders, namely Dunlin and Turnstone.
Notes on access	Saltgrass Lane and New Lane are tarmac roads. A good quality raised path runs north-east from half way along Saltgrass Lane and a good quality gravel/shingle path runs north-west along the inland side of the shingle beach. The top of the beach is also easily walked to north-west and south-east of the VP. People occasionally walk south-east on the upper edge of the intertidal zone (i.e. below the beach), often then causing disturbance. No access restrictions as such, but signage asks visitors to keep to paths and not allow their dogs to chase wildlife.

Access infrastructure	Free parking along Saltgrass Lane and the south end of New Lane. Pay & Display in Keyhaven, about 0.7km from VP. Council interpretation board including bird information.
Survey notes	Sturt Pond, to the north-west, is largely invisible from the VP.



Coastal management interpretation



Looking E from VP

Lepe	
Site overview	Linear east-west stretch of coast with intertidal area comprising much stone and seaweed. Inland there is an area of reedbed adjacent to the stream known as 'Dark Water' together with coastal and floodplain grazing marsh.
Grid Reference for vantage point	SZ 45265 98525
Key habitats present	Sand and gravel foreshore
Number of valid visits	12
Total dogs per hour	2.9
Total Walkers & Dogwalkers per hour	31.4
Diary events per hour	17.1
Flight responses per hour (all species)	5.4
Top 5 bird species (max counts)	Brent Goose (390), Oystercatcher (110), Turnstone (78), Black-headed Gull (120), Dunlin (150)
% Waders foraging	93%
% Wildfowl foraging	49%
Number of species recorded during bird counts	19
Number of visits with some rain (%)	17%
Notes on bird use	Site used predominantly for foraging, in particular Oystercatcher, Turnstone and Dunlin together with large numbers of Brent Geese.
Notes on access	Good (surfaced) path west from car park at Stone Point between road and beach, continuing west of VP. No evident access restrictions and no signage relevant to birds / disturbance.
Access infrastructure	Large shingle car park immediately adjacent to the beach at Stone Point (charges apply). No free parking in vicinity. There is also a café / visitor centre at Stone Point.
Survey notes	Good visibility in both directions, but upper shore beyond Stone Point (c.400m east of VP) and to the west (beyond building on shore c. 200m west of the VP) is not visible from VP. Many visitors walk across car park to café / visitor centre – these movements were typically not recorded as unlikely to cause disturbance and would have compromised recording of more significant disturbance events within intertidal zone. On

	one occasion, when few people were about and birds were gathering near to car park, some disturbance responses were however recorded. In addition, the large numbers of people on occasions meant some disturbance events may have been missed.

