



Phase I - Bird Disturbance Report



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Summary

Designated European Wildlife Sites in North Kent include three Special Protection Areas (SPAs) and Ramsar sites: the Thames Estuary and Marshes SPA and Ramsar site, the Medway Estuary and Marshes SPA and Ramsar Site, and the Swale SPA and Ramsar Site.

The North Kent Environmental Planning Group has completed Phase 1 of a bird disturbance study. This report draws on Phase 1 to provide summary information for Habitat Regulations Assessments (HRAs) of the relevant Local Development Frameworks, land allocation for development and the creation of mitigation and access management strategies. This report is limited to the administrative areas of Canterbury, Dartford, Gravesham, Medway and Swale local authorities. We focus on the impacts of recreational activities on the three SPA and Ramsar sites, and consider these impacts (individually and in-combination) in relation to new housing development.

From the evidence base we draw the following broad conclusions relating to development and the need for mitigation:

- There have been marked declines in the numbers of birds using the three SPAs. Declines are particularly apparent on the Medway and have occurred at the locations with the highest levels of access.
- Disturbance is a potential cause of the declines. The disturbance study shows birds are responding to the presence of people, and there is evidence that the busiest locations (which have seen the most marked bird declines) support particularly low numbers of birds. Detailed and costly fieldwork (involving assessment of invertebrate food supplies) and complex modelling would be necessary to explore in detail the impacts of disturbance on bird population size.
- Access levels are linked to local housing, with much of the access involving frequent use by local residents. Indicative data on future housing development,, when used with the visitor data to estimate change in access levels between now and c.2026, would suggest that the SPA/Ramsar sites would see a future increase of approximately 15%. Given the results of the disturbance work to date and the likely scale of change in the future, it is clearly not possible to rule out any likely significant effects on the integrity of the European sites as a result of increased housing. A suite of mitigation measures are therefore necessary to avoid potential adverse effects caused by future development.
- All activities (i.e. the volume of people) are potentially likely to contribute to additional pressure on the SPA sites and should be addressed within mitigation plans. Dog walking, and in particular dog walking with dogs off leads, is currently the main cause of disturbance (by far) and therefore should be a focus for mitigation. Other particular activities are those that involve people on the mudflats or the water.
- Development within 6km of access points to the SPAs is particularly likely to lead to increase in recreational use of the SPAs. Local greenspace use such as dog walking, cycling, jogging, walking and to some extent family outings will originate from people living within this radius.
- Beyond 6km from access points onto the SPA, large developments or large scale changes to housing levels will also result in increased recreational use. It would appear that visitors to

the North Kent coast mostly originate from a zone north of the M2/A2 between Gravesend and Herne. People living within this broad coastal strip (i.e. beyond 6km from SPA access points and north of the M2/A2) are likely to visit for more coastal specific activities. Assuming users will be drawn to make a dedicated trip to particular features/areas, then we can highlight:

- the mouth of the Swale (for kite/windsurfing, dog walking with dogs off leads on the intertidal, bait digging);
 - the upper parts of the Swale (boating activities);
 - the upper parts of the Medway around Gillingham, Upnor and Rochester (where considerable infrastructure is present and lots of boating activity including powerboats, RIBs etc)
 - nature reserves at Sheppey, Oare Marshes, Cliffe and Northward Hill.
- Development beyond 6km (excluding large sites) can be potentially screened out of assessments and assumed to have no likely significant effect on European sites. For development that does fall within 6km (or large sites beyond 6km) it will not be possible to demonstrate no adverse effect on integrity of the European sites and mitigation measures will need to be considered.
 - Mitigation measures are discussed within the report include awareness raising, on-site wardening, provision of signage and access infrastructure, provision/enhancement of green space away from the SPAs and direct contact with users.
 - Areas currently undisturbed, and in particular the main roost sites should, in particular, be protected from additional recreational pressure.

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Cover photograph Neil Gartshore (© Footprint Ecology).

1. Introduction

Context

- 1.1 The continuous swathe of coastal habitat between Gravesend and Whitstable on the North Kent shore comprises three Special Protection Areas (SPAs) and Ramsar sites. The status of the Thames Estuary and Marshes, the Medway Estuary and Marshes and the Swale as European designated sites reflects their importance for wintering waterfowl, breeding waterfowl, breeding and wintering raptors and also a range of rare plant and invertebrate species. Lying close to London and to major ports, north Kent is of considerable strategic economic importance, and much of the area lies within the Thames Gateway Growth Area, a Government priority for regeneration and economic development.
- 1.2 There is 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 those sites (Liley & Clarke 2003; Liley *et al.* 2006; Sharp *et al.* 2008; Stillman *et al.* 2012). The North Kent Environmental Planning Group has undertaken a bird disturbance study of the North Kent shore to examine the possible impact of human disturbance on the protected bird species present. Phase 1 of the project gathered evidence on bird on the causes and extent of bird disturbance within the three designated European Sites, and is now complete (see Liley & Fearnley 2011, Fearnley & Liley 2011 and Fearnley & Liley 2012). A second phase of the project has been proposed to look at the distribution of invertebrate prey within the designated sites. This would provide evidence on whether disturbance may be contributing to bird population declines through the displacement of birds from good quality feeding areas and would provide some indication of how much food there is in relation to the number of birds using the sites.
- 1.3 The evidence from the bird disturbance study and visitor studies will be used to inform and review the Habitat Regulations Assessments (HRA) of the Local Development Frameworks (LDF), Appropriate Assessments of planning applications, and in future the the development of mitigation and access management strategies. This report collates and puts into context all existing data to enable the findings to be used in assessments of development.

Overview of legislation and its implications

- 1.4 The three sites are classified as SPAs in accordance with the European Birds Directive (Council Directive 79/409/EEC on the conservation of wild birds, updated by Council Directive 2009/147/EC in 2009). This European legislation requires Member States to classify sites that are important for bird species listed on Annex 1 of the European Directive, which are rare and/or vulnerable in a European context, and also sites that form a critically important network for birds on migration.
- 1.5 All three of the north Kent sites are classified for their waders and waterfowl, both Annex 1 and migratory species. The bird interest features for which each site has been classified varies slightly, but the three sites provide passage, overwinter, and breeding habitat to an array of species of European Importance. The three European sites

together provide a vast and linked expanse of critically important habitat to the SPA network around the British coast. In this report we focus on the wintering bird interest, and the area of coast between Gravesend and Whitstable. It should be noted that there are additional parts of the Thames Estuary and Marshes SPA that lie outside our area of focus.

1.6 The additional Ramsar site listing for all three sites arises from recognition of the international wetland importance of each, under the Ramsar Convention¹. It is common for SPAs to also be listed as Ramsar sites. The Ramsar site boundary does not quite match the SPA boundary, notably near Gravesend where the Ramsar boundary extends beyond the western boundary of the SPA.

