Report

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Advice on how to monitor the effectiveness of the Solent Recreation Mitigation Strategy

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This document is being published by the Solent Recreation Mitigation Partnership with all cost figures redacted in order to avoid compromising the tendering process for the survey work.

Footprint Ecology Reference: 288
Date: 19th January 2016
Version: Final
Recommended Citation: Liley, D., Stillman, R., Austin, G., & Panter, C. (2015). Advice on how to monitor the effectiveness of the Solent Recreation Mitigation Strategy. Unpublished report by Footprint Ecology, Bournemouth University and the British Trust for Ornithology for the Solent Recreation Mitigation Partnership.

Summary

This report sets out details of advice on future monitoring on the Solent relating to the Solent Recreation Mitigation Strategy.

New housing in the Solent area will result in more people living close to the coast and recreation pressure along the coast is predicted to increase. The coastline includes three European protected sites which are important for a range of interest features, including wintering birds. Increased recreation has the potential to cause disturbance to the wintering bird interest and, in order to avoid and mitigate for any adverse effect on the European sites, local authorities have established a mitigation strategy. This document considers the monitoring needed to accompany that strategy.

There are six main components to the proposed monitoring:

- Counts of people
- Targeted pieces of work to test the effectiveness of mitigation
- Visitor interviews
- Bird numbers and distribution
- Housing
- Mitigation Delivery

The targeted pieces of work to test the effectiveness of mitigation would be stand-alone pieces of work and have a fixed end-point. The other components would run indefinitely and provide comparative data that would build over time.

Details of the approaches, costs, implementation and reporting/analysis for each component are considered in detail within the report.

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Acknowledgements

This report was commissioned by the Gosport Borough Council on behalf of the Solent Recreation Mitigation Partnership. Our thanks to Stuart Roberts and Chris Payne for overseeing the work and to the numerous members of the partnership who commented or provided background information.

Costs of automated visitor counters were kindly provided by Kenzie MacKenzie at A & P Chambers Ltd.

Our thanks also to Fenella Lewin for proof-reading.

1. Context

Overview

1.1 New housing around the Solent will result in more people living close to the coast and be associated with increased recreation pressure to that coast, including the European protected sites which are important for a range of interest features, including wintering birds. Increased recreation has the potential to cause disturbance to the wintering bird interest and, in order to avoid and mitigate for any adverse effect on the European sites, local authorities have established a mitigation strategy. This document considers the monitoring needed to accompany the strategy and recommends the design of that monitoring.

Access and nature conservation

1.2 A critical issue for UK nature conservation is how to accommodate increasing pressure for new homes and other development without compromising the integrity of protected sites. There is now a strong body of evidence showing how increasing levels of development, even when well outside the boundary of protected sites, can have negative impacts on the sites. The issues are particularly acute in southern England, where work on heathlands (Mallord 2005; Underhill-Day 2005; Liley & Clarke 2006; Clarke, Sharp & Liley 2008; Sharp *et al.* 2008) and coastal sites (Saunders *et al.* 2000; Randall 2004; Liley & Sutherland 2007; Clarke, Sharp & Liley 2008; Liley 2008; Stillman *et al.* 2009) provides compelling indications of the links between housing, development and nature conservation impacts.

1.3 The issues are not straight forward. In the past access and nature conservation have typically been viewed as opposing goals (Adams 1996; Bathe 2007) to the extent that nature reserves often restricted visitor numbers and access (e.g. through permits, fencing and restrictive routes). It is now increasingly recognised that access to the countryside is important to the long term success of nature conservation projects and has wider benefits such as increasing people's awareness of the natural world and health benefits (English Nature 2002; Alessa, Bennett & Kliskey 2003; Morris 2003; Bird 2004; Pretty *et al.* 2005). There is therefore a difficult balancing act and the potential for conflict where high human populations occur alongside areas of conservation importance, particularly where there are existing rights of access to those sites.

The Solent and previous studies

1.4 This report focuses on the Solent shoreline between Hurst Castle and Chichester Harbour, including the north shoreline of the Isle of Wight, a length of shoreline totalling some 250km. The wintering bird interest is summarised by Stillman *et al.* (2009) and includes three Special Protection Areas (SPAs): the Solent & Southampton

Water SPA[1], Chichester and Langstone Harbours SPA[2] and Portsmouth Harbour SPA[3] (Map 1).

1.5 The shoreline is heavily populated and includes urban centres such as Southampton and Portsmouth. New housing levels may be in the region of 82,000 dwellings in the period through to 2026. Much of this development will be concentrated in the narrow strip alongside the coast.

1.6 It is this level of growth and the existing high local population that has prompted concern regarding likely significant effects to the European sites. A series of studies have considered visitor levels and the impacts of increased recreation to the wintering bird interest and were designed to ensure that the in-combination effects of development across a wide area could be considered. The studies included an initial desk-based study (Stillman *et al.* 2009), followed by on-site visitor fieldwork (Fearnley, Clarke & Liley 2010); ornithological fieldwork (Liley, Stillman & Fearnley 2010); a postal household survey (Fearnley, Clarke & Liley 2011) and detailed modelling drawing on the other reports (Stillman *et al.* 2012).

1.7 The modelling work has indicated that there are impacts from disturbance, at least for Southampton Water. Disturbance from current housing was predicted to reduce the survival of Dunlin, Ringed Plover, Oystercatcher and Curlew that are passage or wintering features of the SPAs. Increased visitor numbers as a result of future housing was predicted to further reduce the survival of Dunlin and Ringed Plover (see Stillman *et al.* 2012 for full details).

1.8 The on-site visitor fieldwork (Fearnley, Clarke & Liley 2010), ornithological fieldwork (Liley, Stillman & Fearnley 2010) and the postal household survey (Fearnley, Clarke & Liley 2011) involved a series of sections along the shoreline. These sections reflected discrete lengths of coast and were derived primarily from Wetland Bird Survey (WeBS) count sectors[4]. The sections are shown in relation to key bird sites in Map 2 and Map 3 provides additional context, showing the main car-parks, path networks and stretches of shoreline with public access. The visitor and bird fieldwork took place at a stratified sample of sections and the household survey asked for visit information for all sections, allowing for predictions to be made of access levels currently and in the future (Map 4).

1.9 Where the nature conservation interest is designated as a European Protected site (Special Area of Conservation (SAC), SPA) or as a Ramsar site (wetlands of international importance designated under the Ramsar Convention) there are particular implications.

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[1] For citation and conservation objectives see: http://publications.naturalengland.org.uk/publication/6567218288525312

[2] For citation and conservation objectives see http://publications.naturalengland.org.uk/publication/5789102905491456

[3] For citation and conservation objectives see http://publications.naturalengland.org.uk/publication/4857883850178560

[4] WeBS is a national volunteer-based scheme that monitors non-breeding waterbirds in the UK: http://www.bto.org/volunteer-surveys/webs. The principal aims of WeBS are to identify population sizes, determine trends in numbers and distribution, and identify important sites for waterbirds.

European sites are protected through the provisions of the Conservation of Natural Habitats and Species Regulations 2010 (SI no. 490), which transpose both the Habitats Directive (Council Directive 92/43/EEC) and the Wild Birds Directive (Council Directive 79/409/EEC) into UK law.

1.10 With respect to the impacts of access on relevant sites, Regulation 61 ensures that competent authorities can only agree to a plan/project which is likely to have a significant effect (alone or in-combination) after having determined that it will not adversely affect the integrity of any European site (subject to imperative reasons of over-riding public interest and consideration of alternative solutions). Impacts associated with recreational activities that can be linked to plans or projects should therefore be avoided through the correct application of Regulation 61 by competent authorities. Regulation 61 applies to all European sites and therefore covers both SACs and SPAs (listed Ramsar features are also protected as a matter of government policy). New development and strategic development plans must therefore address any impacts of increased recreation to European sites.

1.11 Also relevant is Article 6(2) of the Habitats Directive, which requires Member States to take appropriate steps to avoid, in the SACs and SPAs, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated. Article 6(2) states that "*member states shall take appropriate steps to avoid….. deterioration of natural habitats.... as well as disturbance of the species...";* the wording therefore puts a responsibility on the member state to address such issues where they arise.

1.12 Given the large volume of previous studies and the relative complexity of the modelling work used to explore the impact of future housing, Natural England commissioned a scientific peer review of the Solent Disturbance and Mitigation Project (ABP Marine Environmental Research Ltd. 2012). Following the review, Natural England wrote to the relevant local authorities and in the letter concluded "Our advice is that the likelihood of significant effect, in combination arising from new housing development around the Solent cannot be ruled out." It was then necessary that local authorities move to consider in detail the mitigation measures necessary. Following work developing the approach for a mitigation strategy (Liley & Tyldesley 2013), an interim mitigation strategy[5] setting out a package of mitigation measures was produced by the Solent local authorities in 2014. The interim package of mitigation measures includes:

- A team of wardens ('rangers') whose role will be to influence the behaviour of visitors
- Initiatives to encourage responsible dog ownership
- A project officer who will coordinate the work and develop the full strategy
- Contribution towards a pilot project (the Alver Valley) to test the effectiveness of providing alternative spaces for recreation

[5] https://www.portsmouth.gov.uk/ext/community-and-environment/environment/solent-recreation-mitigation-strategy.aspx

The need for monitoring

1.13 Monitoring is essential to ensure the successful delivery of the mitigation work, acting as an early warning system and providing the feedback to hone mitigation. Monitoring will be necessary to ensure approaches are working as anticipated and whether further refinements or adjustments are necessary. Monitoring will inform whether resources can be better allocated, and will pick up changes in access patterns (for example in response to changes in climate, new activities or in response to changes on the sites themselves). The monitoring is therefore aimed at ensuring mitigation effort is focused, responsive to changes in access and that money is well-spent and correctly allocated. Monitoring is therefore integral to the mitigation 'package'.

1.14 In addition monitoring is necessary for the relevant local authorities to demonstrate that, in times of austerity, measures have been effective and costs to developers have been proportionate.

1.15 There are monitoring strategies in place at various other European sites where strategic mitigation has been established (for example see Underhill-Day *et al.* 2008; Liley & Underhill-Day 2009; Fearnley & Liley 2014). On the Dorset Heaths and the Thames Basin Heaths regular car-park counts are undertaken, visitor survey data are collected and automated counters record footfall. Such schemes provide useful context and precedents for this report.

1.16 In line with these other monitoring strategies, our approach has been to devise a strategy that collects the information needed to target and hone mitigation and ensures mitigation will be effective. For example information on the distribution of birds, the distribution of visitors, and changes in both access and birds, are important to inform the implementation of mitigation. Knowledge of how visitor numbers are changing, where people are going and what they are doing alongside bird data will ensure mitigation can be tailored to the requirements and needs at that time. Over time it is possible that new forms of access, new issues or changes in the areas birds are using will become important and it is essential that mitigation is flexible to adapt to changing circumstances.

1.17 A component of the monitoring strategy is therefore simple data gathering, with that data building over time and picking up trends and changes in both birds and access. The different elements of the data (such as bird and access data), must be collected in a way that they can be combined as necessary in the future. For example it may be necessary to check whether declines in bird numbers in particular sections relate to changes in access or housing in those areas, allowing the mitigation to then be adjusted to resolve the issues.

1.18 As the mitigation is just starting, with the first rangers being employed over the winter 2015/16, an additional element of the strategy is to check how well particular interventions work and to identify whether any slight changes are needed in those interventions. The strategy therefore needs to contain some discrete, small scale elements to test effectiveness of the wardening and SANGs in particular. These studies