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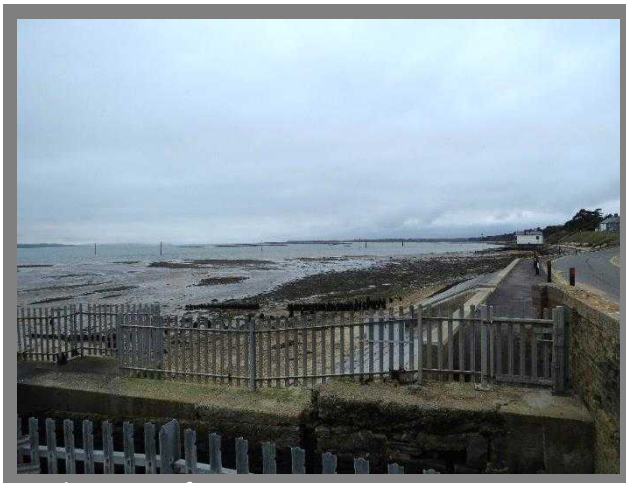
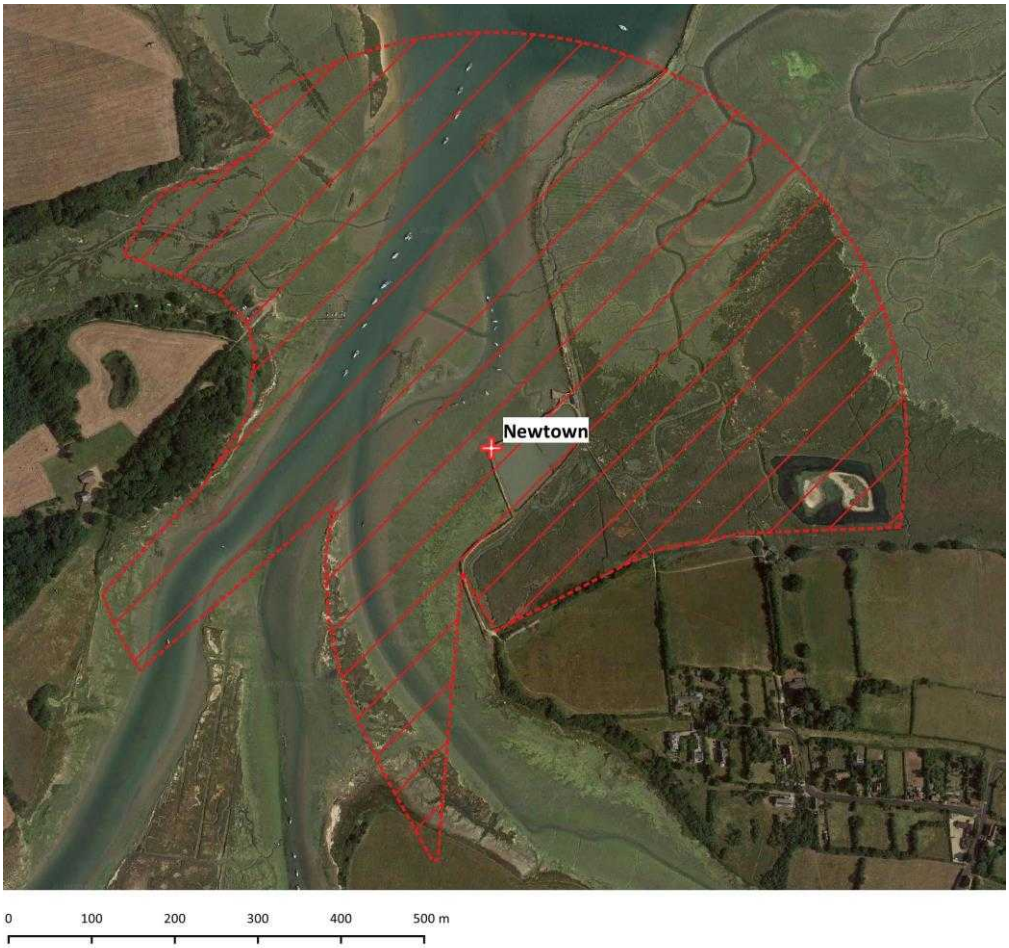
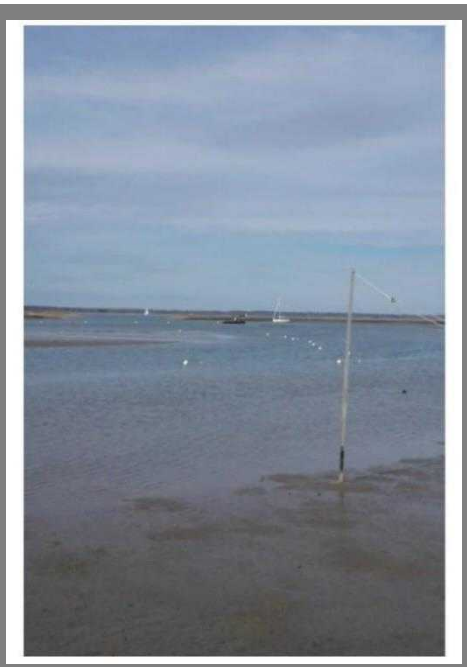


Looking west from VP

Looking SE from VP

Newtown	
Site overview	Along eastern banks of Newtown River, within the Newtown Harbour National Nature Reserve.
Grid Reference for vantage point	SZ 41795 91082
Key habitats present	Mudflat, saline lagoon, saltmarsh
Number of valid visits	14
Total dogs per hour	1.1
Total Walkers & Dogwalkers per hour	5.9
Diary events per hour	4.7
Flight responses per hour (all species)	1.8
Top 5 bird species (max counts)	Dunlin (750), Brent Goose (690), Golden Plover (350), Oystercatcher (28), Shelduck (29)
% Waders foraging	85%
% Wildfowl foraging	65%
Number of species recorded during bird counts	30
Number of visits with some rain (%)	21%
Notes on bird use	Area used for foraging / loafing waders (predominantly Dunlin, with lower numbers Golden Plover and Oystercatcher) and wildfowl (mainly Brent Geese). Up to five Spoonbill were seen during the visits and several sightings of a White-tailed Eagle from the re-introduction project.
Notes on access	Network of paths (map with walks provided in NT car park), can be muddy in places.
Access infrastructure	NT car-park and small car-park in Newtown village (charges apply).
Survey notes	Roosting Golden Plover often present (at any state of tide) NE of survey point, often obscured or difficult to see.