1.7 The conservation objectives for three SPAs are defined by Natural England². They are similar for each SPA and, with regard to the individual species and/or assemblage of species for which the site has been classified (which is slightly different for each SPA), are:

Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.

Subject to natural change, to maintain or restore:

- *The extent and distribution of the habitats of the qualifying features;*
- *The structure and function of the habitats of the qualifying features;*
- *The supporting processes on which the habitats of the qualifying features rely;*
- *The populations of the qualifying features;*
- *The distribution of the qualifying features within the site.*

1.8 Strict protection requirements apply to European sites. The Member States' duties for European sites, both SPAs and Special Areas of Conservation (SACs being designated for non-avian wildlife of European interest), are set out in Article 6 of the European Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna). Relevant duties have been transposed into UK legislation via the Conservation of Habitats and Species Regulations 2010 (SI No. 2010/490), commonly referred to as the Habitats Regulations.

¹ Convention on wetlands of international importance especially as waterfowl habitat, Ramsar, Iran, 2/2/71 as amended by the Paris protocol of 3/12/92 and the Regina amendments adopted at the extraordinary conference of contracting parties at Regina, Saskatchewan, Canada 28/5 – 3/6/87, most commonly referred to as the 'Ramsar Convention.'

² See:

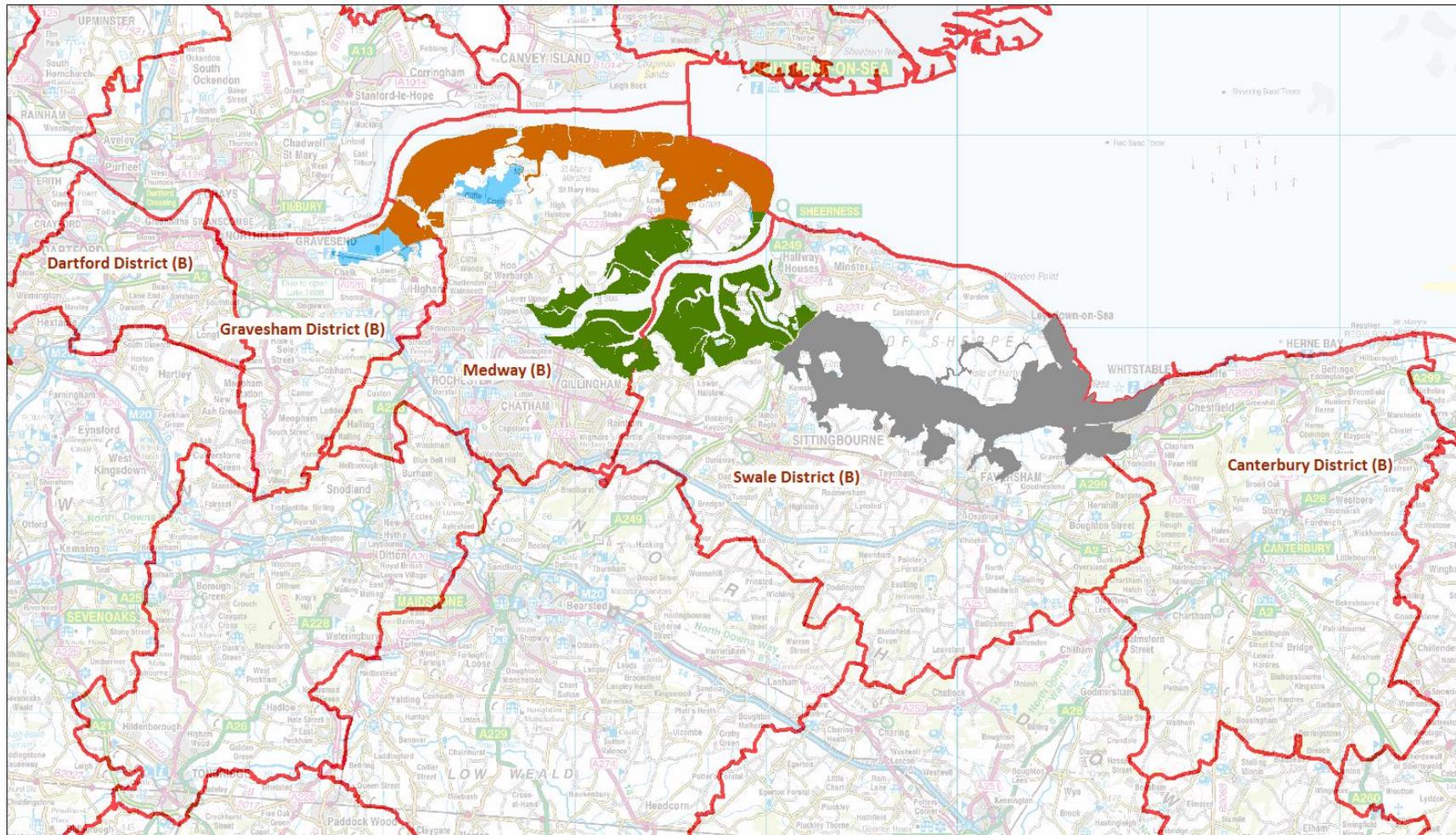
<http://www.naturalengland.org.uk/ourwork/conservation/designatedareas/sac/londonandsoutheast.aspx>

- 1.9 It is important to note that the European legislation requires two key elements of protection. Firstly there is the overall duty to avoid the deterioration of European sites (Article 6(2) of the Habitats Directive), and secondly there is the duty to properly assess plans or projects that are likely to have a significant effect upon European sites, and only allow their implementation if the European site will not be adversely affected, unless further stringent tests apply (Article 6(3) and 6(4) of the Habitats Directive). There is therefore a duty to both prevent or rectify effects from existing impacts, and to ensure that further effects do not occur as a result of new potential impacts.
- 1.10 In complying with the Ramsar Convention, the UK Government treats listed Ramsar sites as if they are European sites, as a matter of national planning policy, as set out at Section 118 of the National Planning Policy Framework 2012, and the legislation to protect European sites is therefore equally applied to the Ramsar listing. In the case of the north Kent marshes it is important to note that the Ramsar boundaries, while mostly coinciding with the SPA boundaries, do also extend in parts well outside the SPAs (Map 1). While we mostly use and refer to the SPA boundaries within this report (because these designations reflect the key areas of wintering birds), areas just outside the SPA may also be important for the wintering birds and the Ramsar interest features.
- 1.11 In addition to its European wildlife importance, the context for this assessment work is the North Kent coast as an area of significant economic importance, both in terms of development and regeneration, industry and international trade. The North Kent coast is the subject of a concentration of strategies and initiatives for economic regeneration and growth, with a clear central government priority, and this is further reflected in the county and district level spatial planning documents.
- 1.12 Proposals for transport improvements, green energy development, increased tourism, regenerated towns and the scale and location of new housing all need to take into account the European wildlife site backdrop to this prioritised area for growth. In accordance with the new National Planning Policy Framework 2012, economic, social and environmental gains should be sought jointly through the planning system.
- 1.13 It is imperative that Local Development Frameworks/Local Plans provide a clear policy steer for a suitable type, amount and location of development that can meet the aspirations of the growth agenda for the area, supported by HRA work to demonstrate that the suite of European sites will not be adversely affected. In the absence of comprehensive HRA work at the plan stage, conflicts are likely to occur when development proposals that accord with the growth agenda are presented, yet they are unable to proceed if they cannot accord with the requirements of the Habitats Regulations.
- 1.14 The clear policy steer may need to take the form of an interim strategy to inform the determination of development proposals until agreed and consistent approaches across the North Kent coast can be embedded in plans. Consistency across LPAs in both HRA and the application of mitigation measures should be sought, so that the application of mitigation throughout the area is strengthened by a coordinated approach.