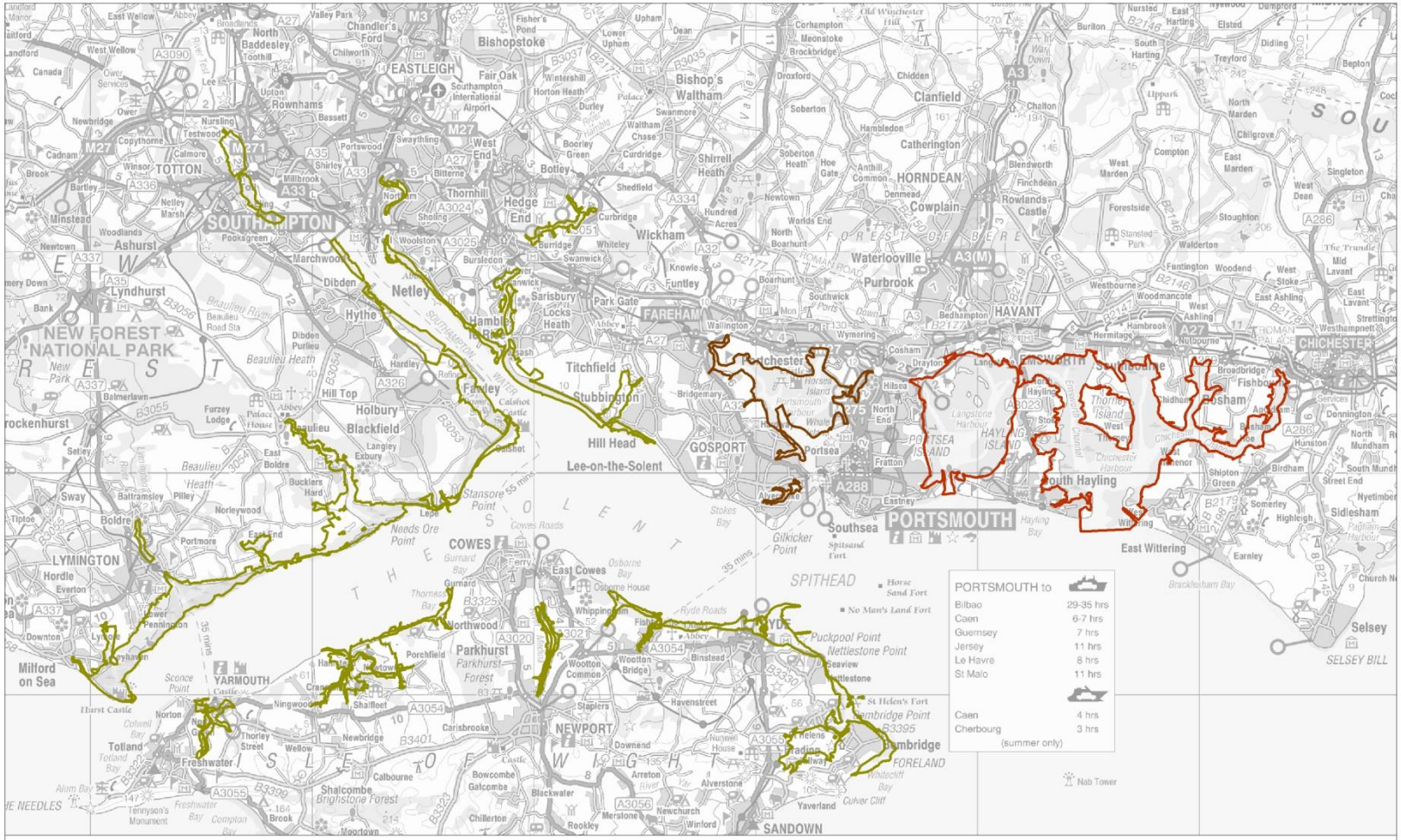
are not necessary to test whether the interventions work or not, as the interventions would not be being implemented if there was any doubt as to their likelihood of success. We can draw confidence in the success of the interventions such as wardening from published studies (e.g. Medeiros *et al.* 2007), and different measures have been carefully considered, compared using expert opinion and ranked prior to selection (Liley & Tyldesley 2013; Ross *et al.* 2014). More relevant and important is work to check that the mitigation is working enough to reduce the disturbance associated with the changes in access linked to housing. Specific studies could also inform the need for changing the design, scale and locations that the mitigation is targeted.

1.19 The monitoring strategy needs also to ensure that the different mitigation elements work together. With different interventions such as the dogs project, the rangers and the SANGs it will be important to consider the mitigation as a package, to look across the Solent and collect data over an extended time period. For example it may well be possible to undertake specific surveys at a single SANG and demonstrate that the SANG is working effectively in drawing local residents away from the coast. Without other information – such as where new houses have been built, how much new development has taken place, where the birds are, which types of access are increasing, it is impossible to place the effectiveness of the individual SANG in context and consider the effectiveness of the mitigation overall. With access patterns changing gradually and awareness-raising work likely to change people's attitudes and behaviour gradually, monitoring must collect comparable data over an extended period in order to fully assess change and success.

Key questions for monitoring

1.20 From the above needs for monitoring, the following are some of the key questions that the monitoring will need to address:

1. How have housing numbers changed over time?
2. How have visitor numbers to the SPAs changed over time in relation to housing?
3. How have visitor distribution and behaviour changed over time?
4. How have the numbers of visitors undertaking potentially disturbing activities changed over time?
5. How have bird numbers (SPA interest) changed over time?
6. Do any changes in bird numbers relate to changes in access?
7. Are mitigation measures successful in reducing disturbance?
8. Are mitigation measures proportionate to the increase in disturbance associated with new development?
9. What level of mitigation has been implemented?



Map 1: SPA boundaries

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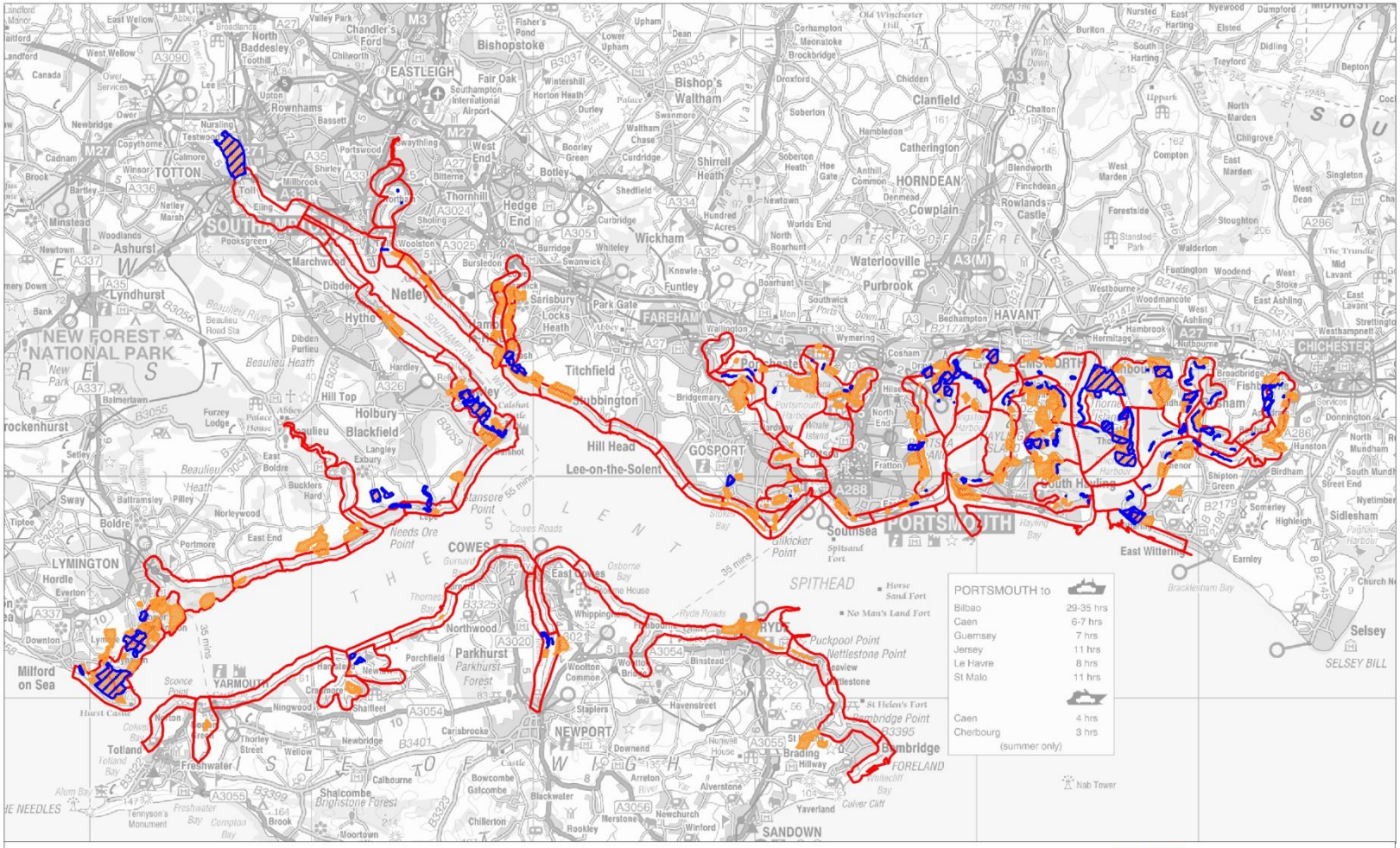
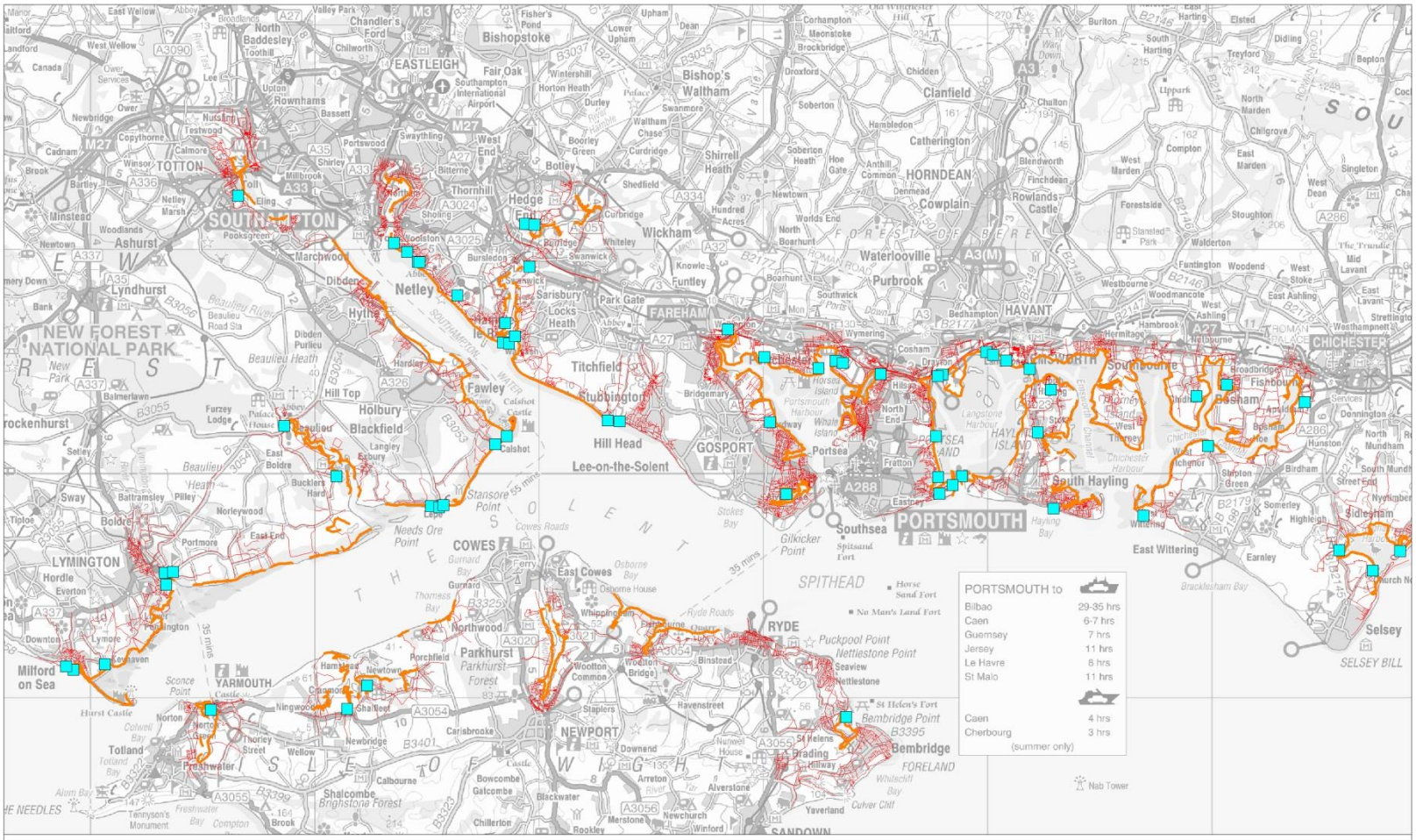


Map 2: Sections and important wader and brent goose sites

Wader and Brent Goose Sites provided by HWT.

Only important wader sites & high/major brent goose sites are shown. See strategy for more details

Contains Ordnance Survey Data. © Crown copyright and database right 2015.