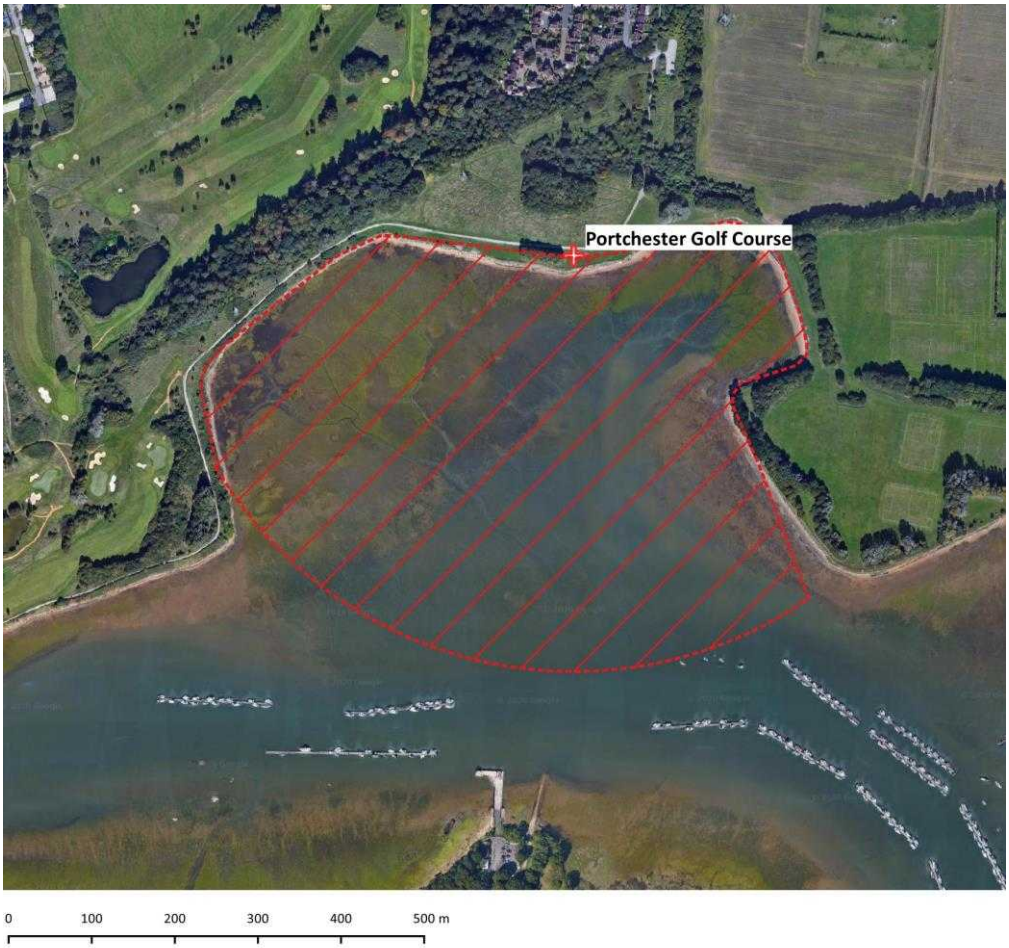
Looking north from VP

Looking NE from VP

Oyster Beds, Hayling	
Site overview	Old reclaimed oyster beds enclosed by rocky bunds, with coastal path on landward side.
Grid Reference for vantage point	SU 71512 03205
Key habitats present	Mudflats, saltmarsh, saline lagoons
Number of valid visits	8
Total dogs per hour	12.6
Total Walkers & Dogwalkers per hour	22
Diary events per hour	19.6
Flight responses per hour (all species)	0.9
Top 5 bird species (max counts)	Dunlin (2000), Mediterranean Gull (400), Black-headed Gull (200), Oystercatcher (250) and Brent Goose (200).
% Waders foraging	43%
% Wildfowl foraging	86%
Number of species recorded during bird counts	25
Number of visits with some rain (%)	13%
Notes on bird use	Counts dominated by roosting waders, in particularly Dunlin and Oystercatcher. Also supports large roosts of Black-headed Gull and Mediterranean Gull. Roost site use dependent on tide height, with birds pushed to inner banks on higher tides.
Notes on access	Access is unrestricted; however, most people stay on footpath, including the dead-end path that extends west from the VP along the south side of the lagoon. Paths are mainly firm along the sea wall, but can be muddy in places.
Access infrastructure	Small free car park for c. 15 cars. Signage comprises RSPB interpretation boards.
Survey notes	VP at the bend of the footpath adjacent to the lagoon with all birds counted in lagoon and on the spit and outer bund as viewed from the VP. Location of VP meant that some surveys were looking directly into sun.