- 1.15 HRA assessment work will require an evidence base that includes scientific assessment of how European site bird interest features may be being affected by existing development, i.e. the current condition and sensitivities of interest features, and also how European site bird interest features may be further affected by potential impacts.
- 1.16 Deficiencies in information require application of the precautionary principle, and it is therefore in the interest of all parties to obtain as much information as possible to inform the HRA work. Where required, the precautionary principle will be informed by current interest feature condition and sensitivities, and any wider relevant information that may indicate that impacts should not be ruled out (for example relating to different species and habitats, or different scenarios, but indicating a response that may also be applicable in this case).

Aims of this Report

- 1.17 This report focuses on the administrative areas of Canterbury, Dartford, Gravesham, Medway and Swale local authorities. These authorities lie closest to the European sites and will therefore be most relevant to the issues considered. We focus on the impacts of recreational activities on the three SPA and Ramsar sites, and consider these impacts (individually and in-combination) in relation to new housing development.
- 1.18 The aim of the report is to bring together information from a range of sources and provide support for plan-making and site specific Habitat Regulations Assessments. The report has been commissioned to provide an overview of the issues, the scale of impacts and the consequences with respect to legislation. Given the complexities of the ecological issues and strict requirements of the Habitat Regulations, a clear view of the the implications and necessary next steps is required.



**Map 1: SPA and Ramsar boundaries
(South side of Thames only)**

Contains Ordnance Survey data © Crown database and database right 2011

Relevant SPAs (also Ramsar)

- Medway Estuary & Marshes
- Thames Estuary & Marshes
- The Swale

■ Ramsar (but not SPA)

District Boundaries

2. Drawing from the available information

2.1 The findings of the bird disturbance and recreational use work carried out to date are summarised from the following reports:

- 1) *What do we know about the birds and habitats of the North Kent Marshes?* (Cruickshanks *et al.* 2011)
- 2) *Bird Disturbance Study, North Kent 2010/11* (Liley & Fearnley 2011)
- 3) *North Kent Visitor Survey Results* (Fearnley & Liley 2011)
- 4) *North Kent Comparative Recreation Study* (Fearnley & Liley 2012)

2.2 Other work considered includes:

- 5) Estuary Users Survey (Medway Swale Estuary Partnership, 2011)
- 6) GGKM Roost survey (mapped in Liley & Fearnley 2011)
- 7) Recent Wetland Bird Surveys produced by the British Trust for Ornithology
- 8) Other relevant studies/work taking place in other areas.

Bird species of particular concern

2.3 Thirty two species of wader and wildfowl for which WeBs data are available are listed in the SPA designations for the three sites. These data are summarised in Appendix 1, which gives the recent peak counts for each site and each species.

2.4 WeBS alerts provide the most robust and standardised means of highlighting which species have undergone major declines on particular protected sites. WeBS alerts are based on trends, assessed over the short-, medium-, and long-term (5, 10 and up to 25 years respectively). Declines exceeding 50% are classified as “High Alerts” and those exceeding 25% as a “Medium Alert” is issued. The most recent WeBS alerts (using data up to 2007/08) are summarised in Table 1. The Medway Estuary and Marshes SPA has a large number of current alerts, with 12 species listed as high alert and an additional two species with medium alerts only, i.e. 14 species for which the site is designated have undergone recent declines of 25% or more.

2.5 Declines in individual species on particular sites may be caused by a range of factors, for example changes in the distributions of a number of waders and wildfowl within the UK have been well documented and illustrate a trend for distributions to shift north-east (Austin & Rehfish 2005; Maclean *et al.* 2008). Declines that occur simultaneously across multiple sites may indicate broad issues, such as effects of climate change (note that increased access/disturbance could occur across multiple sites and be a ‘broad’ issue, as population levels in the UK and access are increasing generally). Site specific declines will potentially indicate particular pressures on individual sites or particular changes to individual sites. WeBS alerts therefore need to be considered in context with the species’ ecology, the distribution of the birds within the sites and the likely factors that might be involved in any decline. It is useful to understand site declines in relation to other sites, and the WeBS alert accounts do provide this information, and a

comparison with other sites designated for each species in the south-east region is also provided by Cruickshanks *et al.* (2011).

2.6 In Table 1 we have highlighted in orange which species have seen site specific declines on each SPA, drawing from the species accounts in the WeBS alert report (Thaxter *et al.* 2010). It can be seen that there are site-specific issues for particular species on each of the three estuary SPAs. Species that are highlighted include wildfowl (pintail, shoveler, wigeon, teal) and waders (curlew, knot), and also other species such as great-crested grebe and cormorant. Table 1 provides some indication of the time periods over which declines have occurred. Drawing on the WeBS alerts reports it can be seen that the declines for many species started in the 1990s. The decline in wigeon numbers on the Swale (which appears to be site specific), appear to be more recent, and probably first came to bear around winter 2003/2004.

2.7 Additional information on the declines in bird numbers can be drawn from some earlier work by the BTO (Banks *et al.* 2005). Banks *et al.* compared the declines on the Medway with trends for the Swale and Thames in order to determine whether the declines on the Medway could be linked to increase in numbers on adjacent sites / count sectors, in other words the extent that birds were redistributing within the Medway/ Swale/Thames complex as a whole. The Banks study did find some evidence that birds were redistributing away from the Medway but staying within the wider north Kent area (in particular this was shown for ringed plover, oystercatcher, grey plover and dunlin). Banks *et al.* highlighted the south and west sections of the Medway as being the ones where the decline in birds had been most marked. In addition, the majority of species identified to be in decline using Core Count data, also showed declines in their Low Tide Count trends, indicating that the factors leading to declines have similarly affected both roosting and feeding usage of the site. Banks *et al.* highlight urban and recreational development around the south and eastern part of the Medway as a potential cause of the observed declines.