Map 3: Path network and SPA shoreline with access

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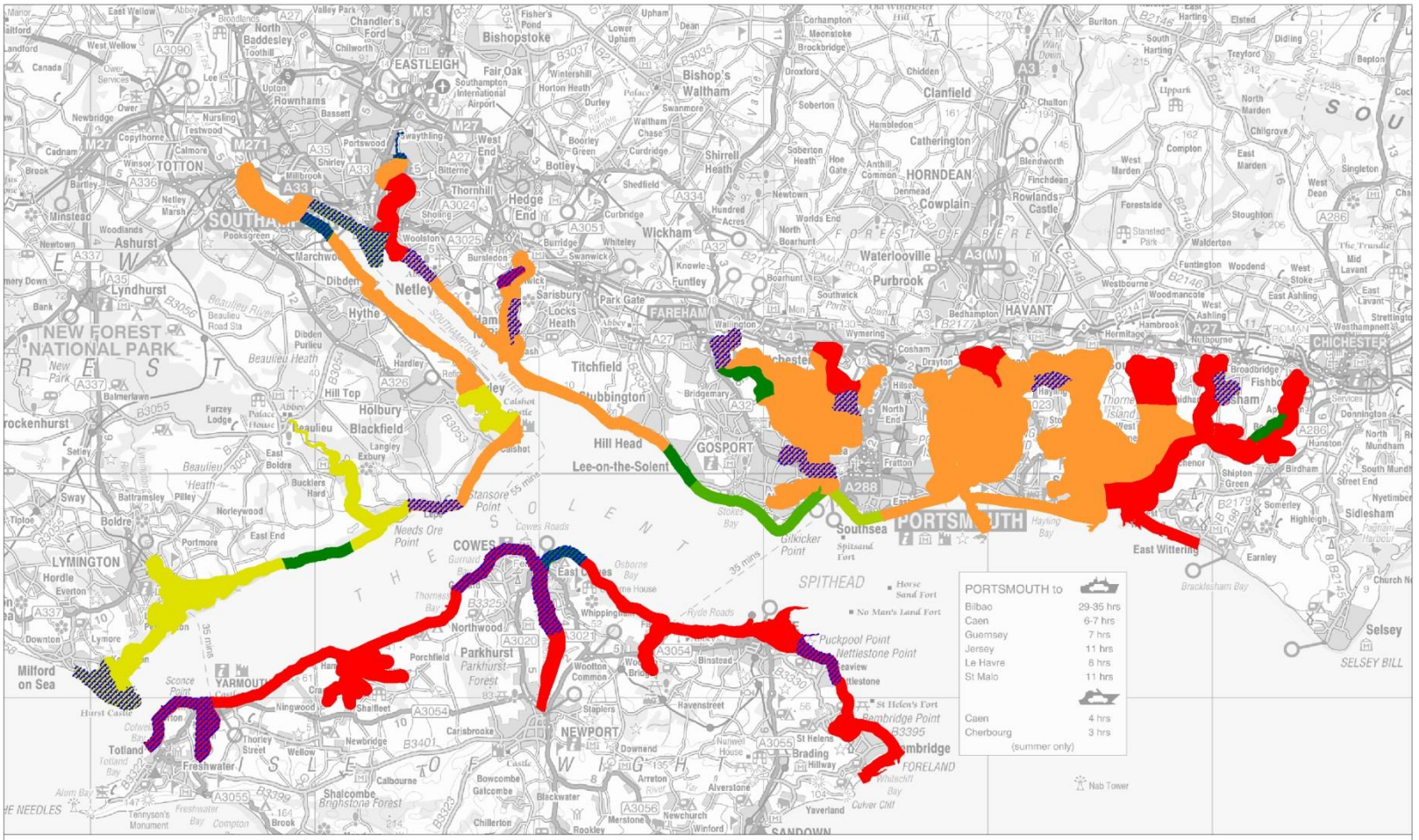

Map 4: Access change and bird interest

Wader and Brent Goose Sites provided by HWT (see Map 2).
Access predictions from SDMP

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- Sections above threshold of 30 visitors per ha
- SPA within section and change above 15% (33)
- SPA within section and change 7.5-15% (48)
- SPA within section and change below 7.5% (10)
- Section outside SPA, Imp. Brent site present change above 10% (2)
- Section outside SPA, Imp. Brent site present and change below 10% (3)
- Section outside SPA and no Imp Wader/Brent sites; or v. restricted access (7)

2. Monitoring Elements

Introduction and overview

2.1 In this section we consider the different components of the monitoring strategy. These elements have been selected following discussion within the team producing this report and discussion with the steering group. An initial meeting was held in Portsmouth to discuss emerging recommendations and thoughts and this discussion helped shape the monitoring strategy set out below.

2.2 Within the text we set out the different monitoring components and provide detail on how they could be implemented and what the work would involve. Initial recording forms are included as appendices where relevant. Costs are given for each component. These costs are indicative and given for guide purposes/budgeting only. Costs are not based on formal quotes and actual costs may vary depending on how the work is commissioned or implemented. The costs do not allow for inflation or discounting and are indicative of how much the elements might cost if commissioned in 2015.

2.3 An overview of the recommended monitoring strategy is set out in Figure 1.

2.4 There are six main areas covered by the proposed monitoring

- Counts of people
- Targeted pieces of work to test the effectiveness of mitigation
- Visitor interviews
- Bird numbers and distribution
- Housing
- Mitigation Delivery

2.5 The targeted pieces of work to test the effectiveness of mitigation represent discrete studies designed to run for a fixed time period and to test the effectiveness of particular mitigation elements. The rest of the recommendations are all continuous monitoring that would take place at regular intervals and continue to run indefinitely.

Monitoring Questions

1. How have housing numbers changed over time?
2. How have visitor numbers to the SPAs changed over time in relation to housing?
3. How have visitor distribution and behaviour changed over time?
4. How have the numbers of visitors undertaking potentially disturbing activities changed over time?
5. How have bird numbers (SPA interest) changed over time?
6. Do any changes in bird numbers relate to changes in access?
7. Are mitigation measures successful in reducing disturbance?
8. Are mitigation measures proportionate to the increase in disturbance associated with new development?
9. What level of mitigation has been implemented?

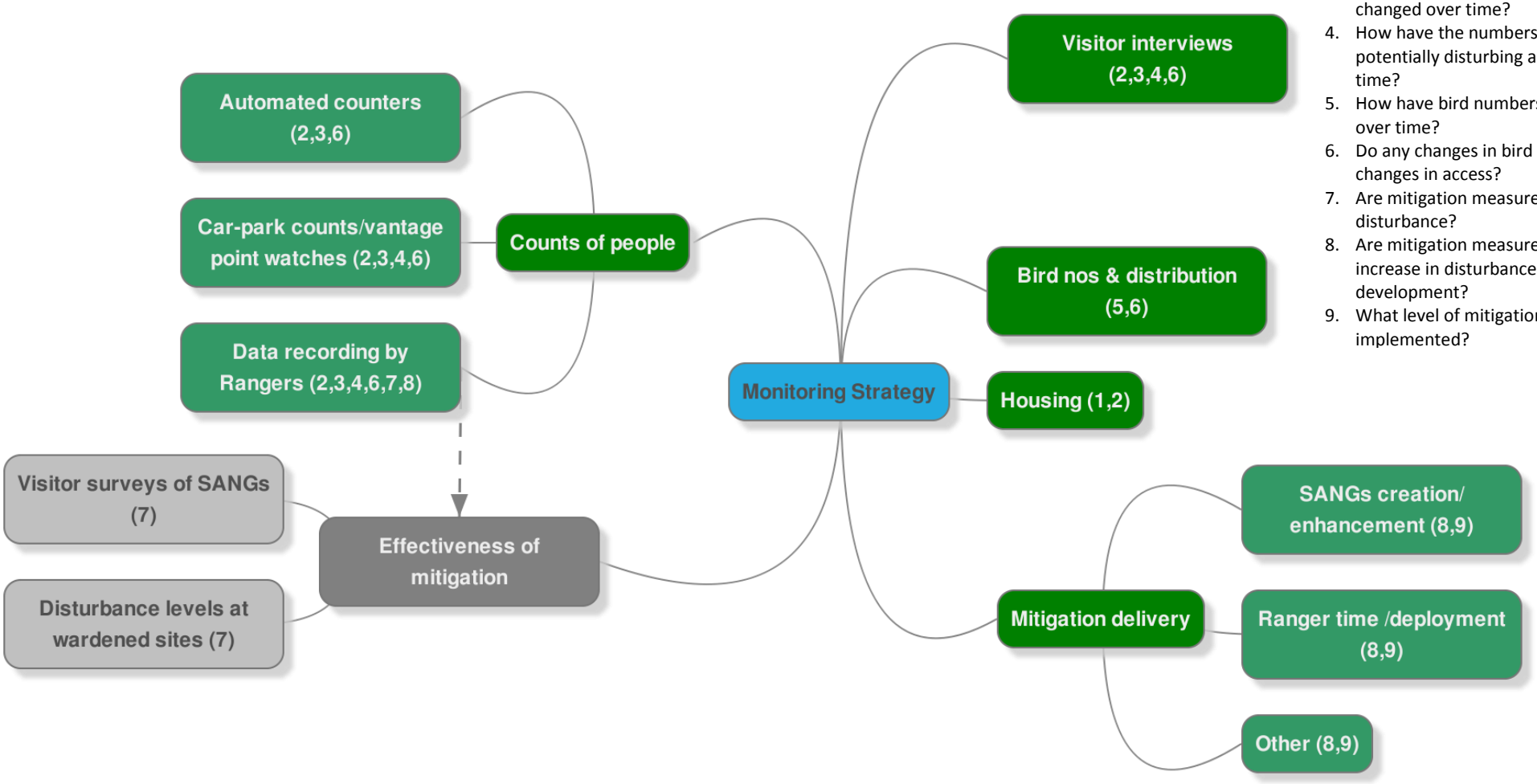


Figure 1: Overview of the different elements within the strategy. Numbers within the boxes relate to the key monitoring questions addressed. Paler shading is used for outer boxes ('children'). Green shading indicates data collection that would take place at regular intervals indefinitely and grey shading reflects monitoring that would be time limited.

Counts of people

Automated counters

2.6 A small number of automated counters (pressure pads, infra-red beams or similar) would be established and maintained over an extended period to give information on visitor trends. The counters would automatically count the number of people passing a specific point, and would provide data on levels of use by hour, by day and by week through the year. The counters would be deployed within the SPA only at carefully selected locations.

2.7 We suggest around ten counters. This level is relatively cost effective and the network is simple to maintain (counters need checking, calibrating and may need regularly visiting to collect data). Other elements within the strategy provide counts of visitors over a much wider geographic area and are more cost effective (car-park counts, counts by rangers etc.). The automated counters would supplement these other counts, providing a much finer level of detail, allowing detailed interrogation of the data to extract information down to each hour. The counters would also collect data over the summer, again supplementing the other visitor count elements. As such a comprehensive network of counters, covering all areas of the coastline is unnecessary and would be too expensive. A small, well maintained network of counters is more beneficial than lots of counters scattered over a wide area and not maintained well.

2.8 The choice of locations for new counters should be such that they provide good geographic coverage of the whole area and supplement any existing counters in place. In Map 5 we show some possible locations (blue dots) – and highlight existing counters that are already in position (red dots). The blue dots are very approximate and more precise locations would need to be identified through site visits and liaison with land owners, public rights of way officers etc. There would be the potential to shift any of the suggested locations to ensure a reliable counter location where it can easily be maintained. We have suggested locations based on cross-reference to Map 4 and spaced to give good geographic coverage across the Solent. Suggested locations are all public rights of way where a counter might be effective.

2.9 The red dots are very approximate locations where we understand counters are already in place. These are run mainly by Hampshire County Council and include two pressure pad counters at Lymington; two gate counters and a microwave counter on the seawall at Normandy; a pressure pad counter on the Solent Way at Sturt Pond in Milford on Sea and counters on Hayling Island at Sandy Point and along the Billy Trail. We understand that these counters have mostly been in position for five years or more already and will continue to be maintained by Hampshire County Council for the foreseeable future. In addition Isle of Wight Council has a permanent counter in place near Yarmouth.

2.10 We have given an indicative annual cost estimate based on a typical counter. There are a range of devices and types of counter that can be installed. Cost savings may be made through bulk purchase or extension of existing networks. A critical element to budget for is the calibration and checking of the devices. Checks need to be made that the

device is working and functioning consistently. Devices may fail, be vandalised, accidentally damaged or stolen and regular checks are necessary to ensure no long gaps in data collection. Sometimes paths shift and change too, careful siting can remove many issues but over time as paths become muddy, waterlogged or blocked by vegetation, new desire lines appear, short-cuts or even the way people step may mean people walking the wrong side of a counter. Each counter will need some direct observations to check how accurately it is counting and to give an adjustment factor for the number of people passing. Dogs, buggies, cycles, different sized groups may all trigger individual counters. Only by watching the counter for a set period is it possible to estimate what the number of 'hits' recorded by the counter relates to in terms of visitor volume. Furthermore, at some locations people may tend to mainly go in a single direction, while at other locations people may tend to go both ways along a path, so it is not safe to assume that the number of actual people is equivalent to the number of 'hits'. Just after set up and at regular intervals counters will need some observation data recording visitor flow (numbers of people, dogs, children etc.) in each direction to allow comparison between counters and give confidence in the data collected.

2.11 The supply, installation, checking, data collection etc. could all be done by specialist contractors or – depending on the device – some elements can be undertaken by local staff, potentially in the case of the Solent by the ranger team.

AUTOMATED COUNTERS

These will provide data on the change in visitor numbers over time. This is important to detect how visitor numbers are changing. Such data can then be used with the other people count data (for example the bi-annual car-park count data) to show how access is changing in relation to new housing. This will allow checks that mitigation is in the right places and help to target resources effectively.