View north from VP showing the footpath alongside the lagoon.

Portchester	
Site overview	Cams Bay - an intertidal bay at the north-west extremity of Portsmouth Harbour.
Grid Reference for vantage point	SU 59440 05351
Key habitats present	Mudflats
Number of valid visits	4
Total dogs per hour	18
Total Walkers & Dogwalkers per hour	14.5
Diary events per hour	11.1
Flight responses per hour (all species)	1.5
Top 5 bird species (max counts)	Wigeon (113), Black-headed Gull (80), Redshank (36), Teal (24) and Common Gull (12).
% Waders foraging	67%
% Wildfowl foraging	33%
Number of species recorded during bird counts	14
Number of visits with some rain (%)	50%
Notes on bird use	Counts recorded generally quite low numbers of foraging waders (Redshank, Curlew, Oystercatcher) and loafing wildfowl (predominantly Wigeon) together with gulls.
Notes on access	Unrestricted access, though most of the shoreline is not easily accessible except for a beach in the north-east. Firm path above MHWM, otherwise grass paths (variably wet).
Access infrastructure	Small free car park for c. 20 cars at the end of Shearwater Avenue. No signage noted in the immediate vicinity. Large area of open grass / playing fields.
Survey notes	VP in the shelter of trees with good views out to the creek.



Looking at the beach in the north-east corner of Cams Bay.

Ryde	
Site overview	Linear north-west – south-east stretch of coast with intertidal area comprising sandflats (Ryde East Sands). Inland from the VP is the eastern edge of Ryde, with woodland associated with St Cecilia's Abbey and Appley Park immediately to the south. Maritime cliff and slope habitats found further to the south-east.
Grid Reference for vantage point	SZ 60432 92557
Key habitats present	Sandflats
Number of valid visits	14
Total dogs per hour	44.5
Total Walkers & Dogwalkers per hour	70.6
Diary events per hour	47.2
Flight responses per hour (all species)	1.5
Top 5 bird species (max counts)	Black-headed Gull (365), Mediterranean Gull (135), Oystercatcher (38), Common Gull (45)
% Waders foraging	94%
% Wildfowl foraging	32%
Number of species recorded during bird counts	13
Number of visits with some rain (%)	14%
Notes on bird use	Sandflats used predominantly by gulls, primarily Black-headed Gull. Foraging waders were also recorded in lower numbers, including Oystercatcher and Sanderling.
Notes on access	Tarmac paths above and below sea wall for length of survey area.
Access infrastructure	Parking extends along the Esplanade from c.450m W of VP to c.100m E. Charges apply from 10:00 to 18:00. No evident access restrictions and no signage relevant to birds / disturbance.
Survey notes	Feeding birds spread widely and in low numbers, whilst high number of people using the area meant it was difficult to simultaneously view all birds and people. Ranger interactions likely to be under-recorded (this was confirmed through discussions with ranger after one survey). People in the east of

	the survey area also did not encounter ranger when they were positioned near VP. Did not record all people using path along seaward side of sea wall due to high volume and unlikely to result in disturbance - instead prioritised recorded interactions between birds and people out on sandflats.