Table 1: Bird species of particular concern (from Cruickshanks et al. 2011). Table show percentage changes over the period winter 1981/82 and 2006/07 unless specified. ¹ % change – 1985/86 - 2006/07, ² % change 1990/1991, ³ % change 1986/1987 – 2006/07, ⁴ % change 1990/1991 – 2006/07, ⁵ % change 1988/1989 – 2006/07, ⁶ % change 1987/1988 – 2006/07. Species highlighted in orange are those where the BTO alerts report suggests the decline is site specific³

	Species	Short-term % change	Medium-term % change	Long-term % change
THAMES	European White-fronted Goose	-86	-92	-99
	Shelduck	-9	-30	-41
	Gadwall	-37	9	188
	Pintail	-68	-61	-33
	Shoveler	-48	-15	-48
	Little Grebe	15	26	193
	Avocet	9	70	7200
	Ringed Plover	27	12	51
	Grey Plover	-49	-20	8
	Lapwing	-46	-39	74
	Knot	-77	-58	-37
	Dunlin	-16	-1	-5
	Black-tailed Godwit ¹	593	352	5100
	Redshank	-4	-18	-12
MEDWAY	Dark-bellied Brent Goose	-30	-52	21
	Shelduck	-3	-58	-20
	Wigeon	18	-59	95
	Teal	-22	-44	93
	Pintail	58	-54	211
	Little Grebe ²	-2	6	6
	Great Crested Grebe	45	-16	-66
	Cormorant	-55	-60	-73
	Oystercatcher	-35	-56	295
	Avocet ³	38	156	15500
	Ringed Plover	-48	-75	-65
	Grey Plover	-39	-62	60
	Lapwing	40	-26	727
	Dunlin	25	-67	-43
	Black-tailed Godwit	56	13	3133
	Curlew	-41	-48	53
Redshank	-27	-62	-36	
SWALE	European White-fronted Goose	-23	-76	-81
	Dark-bellied Brent Goose	20	-3	49
	Shelduck	0	-15	61
	Wigeon	-26	-34	46
	Gadwall	-47	3	25
	Teal	6	80	80
	Pintail	-3	62	194
	Shoveler	-37	-39	-20
	Little Grebe ⁴	-16	-57	-26
	Cormorant ⁵	-32	-56	-79
Oystercatcher	-34	-1	26	

³ See species accounts for respective sites in Thaxter *et al.* (2010)

	Species	Short-term % change	Medium-term % change	Long-term % change
	Avocet ⁶	54	255	5050
	Golden Plover	60	230	1457
	Grey Plover	-44	-54	-13
	Lapwing	3	41	115
	Knot	33	-9	35
	Dunlin	-27	-51	-34
	Black-tailed Godwit	30	88	1480
	Bar-tailed Godwit	-24	-15	59
	Curlew	8	7	-9
	Redshank	-33	-32	-13

2.8 Figure 1 shows the changes in total waterbird numbers at the three sites between winter 2005-6 and 2009-10. During this period, total numbers at the Swale have stayed relatively stable, whereas the Medway has seen a recent decline, and the Thames a longer-term and more substantial decline.

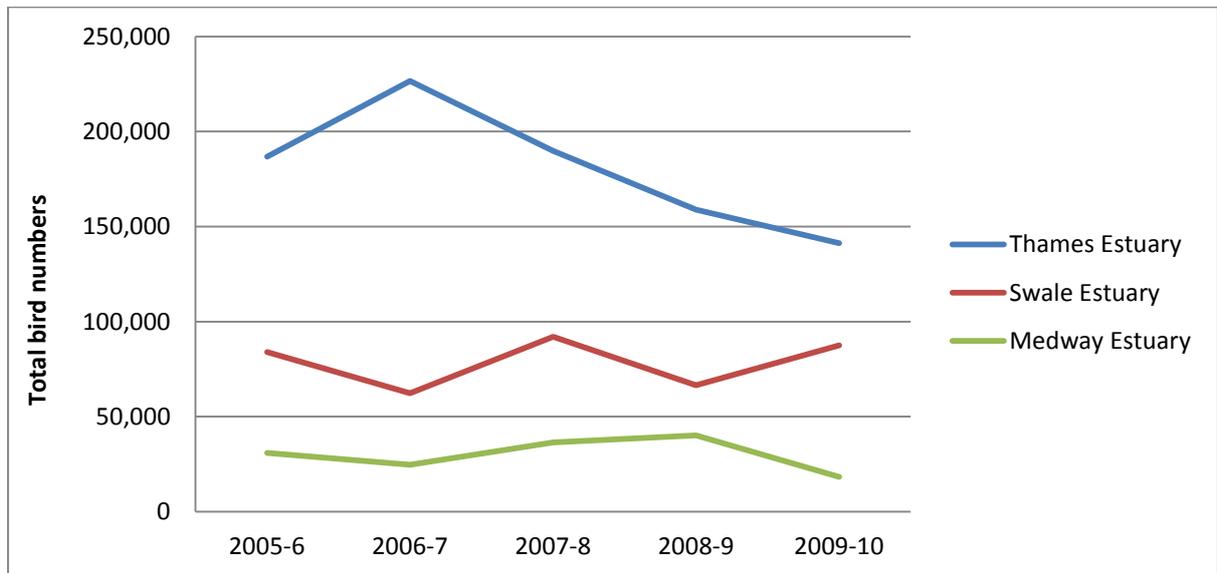


Figure 1: Total number of waterbirds on the Thames, Swale and Medway 2005/2006 to 2009/10 (Holt *et al.* 2011 p. 10)

Bird Disturbance Study

- 2.9 The results of the bird disturbance study are summarised in Box 1 (see Liley & Fearnley 2011 for further information). Bird and visitor distributions were such that people and birds overlapped, and birds were being flushed as a result. Visitor presence resulted in behavioural changes in the bird species present in about 25% of cases. In 13% of cases this involved the birds taking flight and being displaced more than 50m (defined as a major flight). Most behavioural changes were due to the presence of dogs, particularly those off the lead. Variation was observed between sites in the proportion of disturbance events resulting in major flight – this appeared greatest at the sites with fewer visitors, and lowest at the busiest sites.
- 2.10 In Table 2 we summarise the activities observed to cause major flights and the frequency with which the activities were recorded. Nearly half (47%) of all the major flights observed and that were attributed to people/craft etc. were caused by dog walkers with dogs off the lead. This group accounted for 37% of the activity observed, indicating that the disturbance caused was disproportionate to the level of occurrence. Including dog walkers whose dogs were on leads, dog walkers in total accounted for 56% of the major flight events observed. Other activities causing major flight included walkers, bait diggers, birdwatchers, motor vehicles, RIBs/power boats and wildfowling.