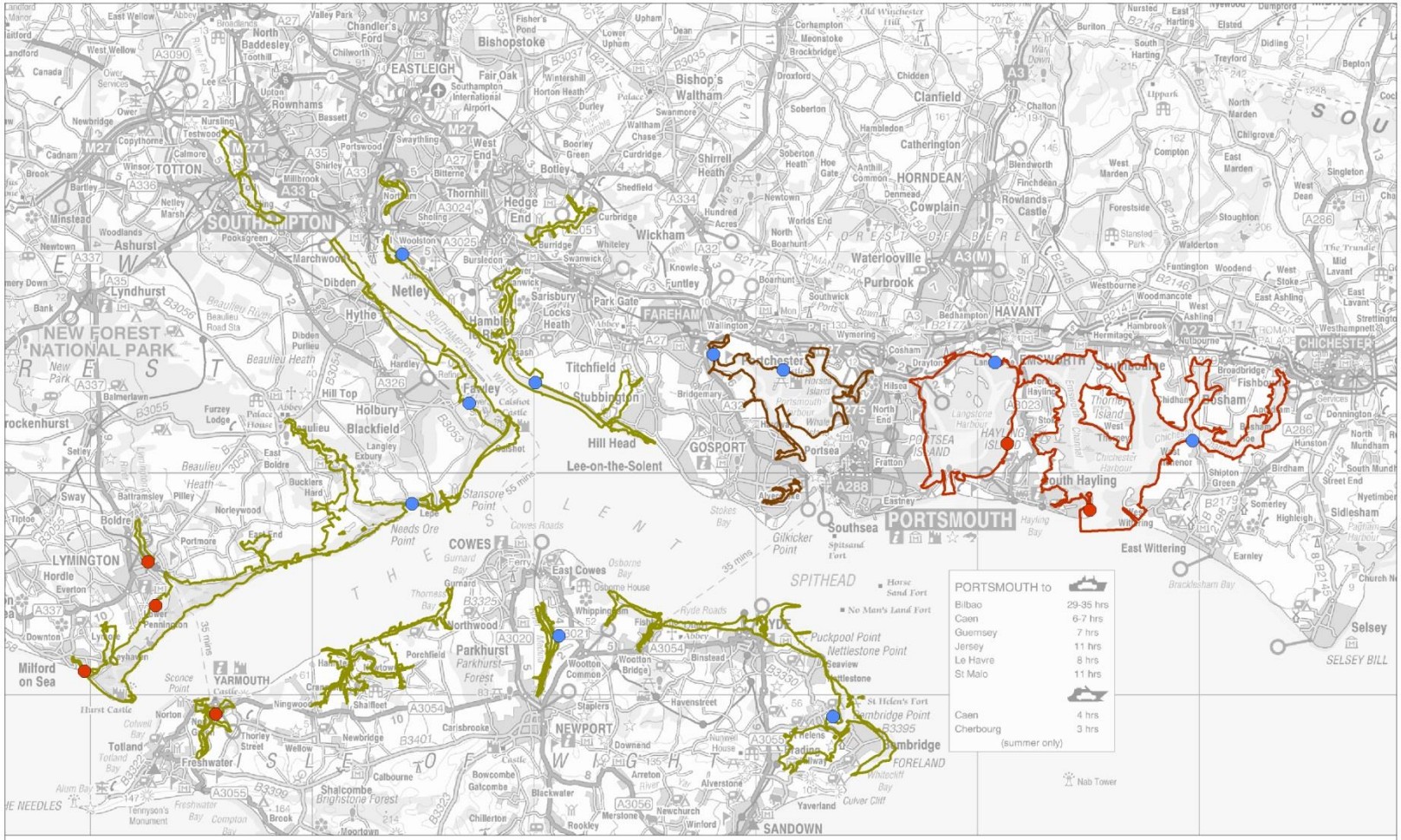
Key outputs: baseline trends in access numbers; very detailed data from a small number of locations. Will allow changes in access levels at very specific locations to be monitored over time.

Annual Cost: roughly [redacted] per counter, [redacted] for 10 counters. This is an approximate budget; a good quality counter* complete with recycled plastic posts is around [redacted] to purchase. Counters may need replacing every 5-7 years and would need checking and data retrieval at regular intervals (every 3 months or so) through the year. Annual cost allows for initial purchase ([redacted]), replacement every 5 years and some staff time to install, check/maintain, calibrate and retrieve data (2 person days per counter per year at [redacted] per person day).

Potential mechanism for delivery: Specialist contractor for the devices and potentially other elements (installation, checks, calibration, data collection etc). Some elements such as data collection and calibration could potentially be undertaken by ranger team. It may be possible to extend an existing local authority contract (Hampshire County Council?).

Options: Additional counters could be useful and it would be possible to add additional counters if necessary (e.g. particular opportunities arise or particular issues at set locations means additional data is useful).

* e.g. from Chambers Electronics, Radio beam counter example



Map 5: Potential automated counter locations

SPAs

- Chichester and Langstone Harbours
- Portsmouth Harbour
- Solent & Southampton Water

Potential counter locations (approximate)

- current (6)
- new (10)

Car-park counts/vantage point watches

2.12 These would involve a vehicular transect route established whereby parked cars would be counted within set locations and people and dogs counted along sections of shoreline (viewed from vantage points close/at car-parks). This is a cost-effective means of getting data on visitor numbers and behaviour over a wide area, and is an approach used on the Dorset Heaths and Thames Basin Heaths. The data could be directly linked to WeBS sectors.

2.13 Counts can be done by the driver and at most parking locations would take just a few seconds – involving a snapshot count of the parked vehicles present when entering the car-park.

2.14 When repeated regularly the data provide a picture of which car-parks are being used regularly and how visitor levels are changing. The data are most relevant to rural car-parks where access by car will be the main way people reach sites. In urban areas a proportion of visitors will arrive on foot and on-street parking can be difficult to count. Another challenge is that some car-parks may be used by people who are not visiting the coast, for example, many people park in the car parks at Farlington all day, and then commute into Portsmouth. They do not visit the coast in any way. Data from such locations does not have to be included in the transects – it is not essential to record every single car parked along the coast, but rather to collect comparable data that highlights where access is changing.

2.15 We envisage five transect routes, each of which would be undertaken simultaneously. The five routes could roughly equate to:

1. The New Forest shoreline (Hurst Castle – Southampton)
2. Southampton – Gosport
3. Portsmouth-Havant (including Portsmouth & Langstone Harbours)
4. Chichester Harbour
5. North shore of the Isle of Wight

2.16 Further work is required to map and drive the routes, test their length, check the time taken to drive (around 2 hours is probably optimum) and to map all the parking locations along the route that would be counted (noting that not all potential car-parks necessarily need to be included). Parking locations would include formal car-parks and informal parking such as lay-bys and verges. As part of the mapping exercise it would be useful to record the capacity of each car-park and basic information (such as whether surfaced or not, presence of facilities etc.).

2.17 The routes require careful mapping and can be set up in sat-navs or similar to facilitate wayfinding, allowing different drivers to undertake the work and allowing them to concentrate on driving safely and counting vehicles.

2.18 We suggest each transect should be repeated 12 times in a given winter (i.e. all five routes, driven simultaneously 12 times). The total of 12 would allow two to be undertaken per month (October – March), allowing coverage at a weekend day and on a weekday and across the winter. Times of day should be varied (for example as shown

in Table 1) and the transects established such that they can be repeated in future years, replicating the timing of previous counts. This could be done such that the weekday transects are always in the first week of the month (or similar) and the weekend ones on the first weekend etc. For individual routes the direction of travel or starting point should be varied between counts.

Table 1: Example of scheduling of car-park transects over a winter. This is hypothetical and could be adapted to ensure the best coverage.

Month	Day of week	Start time			
		0730	1000	1230	1500
October	Weekday	✓			
	Weekend day		✓		
November	Weekday			✓	
	Weekend day				✓
December	Weekday		✓		
	Weekend day			✓	
January	Weekday				✓
	Weekend day	✓			
February	Weekday			✓	
	Weekend day				✓
March	Weekday	✓			
	Weekend day		✓		

2.19 An example recording form is provided in the Appendix 1.

2.20 At a selection of car-parks where there is good visibility of a section of shoreline, a vantage point count could also be undertaken. This would involve the observer counting all the people visible within a pre-defined count area. The count area should be mapped and the boundaries clearly discernible, linked to features visible on the ground such as groynes, slipways, headlands etc. Counts would give the total number of people undertaking different activities and also record details such as the numbers of dogs off-lead. Where appropriate count areas should extend to encompass the water, so as to allow counts of kite surfers and other water sports to be included. The best data would involve all people being mapped, but this can be difficult and takes longer. Alternatively the data would be a simple total for each activity type for each recording area. An example form (which could be linked to maps of each recording area) is given in Appendix 2. The counts would be snapshots and not require the observer to linger, but simply to record/count all people visible at the precise time the vantage point is reached. In most cases this would mean the driver stepping out of the car and onto the seawall to view a particular stretch of shore and the vantage point counts would be simultaneous with the car-park counts.

2.21 The transects should then be repeated indefinitely, but every other year rather than successive winters. After data has been collated from a number of years it will be possible to determine which locations have seen a disproportionate increase in parking, useful information to inform the deployment of rangers. It will also be possible to compare the numbers of parked vehicles at set locations with any corresponding

vantage point counts. This will highlight where changes in parking are not necessarily related to coastal access (e.g. commuters rather than coastal visitors). The vantage point data will highlight whether visitor numbers are changing over time and at which locations, and different behaviours (e.g. number of dogs off-lead) can be compared over time.

CAR-PARK COUNTS/VANTAGE POINT WATCHES

These will cover a broad area and show how visitor numbers are changing. The data will highlight locations where access is changing and help to target mitigation. Vantage point data will show activities, for example, dogs off leads, and such data can be used to check whether visitor behaviour is changing and whether such change is consistent.

Key outputs: baseline trends in access numbers; simple counts of cars and people, covering a wide area. Will provide a broad indication in changes in visitor numbers (at least those coming by car) across a wide area.

Annual Cost: [redacted] (assumes 20 person days fieldwork at £[redacted] per day to undertake fieldwork, therefore £[redacted] total; annual cost halved as undertaken bi-annually).

Potential mechanism for delivery: Undertaken by the ranger team or consultancy.

Options: Additional transects could be added to ensure all car-parks were covered and potentially add more vantage points. Alternatively there would be the option to undertake counts on an annual basis.

Data recording by rangers

2.22 Counts of people could also be undertaken by Rangers during time they are out undertaking their normal duties. Any approach used would need to be simple and relatively flexible so that it can be accommodated during normal work. The advantage of such counts would be that they would provide supplementary data to the car-park counts and vantage point watches, covering a wider range of locations and times. The counts would also reflect the areas rangers are actually deployed and would allow comparison of visitor numbers and behaviour over time and in relation to the amount of time rangers had spent at each location. It is important that the counts are conducted according to a protocol that ensures no bias in recording – for example if counts were only fitted in on quiet days when the rangers were not otherwise busy talking to people the data would not be worthwhile.

2.23 We suggest that visitor recording should be in the form of a timed count, with an hour being an appropriate time period (but note this could possibly be adjusted if an hour was felt to be too long and did not fit with the other duties of the rangers). Counts should be undertaken following a set criteria – e.g. at the mid-point of any visit lasting at least 3 hours. Counts should reflect the number of people passing a specific point (an

imaginary line extending from the count location to the water would be appropriate for most locations). The count locations should be carefully mapped (with notes on exactly where to stand and where the imaginary line extends to) and subsequent counts repeated from the same location.

2.24 The simplest form of the count would be a tally of different activities (dog walkers, cyclists, bait diggers etc) with separate tallies maintained for people passing in each direction. Alongside counts of people the number of dogs (both on and off leads) should also be recorded. Such a tally could be made using hand-held clicker counters or on a recording form while other duties (talking to people, showing people birds etc.) was being undertaken. Alternatively a slightly more detailed recording approach, recording details of each group passing, would be more ideal, but would be potentially difficult to undertake simultaneously with other duties. A recording form for such a count is provided in the Appendix 3. The form functions like a diary, each subsequent event is recorded on a different line, with data included direction, activity, total people, total dogs etc. Other data include whether the group is on the intertidal or not and whether any change in behaviour was noted in response to the presence of the ranger. With such recording it is possible to log any disturbance events, but these are difficult to record in a systematic way (there may be multiple species present and birds may respond by taking flight, becoming alert/stopping feeding, walking away etc). Such information cannot be incorporated in sufficient detail on the same recording sheet and would require the ranger team to spend some time working together/being trained so that data are recorded in a way that is robust and can be analysed in the future. We have therefore included a very simple, single column that records whether birds are flushed or not by the activity. Even with this simple measure there would be a need to ensure consistency of recording and a specific list of species (we recommend simply any of the waders or wildfowl that are interest features of the three SPAs[6]).

2.25 The forms need to be trialled and some work perhaps undertaken with the ranger team to develop how this recording could work and fit within their work programme. In testing the approach the hour-long time period could be used and then the data reviewed to see if shorter time periods (e.g. 30 minutes) might also work. The time periods need to be long enough for a reasonable number of people to be counted and a range of use recorded, but the time optimised so that rangers do not become overburdened with data collection. The locations where the counts are undertaken need to be identified on the ground and mapped.

[6] Note that it is important that a list of potential species is consistent for all locations and doesn't vary according to the site where the ranger is deployed.

DATA RECORDING BY RANGERS

Similar to the vantage point counts, these data will show whether changes in visitor behaviour and access patterns are occurring and whether they are consistent. As these data are collected by the rangers it will reflect the times/locations where rangers have been present. Comparison will be possible with the other count data and the data will be collected more frequently (car-park counts are bi-annual) but not simultaneously across a wide area.

Key outputs: Counts of people from wide range of times and locations, providing indication over time of the changes in visitor behaviour, visitor numbers and the effectiveness of the wardening/ranger presence.

Annual cost: None as undertaken by ranger team as part of core work

Potential mechanism for delivery: Ranger team

Options: Survey effort can be tailored to the time ranger team have available.