VP at Ryde

Looking ESE from VP

Esplanade to W of VP

Looking west along shore from VP

B. FIELD SURVEY DATES & CONDITIONS

Site Name	Survey Dates	Tide	Rain	Wind Direction	Wind	Temp (°C)	Weather - notes
Bunny Meadows	10-Nov-2018	H	None	S	Moderate	12	
	11-Nov-2018	H	Heavy shower	SW	Moderate	12	
	11-Dec-2018	R	None	SE	Moderate	10	
	12-Dec-2018	R	None	SE	Moderate	9	
	24-Jan-2019	R	None	NW	Light	2	Cloudy and cool with moderate visibility
	25-Jan-2019	R	None	NW	Moderate	9	Cloudy, mild with good visibility
	30-Jan-2019	L	None	NW	Light	4	
	31-Jan-2019	L	None	ESE	Moderate	3	Cold wind
	6-Feb-2019	L/R	None	SW	Light	8	Mist, with moderate visibility
	7-Feb-2019	R	None	W	High	8	
	11-Feb-2019	R	None	NNW	Moderate	9	
	12-Feb-2019	R	None	SW	Light	9	
East Head	3-Dec-2018	H	Light Showers	SW	High	13	Windy with showers
	4-Dec-2018	H	None	W	Light	7	Bright and sunny
	8-Dec-2018	R	None	W	High	10	Bright and sunny
	9-Dec-2018	R	None	W	High	10	Bright and sunny
	20-Dec-2018	H	None	SW	Moderate	9	Bright and breezy
	21-Dec-2018	H	None	SW	High	11	Cloudy and windy
	9-Jan-2019	R	None	NW	Moderate	3	Bright and cold
	10-Jan-2019	R	None	N	Light	3	Cloudy and cold
	26-Jan-2019	R	Light Showers	SW	Moderate	10	Cloudy and breezy
	27-Jan-2019	R	None	NW	High	7	Sunny and windy
	7-Feb-2019	R	None	W	High	8	Bright and windy
	8-Feb-2019	R	Light Showers	S	High	11	Cloudy and windy
	18-Mar-2019	H	None	W	Moderate	7	Bright and cool
	19-Mar-2019	H	None	N/A	None	11	Sunny and calm
Emsworth	12-Dec-2018	L	None	S	Moderate	8	Cloudy, windy, cold
	13-Dec-2018	L	None	E	High	6	Sunny intervals, windy, cold
	18-Dec-2018	F	Light	S	High	9	Overcast and windy
	19-Dec-2018	F	Heavy shower	S	Light	9	Sunny, light wind, showers
	7-Jan-2019	L	None	W	Light	9	Overcast
	8-Jan-2019	L	None	NW	Light	7	Partly cloudy, calm

	23-Jan-2019	R	Light	NW	Light	2	Overcast and cold
	24-Jan-2019	R	None	N/A	None	1	Cloudy, still, cold
	5-Feb-2019	R	None	S	Light	7	Overcast and cold
	6-Feb-2019	R	None	N/A	None	8	Foggy
	23-Feb-2019	H	None	SE	Light	14	Bright and sunny
	24-Feb-2019	H	None	SE	Light	15	Bright, sunny and calm
	9-Mar-2019	H	None	W	High	14	Mostly cloudy, windy
	10-Mar-2019	H	Heavy shower	W	High	11	Mostly cloudy, windy
Hill Head	1-Dec-2018	R	Light	SW	Moderate	12	
	2-Dec-2018	L	None	SW	Moderate	12	Intermittent drizzle, breezy.
	11-Dec-2018	L/R	None	N	Light	7	Dry, fine with light SE wind.
	12-Dec-2018	R	None	SE	Moderate	9	
	24-Jan-2019	H	None	Variable	Light	5	Visibility moderate, cool & cloudy
	25-Jan-2019	H	None	NW	Moderate	11	Cloudy, good visibility
	11-Feb-2019	L	None	NW	Light	5	
	12-Feb-2019	L	None	SW	Light	7	Good visibility
Hurst point	10-Nov-2018	R	Heavy showers	SW	Moderate	11	Heavy showers, with gusty winds.
	11-Nov-2018	R/H	Heavy showers	WSW	High	11	Heavy showers, with gusty winds.
	7-Jan-2019	H/F	None	WSW	Moderate	9	Good visibility
	8-Jan-2019	H	None	NNW	Moderate	9	Good visibility
	17-Jan-2019	L	None	NNW	Moderate	5	No description
	18-Jan-2019	L	None	S	High	6	Breezy
	14-Feb-2019	F	None	E	Light	2	Visibility moderate
	15-Feb-2019	F	None	NE	Light	4	
LEPE	1-Dec-2018	L	Heavy	SSW	High	12	Thick drizzle impeded visibility / count
	2-Dec-2018	F	None	SW	High	12	
	7-Jan-2019	R	None	WSW	Light	9	Good visibility
	8-Jan-2019	H	None	NNW	Moderate	7	Good visibility
	17-Jan-2019	H	None	N	Moderate	4	Visibility excellent
	18-Jan-2019	H	None	S	High	6	Breezy
	30-Jan-2019	H	None	NW	Light	-1	Fine but cold
	31-Jan-2019	H	None	SE	Moderate	2	Very cold in the breeze, good visibility
	14-Feb-2019	R	None	SE	Light	10	Good visibility
	15-Feb-2019	R	None	S	Light	11	
	21-Feb-2019	R	None	WSW	Moderate	9	