Table 2: Activities and major flight responses, from the disturbance study (data drawn from Table 6 in the disturbance report)

	% of major flight	% of total observations
Bait digger	5.4	1.4
Birdwatcher	4.7	3.7
Cycling	1.5	6.1
Dog off lead	0.0	0.1
Dog walker, all dogs on lead	9.4	12.2
Dog walker, one or more dogs off lead	46.8	37.2
Fishing (from shore)	0.7	0.2
Jogger	0.7	4.0
Motor vehicle	5.2	8.2
Other	1.2	0.7
Person accessing boat or water	1.7	1.1
Person working on boat	1.0	0.2
Kids playing	0.0	0.0
Other	1.0	0.3
Walking / rambling (without dog)	17.6	22.5
Wildfowling	1.5	0.5
Large boat on outboard motor	0.0	0.6
Rib or similar fast small boat	1.2	0.5
Rowing boat	0.0	0.0

Small sailing boat	0.0	0.1
Swimming	0.0	0.1
Air-borne	0.2	0.4

- 2.11 Various factors were shown to influence whether or not birds showed behavioural changes as a consequence of visitor presence. Distance was a highly significant factor, with birds more likely to take flight when the source of disturbance was closer. Birds were found to respond when disturbance took place within 50m. The number of birds in the flock was also a factor, with the probability of major flight occurring being less for larger groups of birds. The number of people in a group did not appear to be relevant, but the presence of a dog increased the likelihood of birds taking flight, further increasing with the number of dogs and if they were off the lead. The probability of individual potential disturbance events leading to behavioural change was greatest on the intertidal zone, but because of the much larger number of visitors using the shore by far the largest number of disturbance events occurred on the shore. Major flight was more likely to take place at high tide, when birds were more likely to take flight at closer distances.
- 2.12 The disturbance study highlighted the behavioural changes seen in waders and wildfowl as a consequence of visitor presence on the shore, intertidal zone and water, and identified which factors were most likely to lead to changes. The behavioural response of birds is not necessarily always a good indication of the impact of disturbance (Gill, Norris, & Sutherland 2001; Beale & Monaghan 2004). While other studies have shown that repeated flushing can have population impacts (West et al, 2002), we cannot ascertain from this work whether the level of flushing is such that population size may be affected. This would require highly complex modelling of the energetic costs of the increased flight time. Without this modelling, and given the level of flushing recorded, it is certainly not possible to suggest that disturbance is not having an impact on the European sites.
- 2.13 While lower numbers of birds tended to be found at the busier sites, no statistically significant overall correlation was found between bird and visitor numbers. However, there were no visits where high numbers of people were counted and high numbers of birds also occurred. Low numbers of birds were recorded within the survey areas at the busiest sites, in the south-eastern part of the Medway. This is also the area that has seen the most marked declines in bird numbers (2.7).
- 2.14 This suggests that birds may be avoiding the busiest sites, but at the other sites other factors may be influencing distribution. It is therefore not possible to conclude that there are no impacts from disturbance. In fact, negative correlations were shown between visitor density and density of curlew, greenshank, oystercatcher and sanderling, and between visitor and overall bird density at one site, Grain Beach (Location 17). There was therefore some (albeit weak) evidence to suggest that the distribution of birds was related to levels of access, at least at the surveyed sites. It is clear that other factors may also be determining the distribution and abundance of

birds at the sites with lower levels of access, and without a full understanding of these other factors it is not possible to fully determine the scale of impact of disturbance on bird numbers and distribution. Ideally detailed analysis of bird numbers in relation to prey availability would be available and included in this document, but such data are difficult and costly to collect. In the absence of this more detailed (and highly complex work), it is certainly not possible, with the available data, to rule out likely significant effects (from future changes in access levels) on the integrity of the European sites.

Box 1: Bird Disturbance Study: Summary

- Within the 22 areas surveyed, 1400 records of visitors within 200m of the birds (considered as potential disturbance events) were made.
- During these 1400 events, 3248 species-specific observations were made of behavioural responses to visitor presence. Of these:
 - 74% resulted in no response
 - 13% resulted in a major flight
 - 5% resulted in a short flight
 - 5% resulted in a short walk
 - 3% resulted in the birds becoming alert
- Dog walking accounted for 55% of all major flight observations, with a further 15% attributed to walkers without dogs along the shore.
- 37% of potential disturbance events recorded on the intertidal zone resulted in a major flight, while 9% of potential disturbance events recorded on the shore resulted in a major flight. However, of all the major flight observations noted, 73% were caused by shore based visitors and 22% by visitors on the intertidal/area of mudflats.
- The distance between the potential disturbance event and the birds was a significant predictor of major flight, with birds more likely to fly when the source of disturbance was nearby.
- After controlling for distance, major flights were more likely to occur when activities took place on the intertidal zone compared to events on the water or events on the shore, and the probability of major flight increased with the number of dogs present with a group.
- There were significant differences between species with curlew showing the highest probability of major flight and teal and black-tailed godwit the lowest. Brent goose showed the most frequent behavioural changes as a result of visitor presence: birds became alert, walked or flew in 53% of observations of this species. Knot was the species with the highest percentage (36%) of major flights.
- High numbers of major flights were recorded at South Oaze (location 2), Oare Marshes (location 3) and Grain Power Station (location 18).
- Tide state was also significant with major flights more likely at high tide, after controlling for distance. There was also a significant interaction between distance and tide, indicating that the way in which birds responded varied according to tide.

Recreational use

- 2.16 Three separate but linked studies have been carried out on the North Kent shore to explore how the designated sites are used for recreation:
- Detailed information on visitor behaviour, patterns and attitudes was obtained through the North Kent Visitor survey (Fearnley & Liley 2011).
 - The North Kent comparative recreation study (Fearnley & Liley 2012) was commissioned to provide a strategic overview of access across the shoreline.
 - The Estuary Users Survey provides information from clubs and other recreation groups.
- 2.17 The results of the North Kent Visitor survey, in which visitors were interviewed across 22 survey locations in the winter of 2010-2011 are summarised in Box 2. Visitor numbers to locations varied, with a far higher number of people recorded and interviewed at 'honey pot sites' with large car parks and dedicated visitor infrastructure than at relatively remote coastal locations with layby parking.
- 2.18 The visitor survey revealed the importance of the North Kent marshes as a place for visitors to exercise themselves and their dogs. Dogs were recorded at every location. The average route length of a dog walker was 2.6km and 3.0km for a walker.
- 2.19 The time visitors spent at a location was typically short (under an hour) but this varied substantially between locations, suggesting the character and nature of area may play a part in determining visit durations. Locations which had the largest catchment (i.e. where interviewees travelled the furthest to visit) were the places where visitors spent the longest time. Duration of visit and travel distance to a location also varied with the activity undertaken. Only a small number of interviewed visitors came from south of the M2/A2.