Effectiveness of mitigation

Visitor surveys of SANGs.

2.26 In order to determine how well different SANG sites are working it is necessary to interview visitors at the SANG to determine where they come from, why they visit, how often they visit and whether or not they visit the SPA. Visitor numbers are also important and count data could be recorded as part of the interviews, but visitor numbers alone would not be sufficient to assess how well a SANG is working. This is because SANGs might draw high numbers of visitors but if those visitors are not ones who would otherwise be visiting the SPA (were there to be no SANG) it is not effective as mitigation.

2.27 Interviews would be therefore be conducted on a face-face basis, at the SANG sites. Survey points would involve main access points on the SANGs, and while not essential to target every single entry point, main car-parks and busy access points should all be surveyed. Surveys could be based on the surveys undertaken at Alver Valley in 2014/15 (Panter & Liley 2015) and follow the methods used in that survey, with the questionnaire hosted directly on tablets to avoid the need for manual data entry. Key elements to include in the questionnaire would include:

- Whether on holiday or local resident visiting from home
- Activity(ies) undertaken
- Frequency of visit
- Duration of visit

- Mode of transport
- Length of time visiting the site
- Information on site choice (i.e. why that specific location chosen for given activity)
- Other sites visited (included specifically checking whether the coast is visited or used to be visited, and which one site would have been visited as an alternative to the SANG)
- Reasons for choosing other site
- Views on current management of site and potential improvements
- Mapped route taken on site (and information about whether route as mapped is typical); this is important as it shows whether the SANG is being used to its full extent and allows comparison with SPA.
- Home postcode

2.28 Not all SANGS necessarily need to be surveyed, but it is impossible at this stage to recommend how many sites to survey as details of the long term mitigation have not been finalised. We therefore do not know how many SANGs might be components of the overall mitigation package and where those SANGs might be.

2.29 We have provisionally costed for surveys at 10 survey points. Survey points would be entry/exit points or path junctions inside sites (i.e. relatively independent, discrete locations where visitors can be intercepted and interviewed, ideally as they are completing their visit). This total could be sufficient for two to four SANG sites (most SANGs will have multiple points which warrant surveys).

2.30 Surveys should follow the same survey protocol at each site surveyed and surveys should be repeated to match data from previous years. This would mean ensuring surveys were done at the same time of year (ideally the same month, and certainly during the winter). Questions, survey effort etc. should be standardised. Additional questions (e.g. site specific ones) could be asked as long as they do not make the questionnaire overly long or complex.

2.31 Alongside the interviews, SANGs could potentially have automated counters – for example we are aware that there are four permanent counters in place at the Alver Valley. These would be ideal where budget is available or where there is some concern on the likely levels of use of a particular site.

VISITOR SURVEYS OF SANGS

Visitor survey data will show whether numbers of visitors and types of visitor are changing at SANGs over time. The data will allow management to be honed to maximise the draw of the sites to visitors who might otherwise go to the coast.

Key outputs: Questionnaire data showing visitor profiles, choice of sites visited, home postcodes and use of SANGs. Repeat surveys over time will provide indication of how much access SANGs are deflecting from the SPA.

Cost: [redacted] This cost is approximate and assumes 10 survey points (i.e. discrete survey locations, not SANG sites) and each point surveyed for 16 hours with survey effort split over weekend and weekdays (cost calculated at [redacted] per fieldwork hour, including travel, equipment), giving [redacted] for fieldwork. Additional [redacted] for report writing and analysis. Cost scaled to allow two repeat surveys spread over first 10 years SANG is running (i.e. surveys in years 1, 5 and 10 for each SANG and 3 reports in total).

Potential mechanism for delivery: Consultancy or similar

Options: Survey effort could be adjusted to fit with SANGs delivery and it will depend how many SANGs come in the future.

Disturbance levels at wardened sites

2.32 Some testing of the effectiveness of rangers is necessary – to inform whether the level of ranger deployment is sufficient and the extent to which wardening presence does resolve all issues such as dogs off-leads on the mud flats. Any experimental design (such as having pairs of sites, one wardened and one not) is complicated by the fact that this would require some locations not to have any mitigation (i.e. allowing continued disturbance from increased recreation). Another risk is that the wardening effort will be accompanied by social media campaigns, website promotion etc. which will reach a wide audience, and so the levels of disturbance at a site will not only be affected by the presence or absence of a warden within a site, but also by on-going broader scale awareness raising.

2.33 We recommend that a selection of locations is chosen for monitoring, based on where rangers will be initially targeting their time. It is likely that rangers will be particularly targeting certain types of sites, for example:

- Roost sites such as shell banks or saltmarsh that are also close to access routes/vulnerable to disturbance
- Areas of sandflat or sandier mud where people walk across the intertidal at low tide with dogs off leads
- Areas of soft sediment potentially important for feeding birds and close to access routes/vulnerable to disturbance

2.34 At the start of the ranger deployment (i.e. early 2016) a list of locations that are targets for deployment should be generated and categorised into types of sites, following the bullets above. A representative sample should then be selected for monitoring and that monitoring set up early in 2016 or ready for the 2016/17 winter. Monitoring would continue for a period up to five years and would record – at the specific targeted locations – how visitor behaviour and use by birds has changed.

2.35 Each type of location will be slightly different and there may need to be some adaptation of the methods depending on the specific location. We recommend the following (drawn from the original fieldwork undertaken for the SDMP Liley, Stillman & Fearnley 2010) :

- A discrete recording area is mapped, based on the area that is important for the birds (i.e. the roost site or mudflats used for feeding). The area mapped should work as a suitable recording area for data collection and therefore should be entirely visible from a suitable vantage point/survey point.
- A fixed level of survey effort - we suggest 15 visits, each of two hours – is made each winter. Visits should cover weekends and weekdays and a range of winter months and times of day. They should also be targeted to the tide state when the location is particularly important for birds (i.e. roost sites would be visited at high tide). Half of visits should be timed to coincide with when the warden is present.
- For each visit detail background information such as the tide, weather, start and end times of visit, whether warden present, etc.
- A count of birds (only SPA interest features) should be made within the recording area at the start and end of the visit.
- Counts of people/recreational events (such as passing boats) or other events (raptors, sudden noises etc) that relate to the recording area (i.e. typically those passing through the recording area or within a 200m radius[7]). This would be recorded in the form of a 'diary', with data collected for a fixed period totalling 105 minutes.
- Where an entry in the diary occurs when birds are present in the recording area and is within 200m of those birds – or elicits a response from the birds – details of the interaction should be recorded. This would cross-reference to the diary, and also record the species, response, distance at which the birds responded etc.

2.36 Over successive winters the data should show a consistent pattern of change. For example over time the number of dogs off leads would be expected to decrease and perhaps bird numbers or the range of species present might increase. With bird numbers increasing there could be more incidents of birds being flushed (as birds are using the area more) or it may be that the incidence of birds being flushed decreases. Records will be kept of the ranger deployment so it will be possible to check how long the rangers have spent at each location, what they have done and how many people

[7] Note that some events, such as sudden gunfire may cause birds to respond at distances greater than 200m. Such events should also be recorded

they have interacted with. The results from each year could indicate which activities (if any) are continuing to cause problems and this would provide feedback for how the rangers could operate at the site in following years.

2.37 The monitoring would equate to the broader monitoring (visitor counts, bird distribution and numbers etc.) set out in the rest of this strategy. The difference – and reason for a different approach – is that the data will be targeted to a very specific location (such as a single roost site) and the results written up as a case-study. A series of these case studies would provide the necessary context to go with the other data sets. For example, it might be possible to show that the wardening has been particularly successful at site A where X hours of ranger time has been spent over a winter. From the vantage point counts, ranger counts and bird data, it will be possible to identify similar sites with similar issues where similar deployment could then be targeted. Locations of new housing would inform which locations should be prioritised.

2.38 The number of 'case studies' that is possible will depend on budget and wardening effort (it is only worth targeting sites where rangers are deployed for a suitable length of time). Equally the length of time (years) that each should be monitored for is flexible and would be dependent on the results. We have suggested five years, but it may be worth continuing some for longer and others may show a marked success rate after a year or two and then little change, and if so continuing the monitoring would be unnecessary. We suggest around 5-10 locations would be ideal to monitor. It would be ideal if these provided some replicates of different types of sites. For example if five areas of soft sediment potentially providing good foraging areas were selected these might include ones with a range of access levels and different habitat (narrow creeks or more extensive areas). Similar results across a range of sites would then provide confidence in particular approaches and demonstrate that they were not 'one-offs' or linked to some specific feature of that site.

2.39 While the data on visitors could be collected by the rangers themselves, the response of the birds is harder data to collect. We suggest that the data are best collected by external fieldworkers.

DISTURBANCE LEVELS AT WARDENED SITES

More of a targeted piece of research than regular monitoring, this would provide a series of case studies showing change in visitor behaviour, visitor numbers and bird use for particular areas over time. Data would be detailed and very focussed on key types of sites, such as roost sites or good feeding areas. The results will help work out how best to target ranger time.

Key outputs: Change in visitor behaviour, visitor numbers, bird numbers and bird responses over time as wardening deployment initiated.

Cost: [redacted] per location per year. This cost is approximate and assumes 15 visits each of 2 hours, equating to around 6 days of fieldwork (at [redacted] per day); 0.5 days to enter and collate data ([redacted] per day) and 6 days for analysis and report writing (at [redacted] per day). We suggest a minimum of five locations are included. Costs would to some extend be dependent on scale and may be less per location with many locations covered.

Potential mechanism for delivery: Consultancy or similar

Options: The number of locations and range of sites could be extended, depending on resources.

Visitor interviews

2.40 Visitor surveys within the SPA would provide detailed information on who is visiting the SPA and why. Such information supplements the count data in that it provides information on visitor profiles, home postcodes, reasons for site choice etc. Questions would be closely aligned to the SANGs surveys to allow comparison but would include specific questions relating to the SPA.

2.41 Unlike the SANGs surveys we would envisage these interviews continuing indefinitely, with the same locations surveyed using a similar questionnaire and survey protocol (i.e. similar timing etc) every five years. Surveys would only be done in the winter and we suggest ten locations would be sufficient, each surveyed for 16 hours (split over a weekend day and weekend day). This would allow comparison with the original on-site visitor survey data in the SDMP (Fearnley, Clarke & Liley 2010). Suggested locations are shown in Map 6. Map 6 shows all survey points included in the SDMP survey and the symbol size reflects the number of interviews undertaken. Suggested survey locations (dark orange) for this monitoring strategy are those that generated a reasonable volume of interviews in the previous survey, give reasonable geographic coverage, are on designated stretches of coast and as far as possible are aligned with the automated counter recommendations (see Map 5) so that count and interview data can be cross-referenced (at least for some locations).

2.42 Ten survey locations each surveyed for 16 hours as set above would generate around 400-500 interviews. This is a reasonable sample to allow comparison between survey years. Analysis would focus on the comparison with previous surveys and look for emerging patterns and trends, for example in the proportion of interviewees who had interacted with a warden, the proportion of visitors who had visited a SANG etc. The interviews may also be able to provide relevant data on the dog initiatives (depending on what is implemented in the future). As an example questions could address whether interviewees are aware of current projects, or have visited particular websites. Home postcode data would allow any changing patterns in travel distance to be detected (for example if people start to use cars less and travel to closer sites). Comparison between years would include the ratio of different activity types, attitudes of dog walkers etc.

2.43 Surveys would best be deployed on tablets, ensuring benefits in questionnaire design, ease of surveying and no data entry costs.