	22-Feb-2019	R	None	E	Light	8	Mist - visibility c. 1km but impaired at c. 150m
Newtown	7-Nov-2019	L	None	W	Moderate	12	Good visibility. Heavy shower between 13:40-13:55.
	8-Nov-2019	L	None	NNE	Moderate	8	Cloudy with cool breeze
	7-Dec-2019	R	None	WSW	Moderate	10	Intermittent sunshine, breezy with good visibility.
	8-Dec-2019	L	None	W	High	10	Strong breeze, dry with good visibility
	18-Dec-2019	L/R	None	S	Moderate	9	Fine, good visibility.
	19-Dec-2019	R	None	SSE	Moderate	11	Cloudy, mild with good visibility
	7-Jan-2020	L	Light	SSW	Moderate	10	Intermittent drizzle. Visibility moderate.
	8-Jan-2020	L	None	W	Light	11	Dull. Visibility moderate.
	20-Jan-2020	L	None	W	Light	6	Fine and calm. Good visibility.
	21-Jan-2020	L	None	NE	Light	6	Fine & calm. Good visibility.
	1-Feb-2020	L	None	WSW	Moderate	10	Bright & breezy. Good visibility.
	2-Feb-2020	R	None	WSW	Moderate	11	Broken cloud, breezy & mild.
	5-Feb-2020	L	None	SW	Light	9	Fine, very light breeze & good visibility.
	6-Feb-2020	L	None	E	Moderate	8	Intermittent sun, cool breeze. Good visibility.
Oyster Beds	21-Feb-2019	H	None	SW	Light	8	Cloudy and calm
	22-Feb-2019	H	None	N/A	None	6	Misty and calm
	25-Feb-2019	R	None	SE	Light	9	Sunny, light wind
	26-Feb-2019	R	None	E	Light	9	Sunny, light wind
	5-Mar-2019	H	None	SW	Moderate	9	Cloudy and breezy
	6-Mar-2019	H	None	S	High	7	Cloudy and windy
	11-Mar-2019	H	None	W	High	2	Bright and windy
	12-Mar-2019	H	Light Shower	W	High	1	Cloudy and windy
	20-Mar-2019	R	None	N/A	None	7	Cloudy and still
	21-Mar-2019	R	None	N/A	None	8	Cloudy and still
	25-Mar-2019	H	None	NW	Moderate	14	Bright and breezy
	26-Mar-2019	H	None	NW	Moderate	15	Bright and breezy
Portchester	22-Nov-2018	F	None	NE	Light	2	No description
	23-Nov-2018	F	None	NE	Light	6	No description

	5-Mar-2019	H/F?	Light	SW	Moderate	11	Cloudy, breeze, increasing rain
	6-Mar-2019	H/F?	Light	S	High	11	Cloudy, windy and rainy
Ryde	7-Nov-2019	H	None	WNW	Light	5	Good visibility. Broken cloud cover.
	8-Nov-2019	H	None	N	Moderate	5	Fine, cool, with good visibility.
	7-Dec-2019	H/F	None	W	Light	9	Cloudy, mild with good visibility
	8-Dec-2019	H/F	None	W	High	11	Intermittent sunshine, breezy with good visibility.
	18-Dec-2019	R/H	None	S	Moderate	10	Good visibility. Cloud cover 7/8
	19-Dec-2019	R	None	SSE	High	12	Cloudy, light intermittent rain & breezy. Good visibility.
	7-Jan-2020	H	None	SSW	Moderate	10	Dry, mild. Breeze feeling light in shelter.
	8-Jan-2020	H	None	W	Light	11	Dry, cloudy, light breeze.
	20-Jan-2020	H	None	N	Light	3	Fine & calm. Good visibility.
	21-Jan-2020	H	None	NE	Light	3	Dry & fine, very light wind. Good visibility.
	1-Feb-2020	L/R	None	WSW	Moderate	10	Bright & breezy. Good visibility.
	2-Feb-2020	R	None	WSW	High	12	Cloudy, breezy & mild. Good visibility.
	5-Feb-2020	F	None	E	Light	7	Bright (broken cloud), very light breeze. Good visibility.
	6-Feb-2020	H/F	None	NE	Moderate	9	Intermittent sun, light breeze. Good visibility.