Box 2: Visitor survey results

- A total of 1398 visitors were recorded at the 21 surveyed access points and 542 visitor groups were interviewed. The majority of these (96%) were local residents who had made their trip from home.
- The majority of those interviewed (61%) stated they visited the area equally all year indicating the sites are well used during the winter. Visitor use of the area was higher at weekends than on weekdays.
- The area is well used by dog walkers with over two thirds (65%) of interviewed groups accompanied by at least one dog.
- Visitors made their trip to the coast to undertake a broad range of land and water based activities. Two type of activity were dominant: dog walking and walking.
- Two main types of transport were used to access visit location with 63% of visitors arriving by car and 34% by foot.
- Of the visitors who arrived by foot 50% lived within 0.9km of the area they visited while 50% of visitors who arrived by car lived within 4.2km. Those who arrived by foot made more annual visits to the area they visited than those who arrived by car.
- The route a visitor took varied dependent on the activity they were undertaking and location they visited. Visits were typically short with 57% lasting less than an hour and 23% of routes strayed from the paths and crossed onto the intertidal areas or open beach.
- The main reason for 28% of interviewees visiting the location they did was because it was close to home and an additional 26% mentioned it was good for their dog. Visitors indicated that more time would be spent at their visit location if there was better path surfacing and marked trails or routes.
- Visitors had a mixed reaction as to whether they would spend more time on site if they had to keep their dog on lead, where 44% would use the area less and 15% would use the area more. Just over a third (35%) of visitors would spend less time at an area if car parking charges were introduced.
- Of those visitors interviewed 52% came from Medway, 24% from Swale, 12% from Canterbury. In terms of settlements themselves 29% of interviewees came from Gillingham and 10% from Whitstable.

2.20 The North Kent comparative recreation study (Fearnley & Liley 2012) involved the comparative scoring of the frequency of activities (5 shore, 3 intertidal, 8 water and 1 air based) across 33 sections of the coast. Scoring was carried out by local experts. The results are summarised in Box 3

2.21 The busiest sections of the shoreline were those nearest to Gillingham and at the mouth of the Swale. The sections nearer the mouth of the Swale had higher intensity of

bait diggers, kitesurfers, windsurfers, canoes, ribs/small powerboats and jet skis than any other coastal sections. Scoring was carried out by local experts.

Box 3: North Kent comparative recreation study results

- Recreational use of the shoreline is not uniform. Some activities were concentrated across specific coastal areas while others were widespread.
- Bird watching was present across all sections of the shoreline while walking and dog walking were present at all but one.
- Five sections were identified with no car parking provision and restricted access was noted over 10 sections. There were slipways/ launching facilities at 10 sections.
- The coastal sections of the north and south (especially) at the mouth of the Swale scored highest for dogs off lead and on the intertidal, bait digging and shell fishing.
- Kitesurfing and windsurfing were concentrated at a handful of sections
- Overall business scores identified the coastal sections closest to Gillingham and at the mouth of the Swale as the busiest.

- 2.22 The face-to-face interviews carried out for the North Kent visitor survey provide a robust overview of access patterns. It should be noted that the data do not necessarily provide good representation for all user groups. The particularly cold winter, plus the fact that water-based activities tend to be focussed around launch points (which were not necessarily the focus of surveys) meant that users such as kite surfers and wind surfers may have been under-recorded (or at least in the case of the cold weather, not out as often as they might be during a mild winter). The comparative scoring and the Estuary Users Survey therefore provide additional important information. .
- 2.23 The Estuary Users Survey was undertaken in 2011 survey, and included direct contact with 57 user groups and clubs. The results indicate that over the past five years, eight yacht clubs saw an increase in their membership while two clubs reported a downturn and two stated that membership had remained constant. Kayak and rowing clubs both confirmed that the level of membership had increased over the past five years. The jet ski club noted a recent decrease in membership. Overall it seems that club boating, rowing, kayaking and canoeing activity is likely to continue to rise in the foreseeable future, while jet ski club activity levels may fall. An increase in club membership is likely to reflect an increase in the interest in and awareness of the sports, suggesting that increases in individual activity levels (i.e. individuals who are not members of clubs) are also likely. Appendix 2 provides information concerning clubs with increasing membership.
- 2.24 Of the interviewed clubs, only one is open all year (its membership is decreasing). It is difficult to establish whether watercraft activity associated with clubs in the spring is

likely to overlap with the period of time when wintering birds are present. For most clubs, spring and summer are the busiest times when the most boats are on the water and using the moorings. There were eight clubs which stated they are also open over the autumn and activity levels at this time of year would coincide with the arrival of some bird species.

- 2.25 Overall it seems that boating, rowing, kayak and canoeing activity is likely to continue to rise over the foreseeable future, and jet ski activity levels may fall. It is not possible to establish whether this predicted increase would result in increased activity when wintering birds are present. It seems likely that notable increases in activity levels would be observed in the warmer, milder months of the year when wintering birds are absent.

Data gaps and limitations

- 2.26 The lack of information on prey abundance has been previously discussed (see 2.14), and this does form a gap in our understanding. With a knowledge of prey distribution and abundance it would be possible to determine the key areas for feeding, where bird numbers are lower than might be expected (given the level of food) and to what extent bird distribution may be being affected by disturbance. The prey data would also provide the opportunity to undertake more detailed modelling of bird populations (see Stillman *et al.* 2007), as has been undertaken on the Solent (Stillman *et al.* 2012).
- 2.27 Such modelling, and indeed the focus of the bird disturbance work to date, has been on the intertidal parts of the SPAs. The SPAs, and indeed the Ramsar designations, do also include non-intertidal habitats, including large areas of coastal grazing marsh which are integral to the sites and support many of the key species, both during the breeding season and the winter. The Ramsar designations also encompass non-avian interest features

Mitigation and Disturbance Studies at other Locations

- 2.28 Maintaining integrity of a European site is not simply a case of allowing deterioration to the point at which Natural England advise it will cross the threshold into failing its conservation objectives, but rather that competent authorities seek to ensure that the ecological robustness of a site and its ability to function as a thriving ecosystem into the long term, alongside fluctuating natural cycles and processes, is not compromised.
- 2.29 There are numerous precedents for strategic approaches to mitigation and an evidence base of disturbance studies being used to inform HRA work. Two of the most widely cited, and most tested are the Thames Basin Heaths and the Dorset Heaths, where the issues of increased recreation on the heaths and ground nesting birds have led to the development exclusion zones being identified with core strategies and local authorities joining forces to deliver mitigation. While heathlands are clearly different to coastal areas (in terms of access patterns, ecology, interest features and impacts), the heathlands examples demonstrate that strategic solutions are possible to resolving impacts of increased recreation.