VISITOR INTERVIEWS

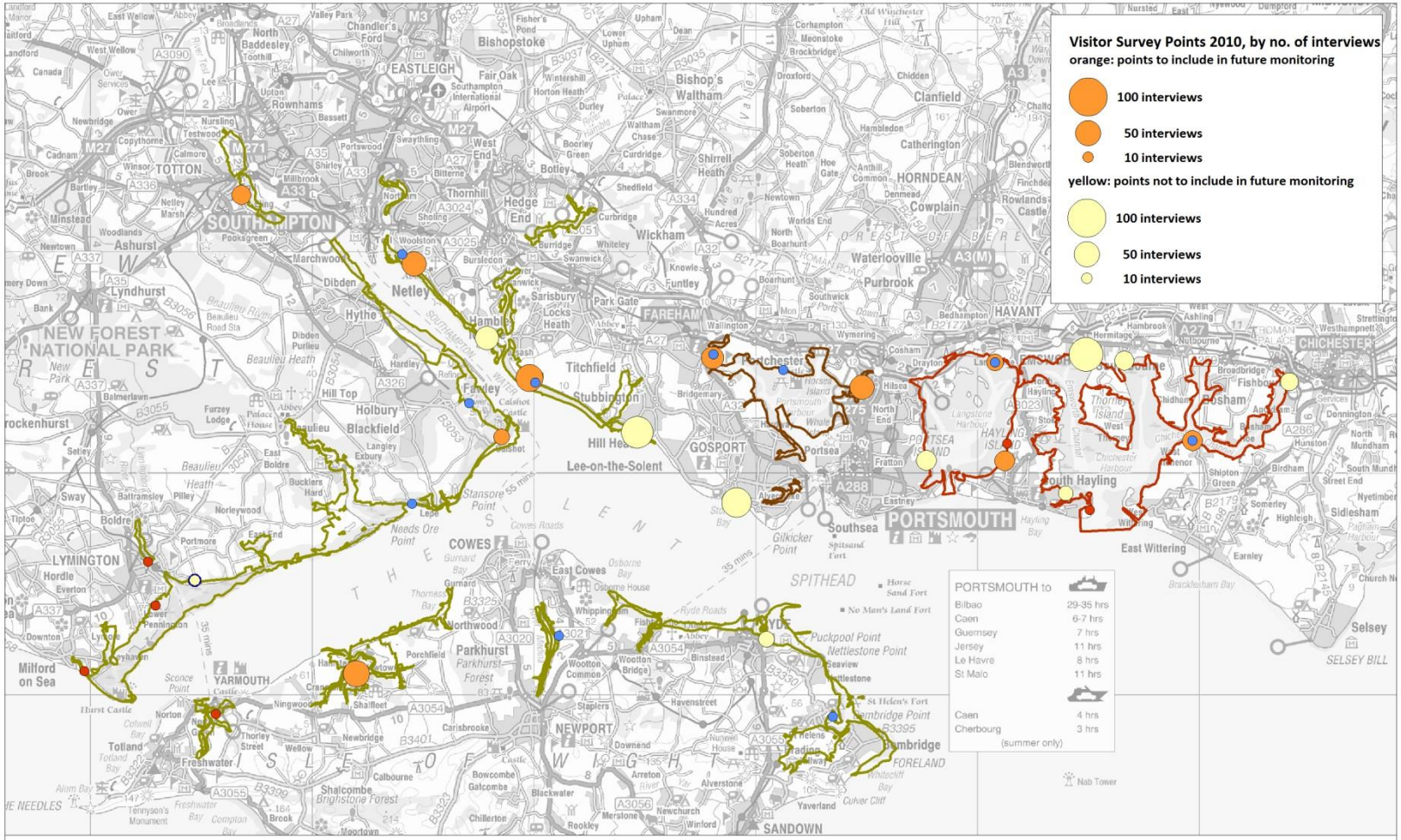
Data from face-face interviews with visitors to the SPA will show to what extent access patterns are linked to new housing, pick up changes in access patterns and potentially also show the extent to which mitigation measures are influencing behaviour.

Key outputs: information on visitor numbers, types of activity, profiles, motivations, postcodes etc , and as repeated in standardised way, a means of looking at changes over time.

Cost: [redacted] per survey, giving an annual cost of [redacted] (assuming repeated every five years). This cost is approximate and assumes 10 survey points and each point surveyed for 16 hours with survey effort split over weekend and weekdays (cost calculated at [redacted] per fieldwork hour, including travel, equipment), giving [redacted].

Potential mechanism for delivery: Consultancy or similar

Options: the number of survey points could be increased and surveys could be repeated more frequently than every five years. The suggested level set out above is probably a minimum to be worthwhile.



Map 6: Potential visitor survey points

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Bird numbers and distribution

2.44 Understanding the distribution of birds and how bird numbers are changing is fundamental. Wardening effort needs to be targeted to areas where birds are, or could be, present. If a particular species is declining or becomes limited to a few locations, it will be necessary to target those areas with the mitigation effort. With a knowledge of which sections of shoreline bird numbers are declining it will be possible to check those locations and determine whether housing numbers have changed nearby, whether access has changed or whether some other factor is potentially influencing bird numbers.

2.45 The WeBS (Wetland Bird Survey) data provides this information. The survey covers the UK and is run by the BTO and the data are used by the statutory agencies to inform site condition and designation. WeBS has been running for decades and the data are used to highlight where species numbers are changing at a particular site and whether such changes are specific to that site or consistent with widespread changes at other sites in the region or nationally.

2.46 WeBS counts provide data for both high tide and low tide through two separate monitoring schemes both undertaken by volunteer counters coordinated by a local organiser. WeBS high tide counts are undertaken on a monthly basis throughout the year. WeBS low tide counts are undertaken periodically, typically every five or six years based on monthly counts over the winter season (November to February). Low tide surveys do not occur automatically but do so following agreement between the WeBS Low Tide National Organiser and the WeBS Local Organiser. The WeBS National Organiser can therefore coordinate coverage across all WeBS Low Tide sites on the Solent.

2.47 There are 68 WeBS high tide count sections and 229 WeBS low tide count sections covering the Solent. Coverage of the high tide count sections has been reasonably complete over the past five years (Map 7) although because WeBS was historically a winter-centric monitoring scheme and continues to report winter-centrically (because the majority of species are “winter visitors”) some sectors may have incomplete coverage between April and August. As Map 7 also shows, some parts of the SPAs are not covered too. This is because these areas tend not to have high numbers of birds or contain relatively little intertidal habitat (i.e. are open coast).

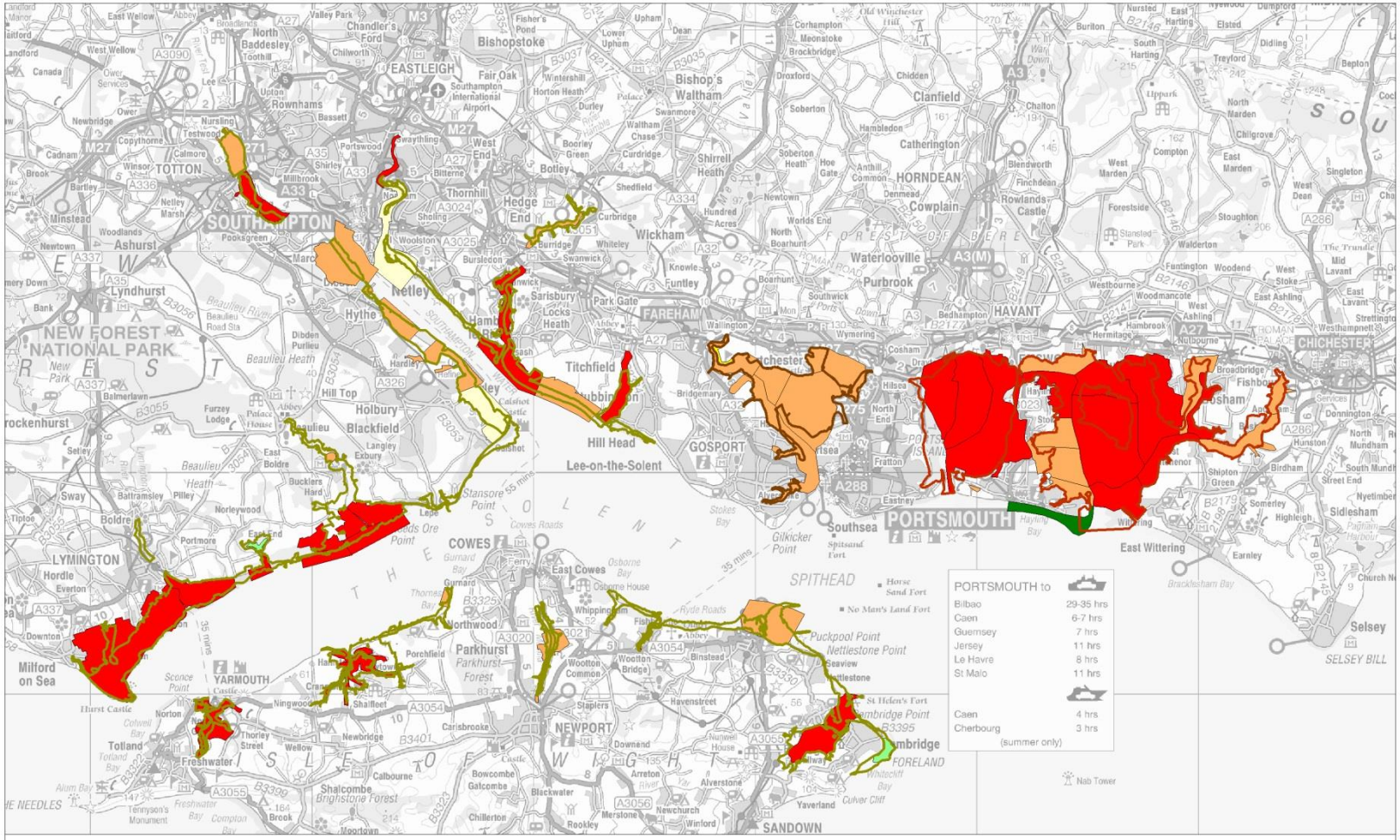
2.48 Although referred to as ‘wintering’ waterfowl, most species are actually present during most months of the year. Typically "winter" waders will be present until mid to late May and they begin to return from mid to late July. Wildfowl tend to leave earlier than waders but start to arrive back at much the same time. May and August are particularly important for passage waterbirds and indeed peak numbers of some species at some sites occur during those months. In Table 2 we highlight peak counts by month for different sites, drawing from recent WeBS data. It can be seen that a range of species such as Avocet, Black-tailed Godwit, Sanderling, Shelduck and Curlew can peak at certain sites in the summer period, between April and August, when coverage can be patchy.

2.49 Coverage could be boosted using professional fieldworkers to plug gaps in volunteer coverage. With regard to high tide counts, of the 68 count sectors, there are about 20 that only get coverage between September or October and March. This includes about half the sectors of Chichester Harbour. With regard to low tide counts, coverage within a winter is likely to be reasonably complete for those sectors allocated to volunteer counters as the commitment is only for four monthly counts. However, coverage between consecutive surveys is difficult to guarantee as each survey essentially requires recruitment from scratch. The need to boost coverage is difficult to assess. Low-tide counts provide data on feeding birds and this is when many species will be particularly sensitive to disturbance. By contrast the high tide counts provide data on the total number of birds present and highlight roost sites, which can also be vulnerable. The mid-winter period is when bird numbers tend to peak overall, but as Table 2 shows other months can be particularly important for some species at some sites. During the mid-winter period birds are likely to be particularly vulnerable to disturbance as there is more competition (higher numbers of birds overall) and cold weather can make particular demands. Over the winter depletion can mean food is particularly limited. Conversely, during the summer months, access levels may peak, and as such some coverage of birds during the shoulder periods (April and August) would seem justified.

2.50 WeBS therefore provides the best data on bird distributions and numbers, but it would seem that there is some merit in 'boosting' coverage by filling any gaps. We therefore suggest that core counts are boosted every third year – with the boosted coverage filling in any gaps and potentially also covering some of the open coast (within the SPAs) that is not normally counted. This would mean every third year there was really detailed coverage of the whole coast for the period August-April and outside that there would be the existing volunteer coverage as currently occurs. In addition low tide counts could be aligned to occur every six years and ideally undertaken across all areas in the same year, to provide comparative data. Low tide counts would cover the period November-March and would have some 'boost' coverage as necessary to fill any gaps.

2.51 The BTO charges organisations for the provision of WeBS data, with the charges adjusted depending on the organisation and circumstances. It would be expected that for years/months where the Solent Partnership were funding boost surveys, the BTO would provide the balance of data i.e. for those sectors covered routinely by the WeBS volunteers, free of charge. WeBS data for years/months outside of those boost years/months would be provided through the normal WeBS data request process. The data per se are not charged for, but there is a standard cost from the BTO to cover the cost of provision. Previously, the Eastern Solent Coastal Partnership has received WeBS data and this was subject to a 60% discount because it was agreed that the work for which the data were to be used was of direct conservation benefit. It is likely that the same discount rate would be applicable in the future. Based on previous data costs, we would estimate the provision of data from the BTO to be in the region of [redacted]. This would be for six years of data, including low tide count for one winter and high tide core count data for all months in the 6 years, but assuming counts would be boosted by professional surveyors as set out above.

2.52 There are other sources of bird data in addition to the WeBS, for example there is the relatively new Solent Birds app, through which observers can enter casual counts of birds and record other information including disturbance. Such data sources may provide additional information to supplement WeBS count data over time, and such data may be particularly useful for parts of the shoreline where no current WeBS data are collected. The use of apps, social media and additional media coverage generated by the rangers etc. may also mean that more volunteer recorders are interested in being involved. This may over time mean that the need to 'boost' the WeBS data is reduced.