C. SUMMARY OF DIARY DATA BY ACTIVITY AND LOCATION

Activity Broad Group	Activity	Bunny Meadows	East Head	Emsworth	Hill Head	Hurst Point	Lepe	Newtown	Oyster Beds	Portchester	Ryde	Total
Airborne	Airborne				2 (0)	2 (1)						4 (0)
	Drone							2 (2)				2 (0)
	Microlite							1 (1)				1 (0)
Natural Event	Predator - aerial or terrestrial								3 (1)			3 (0)
Terrestrial	Beach combing				1 (0)							1 (0)
	Bird watcher	2 (1)	2 (0)	2 (0)	8 (2)	1 (0)	6 (2)	11 (9)	28 (10)			56 (2)
	Cycling	16 (4)	4 (1)	7 (1)	1 (0)	48 (12)	52 (14)		18 (6)	3 (3)	1 (0)	139 (4)
	Dog-walking	101 (26)	540 (74)	528 (52)	171 (35)	106 (27)	47 (13)	21 (18)	134 (48)	71 (80)	840 (73)	1491 (46)
	Fishing	1 (0)							4 (1)			5 (0)
	Horse riding					2 (1)			3 (1)			5 (0)
	Jogging	24 (6)	9 (1)	27 (3)	16 (3)	15 (4)	2 (1)		9 (3)	3 (3)	10 (1)	79 (2)
	Metal detecting			1 (0)							2 (0)	2 (0)
	Motor vehicle		4 (1)	2 (0)		4 (1)	3 (1)					7 (0)
	Other	1 (0)										1 (0)
	Walking	235 (61)	166 (23)	452 (44)	281 (58)	216 (54)	229 (63)	52 (45)	74 (27)	12 (13)	299 (26)	1398 (43)
Water	Canoe on water					1 (0)	4 (1)	1 (1)				6 (0)
	Kite-surfer on water				2 (0)		9 (2)				1 (0)	12 (0)
	Motor boat	1 (0)		1 (0)			7 (2)	24 (21)				32 (1)
	Other						1 (0)				1 (0)	2 (0)
	Paddle boarders					1 (0)						1 (0)
	Person accessing boat or water			3 (0)				1 (1)				1 (0)

	Person working on stationary boat						1 (0)	1 (1)				2 (0)
	Rowing boat	1 (0)						2 (2)				3 (0)
	Small sailing boat	3 (1)					1 (0)					4 (0)
	Windsurfer on water		1 (0)	2 (0)	3 (1)	2 (1)	3 (1)		4 (1)		2 (0)	14 (0)
Total		385 (100)	726 (100)	1025 (100)	485 (100)	398 (100)	365 (100)	116 (100)	277 (100)	89 (100)	1156 (100)	3271 (100)

D. SUMMARY OF VISITOR NUMBERS BY ACTIVITY

Activity Broad Group	Activity	Bunny Meadows	East Head	Emsworth	Hill Head	Hurst Point	Lepe	Newtown	Oyster Beds	Portchester	Ryde	Total
Airborne	Airborne				1 (0)	2 (0)						3 (0)
	Drone							5 (3)				5 (0)
	Microlite							1 (1)				1 (0)
Natural Event	Predator - aerial or terrestrial											
Terrestrial	Beach combing				1 (0)							2 (0)
	Bird watcher	1 (0)	4 (0)	3 (0)	11 (1)	2 (0)	14 (2)	16 (9)	44 (11)			88 (1)
	Cycling	20 (3)	5 (0)	7 (0)	1 (0)	68 (11)	77 (10)		22 (6)	3 (2)	1 (0)	208 (2)
	Fishing	1 (0)							8 (2)			9 (0)
	Horse riding					3 (0)			3 (1)			6 (0)
	Jogging	26 (4)	9 (1)	30 (1)	16 (2)	16 (3)	2 (0)		11 (3)	3 (2)	10 (1)	129 (1)
	Metal detecting			1 (0)							2 (0)	2 (0)
	Motor vehicle		1 (0)	2 (0)		4 (1)	3 (0)					14 (0)
	Other	1 (0)										1 (0)
	Walkers and Dog-walkers combined	583 (90)	1471 (99)	3198 (98)	825 (96)	523 (83)	659 (83)	144 (77)	308 (77)	116 (95)	1730 (99)	9589 (94)
Water	Canoe on water			5 (0)		5 (1)	15 (2)	2 (1)				27 (0)
	Kite-surfer on water				3 (0)		9 (1)				1 (0)	13 (0)
	Motor boat	1 (0)		2 (0)			7 (1)	14 (7)				22 (0)
	Other			1 (0)			2 (0)				1 (0)	4 (0)
	Paddle boarders			10 (0)		3 (0)						15 (0)
	Person accessing boat or water			4 (0)				1 (1)				2 (0)
	Person working on stationary boat						1 (0)	3 (2)				4 (0)
	Rowing boat	1 (0)						2 (1)				8 (0)