2.30 Useful visitor studies and disturbance work that provides context includes work on the Exe Estuary and Dawlish Warren (Lake 2010; Liley & Cruickshanks 2010; Liley *et al.* 2011) and on the Humber (Cruickshanks *et al.* 2010a). The series of studies on the Solent is also particularly relevant. The Solent Forum has commissioned a series of studies which have formed the evidence base to consider disturbance impacts and the need for mitigation. Some of the studies have been similar to those in North Kent and have included a disturbance study (Liley, Stillman, & Fearnley 2010) and on-site visitor work (Fearnley, Clarke, & Liley 2010). The evidence-base relating to the Solent also includes a postal survey of residents (Fearnley, Clarke, & Liley 2011) and detailed models of bird survival over the winter in relation to access changes (Stillman *et al.* 2012). The Solent evidence base has only recently been completed, and the most recent Natural England advice⁴ to the Solent Local Authorities has recommended “.....partners to begin discussion of a strategy for impact avoidance or mitigation measures”.

⁴ Letter from Wanda Fojt to Solent Forum, dated 17th April 2012.

3. Predicting changes in visitor numbers and recreational pressure

Housing numbers

- 3.1 Housing levels around the three north Kent SPAs are summarised in Cruickshanks *et al.* (2011). We have updated the data given in that report, using housing data from 2012⁵ within the GIS to extract the number of current residential properties at different distance bands from the SPA. The SPAs were merged to allow us to summarise the data as though the three SPAs were a single designated site, and we extracted housing figures based on the SPA rather than Ramsar boundaries. We also excluded the area north of the Thames (and east of the Dartford Crossing), as these areas are a considerable travel distance and despite being relatively close ‘as the crow flies’.
- 3.2 There are nearly 35,000 residential properties currently within 1km of the three SPAs/Ramsar boundaries. This rises to nearly 200,000 within 5km; 287,000 within 10km; 396,000 within 15km and nearly 600,000 within 20km. Comparing the SPAs in North Kent individually with other sites it can be seen that the level of current housing is high compared to many other SPA sites (Table 3), however taking into account the relatively large size of the sites, the number of properties is comparable, and in some cases (such as small estuaries, for example Pagham Harbour or the Deben), lower. Such a comparison is relatively simplistic as many factors besides simply the number of houses in relation to the area of the SPA will determine the relative impacts of housing. It does however provide some wider context and indicates which sites may be expected to have impacts from development and increased recreation.

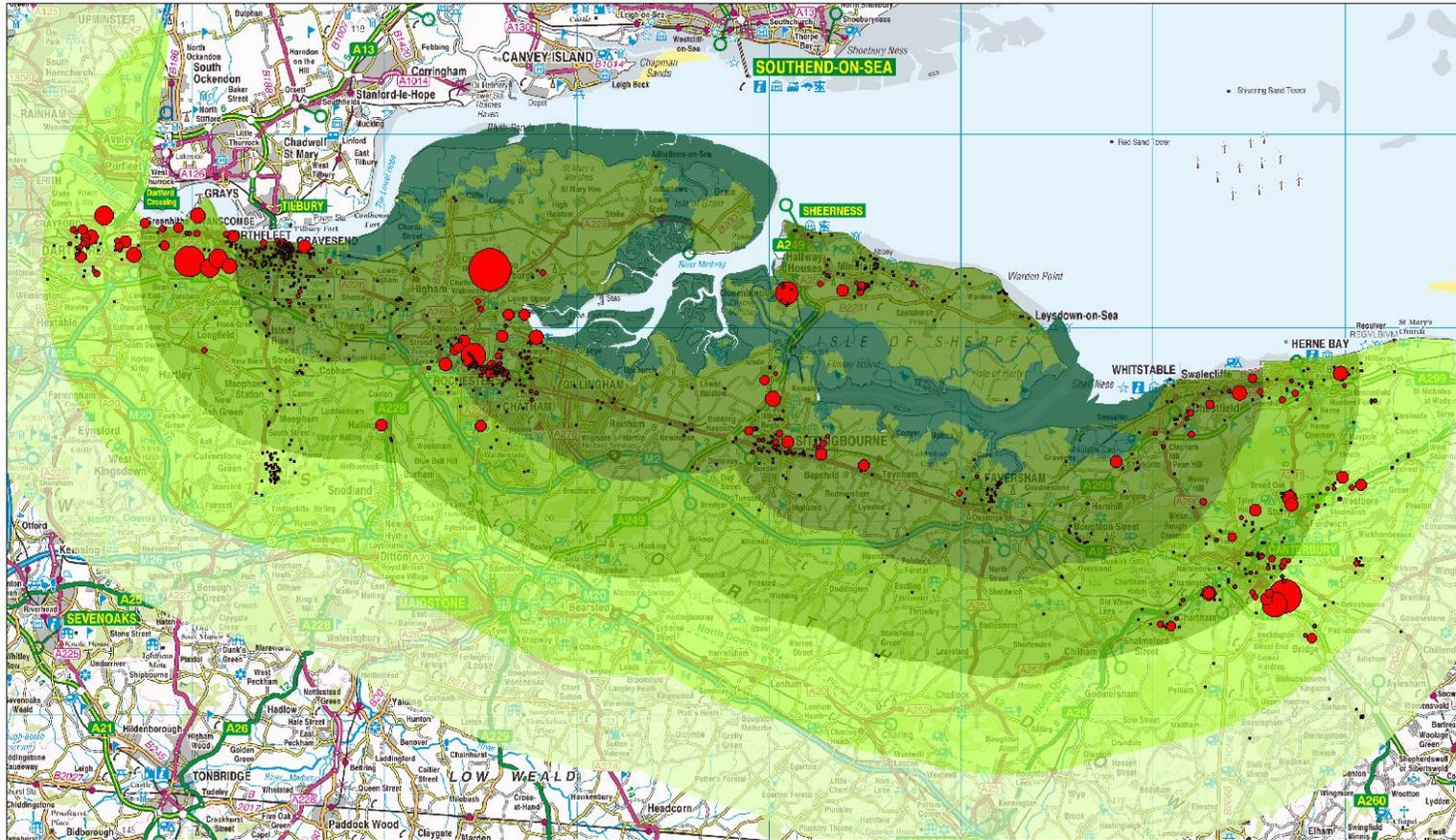
Table 3: Number of residential properties surrounding a selection of SPA sites. Selected SPAs are estuaries, coastal or wetland sites and predominantly in the south. We have included the Thames Estuary & Marshes, The Swale and the Medway Estuary & Marshes SPAs as separate sites within the table and make no adjustments to the 20km buffers to take into account geographic separation (such as estuaries).