Map 7: WeBS count coverage (winter months)

% coverage of WeBS 2009-2013; Sept-March

100 (i.e. complete coverage)	(27)	40 to 60	(1)
80 to 99	(26)	20 to 40	(2)
60 to 80	(2)	0 to 20	(1)

SPAs

- Chichester and Langstone Harbours
- Portsmouth Harbour
- Solent & Southampton Water

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Table 2: Peak counts of particular species by month and area, from WeBS data for 2013/14.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Chichester Harbour	Lapwing, Mallard, Turnstone	Brent Goose, Shelduck	R-b Merg.		Sanderling			Ringed Plover	Redshank, Curlew, O'catcher			Dunlin, Teal, Grey Plover, Bar-t Godwit, Blk.t Godwit, Pintail
Southampton Water	Wigeon, Curlew	Lapwing, Teal, Great Crested Grebe, Shelduck, Shoveler	Dunlin, Blk.t Godwit						Redshank, Cormorant	O'catcher, Turnstone, Ringed Plover	Brent Goose, Golden Plover, Mute Swan	Mallard, Grey Plover
Beaulieu Estuary	Wigeon, Brent Goose, Dunlin, Curlew, O'catcher	Lapwing	Turnstone	Avocet			Coot	Blk.t Godwit, Ringed Plover, Gadwall		Teal, Golden Plover, Mallard, Redshank, Shoveler	Pintail	Grey Plover
Portsmouth Harbour	Dunlin, Tufted Dick, Ringed Plover	Brent Goose, Curlew, Teal, Mute Swan, Lapwing	O'catcher, Shelduck, Red-breasted Merganser, Coot, Great Crested Grebe							Wigeon, Turnstone, Mallard	Redshank, Blk.t Godwit, Little Grebe, Cormorant	
Langstone Harbour	Grey Plover, Lapwing, Shelduck, Knot, R-b Merg., Gadwall, Great Crested Grebe		Dark-bellied Brent Goose	Whimbrel				O'catcher, Curlew, Redshank		Wigeon, Blk.t Godwit, Teal, Turnstone, Ringed Plover, Mallard	Dunlin, Bar-t Godwit, Shoveler, Coot	Pintail

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brading Harbour	Redshank, Pochard, Curlew, Shoveler, Lapwing, Wigeon, Teal, Brent Goose	Tufted Duck					Cormorant				Mallard, Coot	Dunlin, Gadwall
North West Solent	Dunlin, Brent Goose, Lapwing, Curlew, Redshank, Shelduck		Knot, O'catcher, Golden Plover, Shoveler, R-b Merg.					Coot	Blk.t Godwit, Mallard, Ringed Plover, Mute Swan, Cormorant	Wigeon, Grey Plover, Turnstone	Pintail, Gadwall	Teal
Medina		Lapwing, Curlew, Wigeon, Turnstone, Teal							Dunlin	O'catcher	Brent Goose, Mallard, Mute Swan, Little Grebe	Coot, Redshank
Newtown Estuary	Wigeon, Brent Goose, Dunlin, Knot, O'catcher, Ringed Plover, R-b Merg.						Curlew		Redshank		Teal, Mallard, Grey Plover, Blk.t Godwit	Lapwing
Yarmouth	Wigeon, Mallard, Shoveler	Teal, Golden Plover, Coot, Little Grebe	Turnstone		Shelduck			Mallard		O'catcher	Redshank	Brent Goose

BIRD NUMBERS AND DISTRIBUTION

Bird numbers may fluctuate over time for a range of reasons. Knowing where the key areas are for birds and whether particular species are undergoing particular declines will help to target mitigation. Analysis of the data can show whether bird numbers at particular parts of the coast are changing differently to other parts, and this may highlight where mitigation is particularly successful or not working. Bird data can be linked to visitor numbers to test whether changes in bird numbers relate to changes in access.

Key outputs: information on whether bird numbers and distributions change over time allowing mitigation to be focussed on key areas and whether bird numbers and distribution change in relation to changes in access and the introduced mitigation.

Costs to boost existing volunteer coverage

High tide counts: [redacted] every third year. This is an approximate cost because the requirement for professional coverage may vary considerably between months. It is estimated on the basis of [redacted] per month for the months Sep-Mar and [redacted] per month to include Apr and Aug (when volunteer coverage is reduced). WeBS would seek to keep the requirement for high-tide count gap filling to a minimum. To this end, for sectors identified as those for which April and August counts are not typically undertaken, the BTO's WeBS Counter Network Organiser would seek to encourage local volunteers to extend their counting season accordingly during the gap filling periods.

Low tide counts: [redacted] every six years. This is an approximate cost because the requirement for professional coverage may vary considerably between months. It is estimated on the basis of [redacted] per month for the months Nov-Mar

Cost for data provision from BTO: [redacted] for 6 year period

Potential mechanism for delivery: Data would be collated through the standard WeBS recording route. There would be a monthly requirement for a WeBS approved coordinator to liaise with WeBS Local Organisers and counters and a pool of professional observers to plug gaps in coverage identified each month. Based on a similar undertaking on the Severn the coordinator role requires about two days per month. A single counter can cover a single isolated sector or two, possibly three adjoining sectors over a single high tide. A single counter can cover one isolated or two, possibly three, adjoining sectors over a single low tide. Although low tide and high tide counts clearly do not overlap, during winter it will often be difficult to plan for both on the same day because of the availability of daylight. This would be less of an issue during the summer.

Options: Boost surveys could be dropped (note data provision costs would then increase) or boost surveys extended to additional months depending on resources.

Housing

2.53 A key component of the monitoring would be tracking housing delivery such that housing data can be related to the other monitoring data collected. Housing data would involve an annual record of new housing in a way that can be plotted on a map and overall change around certain sections of the coast extracted. These data are already being kept and will relate to the amount of mitigation monies collected.

2.54 It may also be useful for the local authorities to collate future predictions of housing in order to ensure mitigation effort can be adapted and adjusted to the need. Such data were collated as part of the original Solent Mitigation and Disturbance Project and at key points in the future it may be useful to repeat this. We have not included this or recommended a set timescale as it is probably best undertaken as part of plan review etc. and is probably best commissioned as required rather than at fixed intervals.

HOUSING

Housing data is necessary to collect to check whether any changes in visitor numbers relate to where new housing has been built or other factors (such as media coverage, tourism promotion, particular activities etc.). Knowing where new housing has been built will be important in targeting where to focus mitigation.

Key outputs: Spatially explicit data on housing recording new developments by year, collected in a standard way across local authorities and collated to give a single data set.

Cost: None, already collected systematically to keep track of contributions collected.

Potential mechanism for delivery: Local authorities

Mitigation delivery

SANGs creation and enhancement

2.55 In order to determine whether changes to SANGs result in changes in access patterns within the SPA or to the SANGs themselves, detailed recording of works done and changes over time will be necessary. A record will need to be kept for all SANGs sites as to what enhancements are undertaken and when. Any issues on sites – such as flooding – which may affect visitor use should also be logged. Such information can then be used to check whether changes in visitor levels or use within the SPA or within the SANG relate to changes in management.

SANGs CREATION AND ENHANCEMENT

In order to test the effectiveness of SANGs it will be necessary to record when individual SANGs are open for access and details of improvements undertaken on sites. Temporary changes (flooding in the Alver Valley for example) will also be important to record. With detailed data from SANGs it will be possible to interrogate visitor data from the SPA to look for changes at adjacent sites.

Key outputs: Spatially explicit data on SANGs creation, improvements or any changes in accessibility.

Cost: None, such data will be collected anyway – e.g. when commissioning works on SANGs. Careful records simply need to be maintained, ideally in a standard fashion across any SANG sites.

Potential mechanism for delivery: Local authorities

Ranger time/deployment

2.56 A log should be maintained of how much time rangers are deployed at which locations and it should record details of the number of people spoken to/engaged with and details of the interaction. These data would always be collected whenever the rangers are out. The information recorded does not need to be overly complex and should include basic information such as how long was spent at each location, how many people (and groups) were spoken to, type of engagement (this could be categorised, for example as: shown birds, leaflet given out, alternative site suggested etc). It may be necessary to have slightly different forms or recording protocols depending on whether the rangers are just doing day-day site visits or attending particular events etc.

RANGER TIME/DEPLOYMENT

Knowing how much time rangers have been deployed and where is essential to check that rangers are being deployed in the key areas where access is increasing and where birds are. It will be possible to analyse with the data on visitor numbers, behaviour and the questionnaire data to work out where the deployment of rangers has been most effective and to inform the future wardening effort (e.g. optimum amount of time at locations to have biggest effect, etc.)

Key outputs: Record of deployment of rangers and details of their work. Data would be spatially explicit – for example in the form of grid references or waypoints. This will allow deployment to be mapped – for example generating a thematic map, based on WeBS sectors, to show the amount of ranger time in total over a winter in a given WeBS sector.

Cost: minimal, incorporated into running/deployment cost

Potential mechanism for delivery: undertaken by ranger team

Other

2.57 Additional mitigation measures may well be established in the future. These may include some elements targeted at dog walkers and the other mitigation measures outlined in Liley & Tyldesley (2013). The general monitoring – such as vantage point counts, counts by rangers, visitor survey data – will provide information on behaviour and visitor attitudes and will indicate change.

2.58 It will however be important to record these mitigation measures in terms of what is undertaken and where. Such data could then potentially be used with data on access and visitor data to explore the relative effects on visitor behaviour. Data recording will need to be confirmed once the other mitigation measures are finalised and it may be necessary to include additional monitoring depending on what measures are implemented.

3. Data presentation, analysis and reporting

3.1 This section will explore how to bring the different threads outlined above together – it is one thing simply collecting data on birds and access for example, but there is another step to combine the data in a meaningful analysis.

Report recommendations

3.2 Annual reports should be produced using a standard template and simply giving key totals for the different on-going monitoring threads, context (including factors such as unusual weather, for example a cold winter or other elements which may have affected the birds, access or effectiveness of mitigation) and highlighting any issues or changes in the monitoring. The annual reports should report progress in answering the key monitoring questions. The following sections summarise the types of analysis recommended for each of the monitoring questions.

1. **How have housing numbers changed over time?** – Changes in housing numbers throughout the Solent, based on latest data at time of report. These data would test whether overall housing growth and regional differences in growth are as predicted. Any deviation from expectation could be used to refine future mitigation.

2. **How have visitor numbers to the SPAs changed over time in relation to housing?** – This could be reported in two ways:

   (a) Actual changes derived from monitoring at SPAs (using data from the automated counters, car-park counts, vantage points and counts by rangers)

   (b) Predicted changes derived from changes in housing numbers throughout the Solent and distance typically moved by people visiting the coast.

The latter (b) would be based on the results of postal and visitor surveys conducted during the Solent Disturbance and Mitigation project. Data from a) could be used to test the predictions in (b) to build confidence in predictions and potentially refine future predictions.

3. **How have visitor distribution and behaviour changed over time?** – This should report the number of visitors throughout the Solent, with a breakdown of their activities. Comparisons should be made year-on-year, but also to the reference point recorded during the Solent Disturbance and Mitigation Project. The report should highlight areas in which there have been significant changes in visitor numbers. Relevant data would come from the car-park counts, vantage point counts and interviews.

4. **How have the numbers of visitors undertaking potentially disturbing activities changed over time?** – This should identify sites in which there have been large increases in activities that have a potentially greater effect on birds. These would be defined as activities that occupy a large area of habitat at times when birds are likely to be present in high numbers. Trends should be shown year-on-year but also relative to

the reference point recorded during the Solent Disturbance and Mitigation Project. Relevant data would come from the car-park counts, vantage point counts and interviews.

5. How have bird numbers (SPA interest) changed over time? – The latest available Wetland Bird Survey (WeBS) data should be presented within the report, supplemented with additional bird counts. Ongoing WeBS alerts for each site should also be highlighted (these identify species with atypically high rates of decline). The data should be presented on a WeBS sector by sector basis, but should also provide a larger-scale summary for individual sites (e.g. harbours).

6. Do any changes in bird numbers relate to changes in access? – Changes in bird numbers within WeBS sectors and sites should be compared to changes in activities, especially those expected to have a greater effect on the birds. Data from the vantage point counts, car-park counts and rangers' counts could be used to work out the change in access that has occurred on individual WeBS sectors and then these changes compared with the WeBS data. In making these comparisons it should be realised that changes in bird numbers could be caused by several factors beyond changes in visitor numbers, some outside of the site itself. For instance, winter bird numbers in the Solent may decline because of changes in the wintering distribution – as the climate warms, northern-nesting birds will tend to winter further north, closer to their breeding grounds, to reduce the cost of migration. It is unlikely that these additional factors can be taken into account in the annual monitoring, but they should at least be considered when interpreting results. WeBS data can be analysed to pick up which sectors have declined and where bird numbers have increased in particular areas. WeBS alerts analysis (undertaken by the BTO and published on their website) will highlight site level change and which species have had site specific declines. A site specific decline will indicate that something particular has changed or happened at that particular site rather than a change in bird numbers that fits with a regional or national pattern.

7. Are mitigation measures successful in reducing disturbance? – The specific studies relating to SANGs (the SANGs visitor surveys) and the test of ranger effectiveness will provide specific results relating to particular interventions. More general patterns on how well mitigation is working can be drawn out from the other data, for example:

(a) Reduction or maintenance of the frequency of visitors in relation to increase in housing.

(b) Reduction or maintenance of the frequency of disturbance events in relation to increase in housing.

(a) Will be determined from the results of 3 and 4 above, for example, derived from counts of visitor activities within sites. (b) Is more complicated to assess directly, but can be inferred from the overlap between human activities and the birds. It would be based on the counts of activities within different parts of a site and at different times. For example, a reduction in the amount of intertidal activity occurring at times when

birds were present would decrease disturbance, even if the overall number of visitors at the site remained constant or increased.

8. Are mitigation measures proportionate to the increase in disturbance associated with new development? – This will be derived from the results of 7 above. If frequency of visitors and / or frequency of disturbance events remain constant or decrease, then it can be assumed that the mitigation measures are proportionate. If there are increases in either the frequency of visitors, and / or frequency of disturbance events, then further data checks or consideration of increased mitigation effort might be recommended. As access levels may be linked to other factors besides local housing (for example tourism), visitor data and housing data will be necessary to ascertain the links between development, access and disturbance.