	Small sailing boat	15 (2)					1 (0)					16 (0)
	Windsurfer on water		1 (0)	10 (0)	3 (0)	2 (0)	5 (1)		4 (1)		5 (0)	29 (0)
Total		649 (100)	1491 (100)	3273 (100)	861 (100)	628 (100)	795 (100)	188 (100)	400 (100)	122 (100)	1750 (100)	10197 (100)

E. BIRD COUNT DATA

Row Labels	Species Name	Bunny Meadows	East Head	Emsworth	Hill Head	Hurst Point	Lepe	Newtown	Oyster Beds	Portchester	Ryde	Grand Total
Gulls & Terns	Black-headed Gull	392	170	700	1646	704	674	214	3240	227	2654	10621
	Common Gull	2		17	31	7	57	2	22	42	255	435
	Great Black-backed Gull		1		2		6	1	1		15	26
	Great Skua								1			1
	Herring Gull	15	5	13	170	19	91	7	58		230	608
	Lesser Black-backed Gull				1							1
	Mediterranean Gull		2	14	5		10	10	3710		279	4030
	Sandwich Tern	1	17	1								19
	Yellow-legged Gull				3							3
Other Species	Cormorant	9	4	3	4	9	19	3				51
	Goldcrest									1		1
	Great Crested Grebe		30		12		6	9		3	6	66
	Grey Heron	16										16
	Kingfisher		1									1
	Little Egret	3	5	1		6	4	28	5	3	1	56
	Little Grebe	16						77	58	11		162
	Shag					1						1
Wader	Avocet		3									3
	Bar-tailed Godwit							4	2			6
	Black-tailed Godwit	305	15	777		55						1152
	Curlew	58	88	21	1	23	78	193	35	11	3	511
	Dunlin	2544	1749	183	40	999	334	5138	7830		1	18818
	Golden Plover		70					1080				1150

Row Labels	Species Name	Bunny Meadows	East Head	Emsworth	Hill Head	Hurst Point	Lepe	Newtown	Oyster Beds	Portchester	Ryde	Grand Total
	Greenshank	7	9	6		6		2	2			32
	Grey Plover	233	166	28	1	57	36	212	507			1240
	Knot	65	220					351	71			707
	Lapwing		493			124						617
	Oystercatcher	16	358	170	423	91	929	455	2940	10	257	5649
	Redshank	227	172	26	59	23	14	152	798	88		1559
	Ringed Plover	80	41		143	6	113	278	70			731
	Ruff					1						1
	Sanderling				85						171	256
	Snipe	2	1									3
	Spoonbill							17				17
	Spotted Redshank			15								15
	Turnstone	23	34	6	247	299	710	52	409			1780
Wildfowl	Brent Goose	604	2766	3976	225	2052	1790	3025	1005	38	220	15701
	Canada Goose	23				17	9					49
	Gadwall				171	8		3				182
	Goldeneye							4				4
	Goosander		2		4		2					8
	Mallard	20	2			95		19	8	2		146
	Mute Swan	1		27	7	321	4	35	6		7	408
	Pintail			132		30			19			181
	Red-breasted Merganser		58		2	1		32	35	11		139
	Red-throated Diver					1						1
	Shelduck	168	44	12	1	7		352	68			652
	Shoveler								1			1

Row Labels	Species Name	Bunny Meadows	East Head	Emsworth	Hill Head	Hurst Point	Lepe	Newtown	Oyster Beds	Portchester	Ryde	Grand Total
	Teal	812	45	394		1872		101		55		3279
	Wigeon	1610		1701	28	263		194		329		4125
Grand Total		**7252**	**6571**	**8223**	**3311**	**7097**	**4886**	**12050**	**20901**	**831**	**4099**	**75221**

waterman

UK and Ireland Office Locations