9 What level of mitigation has been implemented? By summarising the total amount of mitigation – in terms of warden time, dogs initiatives, SANGs etc. the overall quantum of mitigation can be summarised and potentially mapped. In order to demonstrate the effectiveness of mitigation it is important to clearly summarise what is done. With such data clearly set out in each annual report it is possible to review progress over multiple years.

3.3 A key purpose of the annual reports will be to highlight any changes required to the mitigation highlighted by monitoring. They should recommend any changes in mitigation required due to factors such as emerging, novel types of recreation that have potential to impact on bird populations. Such activities may be detected by the monitoring, but there would also be value in performing horizon-scanning activities to identify potential impacts at an early stage. These could simply involve communication (e.g. through email) to all local stakeholders and rangers asking them to identify any potential emerging threats or cross-reference to the annual Solent European Marine Sites Response Reports[8], which include anecdotal accounts of current and emerging issues.

3.4 Every five years a more detailed report should be produced, including more detailed analysis, a more thorough review of the mitigation and monitoring, a check that the monitoring is working effectively and an assessment of whether further studies could improve the effectiveness of mitigation. This could include recommendations as to whether some of the raw data on which the mitigation strategy is based could be improved through further studies. The five year reporting should also include a workshop-type event to communicate the project to local stakeholders, and to run more formal horizon scanning to identify how ongoing mitigation may need to be adapted to address novel issues.

3.5 The five year reporting could also address whether the monitoring should be supplemented with more detailed research to determine whether disturbance rates are reducing the population sizes of birds, or causing more birds to die. This is because the

[8] See http://www.solentems.org.uk/annual_monitoring/

monitoring cannot determine whether changes in the number of people, their activities and overlap with birds are reducing the number of birds that can be supported in the system, or reducing the survival rates of the birds. Whether or not such understanding is required needs discussion, but if it is, the only current way of achieving this is to develop individual-based models (IBMs) of the birds and their food supplies. This would mimic the approach previously used for Southampton Water. However, this relies on knowledge of the abundance and size distribution of invertebrate prey throughout a site to be modelled, which is only currently available for Southampton Water and Chichester Harbour. The five year reporting should assess whether alternative, more simple approaches to IBMs are available, and then decide whether the techniques available at the time could be used to better understand how disturbance rates are affecting the population sizes of the birds.

3.6 Given the data requirements of IBMs, any opportunities to collect suitable invertebrate data - numerical density of size classes of important bird prey species collected from samples throughout a site - should also be identified. This could include advice of surveys collected for other purposes to ensure that the criteria above are met. Many of the other data requirements of these models will be met by the proposed monitoring, including observations of the distribution of people, and the distribution and abundance of the birds. However, any additional observations of the diets of the birds, the proportion of time they spend feeding per day, changes in their distribution through the tidal cycle, and their response to disturbance would also be of value. The five year review could assess opportunities to collect these data, or collate them from other studies.

REPORTING

Alongside the actual monitoring, resources need to be allocated to data collation, analysis and presentation. Monitoring data should be maintained in a series of databases and annual reports using standard format/template should provide an indication of recent results. Five yearly reports would contain more detailed analysis.

Around [redacted] per annum should be allocated for the data collation and annual reports, with additional funding (around [redacted]) for the more detailed five yearly reports. Data collation could be undertaken by a local records centre, local authority, Partnership Officer, lead ranger or external contractor. Reporting is perhaps best undertaken by a contractor as some statistical analysis will be required. [redacted] would allow for 12 days of external time (at [redacted] per day) and depending on the level of input from rangers/Partnership Officer more or less budget may be necessary. An additional [redacted] every 5 years would allow for an additional 10 person days (at [redacted] per day) for further analysis.

4. Discussion and limitations

4.1 We have set out a monitoring strategy that involves a series of different monitoring elements, most of which would continue indefinitely and provide information on visitor numbers, visitor behaviour, visitor profiles and bird distributions. Alongside this information on the changes in housing and mitigation delivery will provide context on how much the local human population has changed and the measures put in place to minimise disturbance.

4.2 While we have set out clear recommendations, there is scope for flexibility within our framework. Should additional budget be available or particular issues arise that mean more detailed data collection is desirable then the various monitoring elements can be scaled up and adapted. For example visitor interviews within the SPA could be undertaken more frequently than every five years, or bird monitoring could be extended (with options to include July or additional low tide monitoring more frequently than every five years).

4.3 We have made our recommendations aware of the resource implications of our proposals and the need for robust data. The original evidence base for the Solent Disturbance and Mitigation Project was subject to detailed scrutiny (ABP Marine Environmental Research Ltd. 2012), and while generally supportive of the approaches used, the review did suggest the modelling could have been over-precautionary (a point contested by the authors). While recognising the limited resources available, the review did suggest additional work areas for the future, centred on gaining a greater understanding of the sensitivity of the modelling work and developing the models further. Recommendations included determining the prey availability to birds throughout the study area and gaining a greater understanding of the relative usage of different sections, habitats and intertidal zones along the coastline by both people and birds. We have had regard for these recommendations in producing this strategy. Our approach has been to focus on the information that can be easily and effectively collected, with an eye to the possibility of further IBMs in the future, if required (see para 3.6).

4.4 We have not included regular, long-term repeat monitoring of disturbance (as in the behavioural response of birds to the presence of people), as this is challenging to analyse and best explored through models (IBMs). Data on behavioural responses to disturbance (for example how often birds are flushed in a particular location) are difficult to interpret and perhaps not suitable for a long term monitoring project. The response of birds will depend on a range of factors, including food availability, competition (numbers of other birds) and weather (for example and discussion see Gill, Norris & Sutherland 2001; Beale & Monaghan 2004). Changes in the flush rate of birds may relate to a range of factors such as prey density that are difficult to record. We therefore have focussed our monitoring on basic information that can be easily compared over time.

4.5 Over time additional data, monitoring requirements or changes in circumstances may mean the monitoring strategy needs adapting and reviews are recommended. New datasets such as that collected by the Eastern Solent Coastal Partnership through their Solent Bird app may provide opportunities for further analysis or additional detail in certain areas.

4.6 It will be essential that monitoring provides useful data that is easily accessible and easy to interpret. We have made some recommendations for reporting and data collation but it is crucial to the success of the monitoring that the approaches work for those that need the information. The way the data are collected, shared and circulated will be important and needs to fit with the partnership and people involved. The monitoring involves different threads/discrete areas of data collection, some of which may be undertaken by different parties. Care will be needed to coordinate the monitoring and ensure the data can fit together. WeBS data collection is undertaken by volunteers and it will be necessary to ensure their input is recognised and acknowledged.

4.7 We have recommended ways in which the different monitoring might be commissioned or implemented and our recommendations include use of ranger time, volunteers (WeBS) and professional surveyors. It may be that costs could be reduced through commissioning work over multiple years or by making the most of staff time (such as the rangers or other local authority staff). The regular, repeat monitoring would not fit with local student individual projects (e.g. Masters students or undergraduates), which require a greater degree of original research. However, this could fit well with student work experience or collaborative projects. For example, at Bournemouth University students undertake 5-6 week placements (work experience), and can also take part in Student Environment Research Teams (SERTs) (short collaborative projects targeted at environment research or monitoring, which can also count as placements). SERTs, or similar joint student projects, could provide a cost-effective way of collecting monitoring data, and could run year-on-year, with students applying to be part of the project each year.

5. Conclusions

5.1 We have presented a package of monitoring measures in previous sections of the report and recommended these are brought together in annual reports and more detailed five year reports. We consider all elements essential to provide the information necessary to underpin and inform the progression of the mitigation. Some data elements may not be so relevant now – in terms of getting the ranger team established etc. – but are essential as baseline data against which to compare results in the future.

5.2 We have set out each element in terms of its basic cost and the cost estimates within the body of the report discuss the potential to extend monitoring further should additional resources be available. Where additional options are worth considering (in most cases extending the monitoring) these are highlighted in the green summary boxes within the report.

5.3 In this section we provide an overview of the measures as a summary, with outline costs for the next five years. These are set out in Table 3. It is important to note that the costs are weighted to the early years. In particular we envisage that the visitor surveys of SANGs would only continue for the first ten years, and surveys of the disturbance levels at wardened sites would only be necessary for around five years, possibly less. Some elements, such as the WeBS data, would involve a six year cycle and therefore do not fit well into a five year block.

5.4 While we consider all elements of the monitoring essential as they fit together as a package, we have highlighted in the table where certain elements could be delayed if resources are particularly limited in the initial year(s).

Table 3: Summary of costs. For detail see individual green boxes in previous sections. Visitor surveys of SANGs and Disturbance levels at wardened sites (4th and 5th rows) are monitoring components that would not continue indefinitely. All other elements would continue at set intervals.

Monitoring component	16/17	17/18	18/19	19/20	20/21	5 yr total	Notes
Automated counters	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Assumes 10 counters. Might be possible to delay implementation in initial year should budget be limited.
Car-park/vantage point watches	[redacted]		[redacted]		[redacted]	[redacted]	Some additional work needed to map and set up. May be merit in setting up and trialling in 16/17 and then commencing biannually from 17/18. Could be undertaken by ranger team
Data recording by rangers						**£0**	Undertaken by ranger team. Level of counts dependent on available time.
Visitor surveys of SANGs	[redacted]				[redacted]	[redacted]	SANGs surveyed in years 1, 5 and 10. Start year could be shifted and dependent on future SANGs delivery
Disturbance levels at wardened sites	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Assumes five locations. Probably only runs for the first five years and costs could be reduced if results from initial years suggest no further changes. May be economy of scale too (see main text).
Visitor interviews (SPA)	[redacted]				[redacted]	[redacted]	Five year cycle, start year could be adjusted
Bird numbers and distribution		[redacted]			[redacted]	[redacted]	Low tide counts (6 year cycle) and core counts (2 year cycle) with boosted coverage. Data provision included in 20/21
Housing						**£0**	Records maintained by local authorities
SANGs creation/enhancement						**£0**	Records kept of delivery/enhancement
Ranger time/deployment						**£0**	Records maintained by ranger team
Reporting	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	
Total	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	

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7. Appendices

Appendix 1: Car-park count recording form

Date:	Surveyor:	Section:	Weather description/notes
Transect:	Start time: End time:	Cloud cover (8ths)	

Car park number	**Time**	**Total parked vehicles**	**Commercial vehicles**	**Vehicles with bike racks**	**Vehicles branded with dog walking**	**MPV / minibus vehicles**	**Camper vans**	**Rain** (enter 1 if present otherwise blank)	**Notes**

Record any details here relating to route/traffic or other general issues on the day that might affect count (road closures, world cup finals etc)

Notes

Car-park number is the unique ID number assigned to each car-park

Total parked vehicles is the total number of parked vehicles – columns to the right are subsets of this total

Commercial vehicles are vans or similar that have company branding on and may relate to people at work or linked to work

Dog branded vehicles are those used by commercial dog walkers

Campervans are separated from MPV/minibus type vehicles in that they clearly are used for sleeping in

Appendix 2: Vantage Point Recording Form

Vantage Point Recording Form

Date:	**Rain: (circle)** None Light Heavy
Section: **Location:**	**Wind: (circle)** None Light (1-2) light/Mod (3-4) Strong(5+)
Time:	**Wind Direction:**
Observer:	**Weather Notes:**

ID (cross reference to map)	Activity code	Total people in group	Number of dogs on lead	Number of dogs off lead	Notes
e.g. A	*2dw, 1dx, 1dl, 1kp*	*3*	*1*	*1*	

Appendix 3: Recording form for counts by rangers

Solent Visitor Count Form

Date:	**Start time:**	**Rain: (circle)** None Light Heavy
Section:	**Finish time:**	**Wind: (circle)** None Light (1-2) light/Mod (3-4) Strong(5+)
Location: (grid ref)	**Location Notes:**	**Wind Direction:**
Observer:		**Weather Notes:**

ID	Time (when passed surveyor)	Activity Type(s)	Group size (total people)	Dogs on lead	Dogs off lead	Direction	On intertidal (Y/N)	Modified behaviour when warden seen (Y/N)	Birds flushed (Y/N)	Notes
e.g. 1	*09.00*	*Dw, dx, dl*	*3*	*1*	*2*	*N*	*Y*	*Y*	*N*	*Walking on beach; put dog on lead when noticed me.*

Activity codes

AB	Air-borne (microlights, helicopters, planes etc)
B	Person working on boat (boat stationary)
BD	Bait digger (use for Cockle raking or bait digging – but use notes to specify)
BR	Birdwatcher
BW	Person accessing boat or water (inc e.g. windsurfers walking across mudflat)
C	Cycling
Ca	Canoe on water
dw	Dog walker
dl	dog on lead
dx	Dog off lead
F	Fishing (from shore)
HR	Horse Riding
J	Jogger
JS	Jet Ski on water
KP	Kids playing (with or without parents)
KS	KiteSurfer on water
LMb	Large boat on outboard motor
LS	Moderate – large sailing boat, not running motor
MD	Metal Detecting
MV	Motor vehicle
P	Picnic
RB	Rowing boat
SMb	Rib or similar fast small boat
SS	Small sailing boat (e.g. Laser / dinghy)
SW	Swimming
W	Walking / rambling (without dog)
WF	Wildfowling
WS	Windsurfer on water
WSk	Water skiing