SPA	SPA area (ha)	Total residential properties 20km	Residential Properties per ha SPA
South West London Waterbodies	827	1,888,140	2283
Portsmouth Harbour	1,246	467,999	376
Pagham Harbour	627	177,400	283
Mersey Estuary	5,007	1,268,187	253
Crouch and Roach Estuaries (Mid-Essex Coast Phase 3)	1,739	405,757	233
Thames Estuary and Marshes	4,492	745,895	166
Deben Estuary	977	154,959	159
Solent and Southampton Water	5,387	681,061	126
Medway Estuary and Marshes	4,670	570,490	122
Nene Washes	1,505	172,392	115
Poole Harbour	2,308	258,933	112
Tamar Estuaries Complex	1,939	178,436	92

⁵ Royal Mail Postzon data purchased Feb 2012

SPA	SPA area (ha)	Total residential properties 20km	Residential Properties per ha SPA
Chesil Beach & the Fleet	745	65,606	88
Exe Estuary	2,360	203,141	86
Dungeness to Pett Level	1,473	126,588	86
Ouse Washes	2,485	204,248	82
Stour and Orwell Estuaries	3,658	271,553	74
The Swale	6,486	407,331	63
Severn Estuary	17,550	912,183	52
Humber Estuary	3,7494	443,415	12
N Norfolk Coast	7,830	52,685	7
The Wash	61,817	160,817	3

- 3.3 Potential locations for future development were provided by relevant local authorities surrounding the three SPAs. The data were provided for testing purposes only and simply provide an indication of possible change. Different local authorities are at different stages in the development of relevant strategies and the data provided were therefore not necessarily strictly comparable between authorities. The data were provided in separate GIS files, drawn largely from SHLAA (strategic housing land availability assessment) data and in most cases filtered to reflect contents of relevant strategic planning documents. We used this data to consider how housing patterns may change in the future, in relation to current housing and the access patterns of residents.
- 3.4 The data from the local authorities contained residential units only and data from each local authority was in a slightly different format. We converted all data to point data, with any sites mapped as polygons converted to a point (centroid of polygon) and all different data merged into a single file. For Canterbury the data occasionally was a range, for which we took the mid point. Where there was no information on the number of units (some Canterbury sites only), we included the locations in our mapping but treated the data as no housing in the summary totals.
- 3.5 The merged data file contained details of 655 sites and potentially some 62,290 new dwellings (20,094 within Canterbury District, 4,703 from Gravesham, 14,726 from Dartford, 9,656 from Swale and 17,814 from Medway). These locations are mostly strategic and large sites, and we have made no effort to try and map or predict windfall locations. The locations included and used are shown in Map 2, where the green shading reflects the distance from the SPA boundary.



Map 2: SHLAA data in relation to SPA/Ramsar boundaries

Contains Ordnance Survey data © Crown database and database right 2011

Potential new development

- 5,000 houses
- 2,500 houses
- 500 houses

- 0-5km from SPA/Ramsar
- 5-10km from SPA/Ramsar
- 10-15km from SPA/Ramsar
- 15-20km from SPA/Ramsar

SPA/Ramsar

3.6 We summarise the number of current houses at different bands from the three SPAs (merged) in Figure 2 and also show the volume of new housing in the GIS layers provided by the relevant local authorities. In relation to the SPA boundaries, it can be seen that the pattern for current housing is one where there are high levels of housing within 5km, and then over the distance bands between 6km and 12km the amounts of current housing are relatively low. Numbers of dwellings rise beyond 12km, coinciding with the M25 and outskirts of London. At the Dartford Crossing our bands also extend north of the Thames (we deliberately excluded the area east of here and north of the Thames as the Dartford Crossing is the first crossing point). The new housing, as mapped, doesn't show too much variation with distance. There are peaks within the 3km distance band and the 11km distance band.

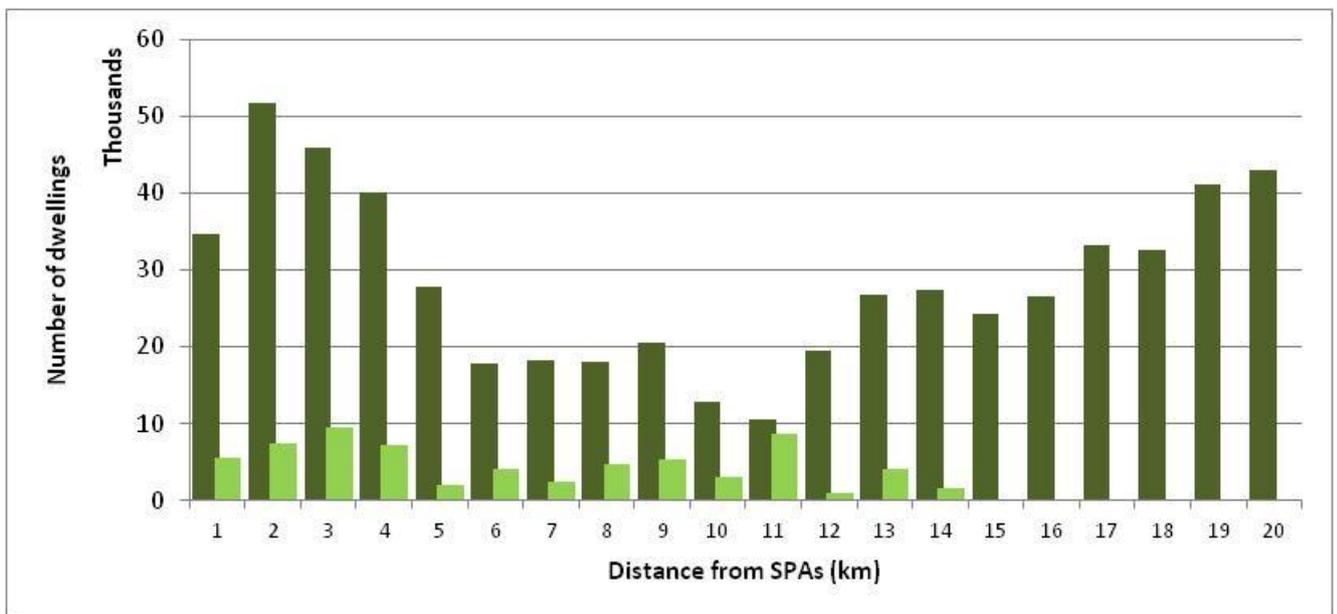


Figure 2: Current (dark green) and possible new housing (pale green) in relation to distance from the three SPAs. Data grouped in 1km distance bands.

3.7 We repeat Figure 2 in Figure 3, this time we show the cumulative levels of development in relation to distance too. The peaks in new development are visible within the 3km and 11km distance bands. The two green lines, showing cumulative development (current housing being dark green and new housing in light green) suggest that levels of development are particularly focused within around 6km currently and that new housing will closely match that distribution.

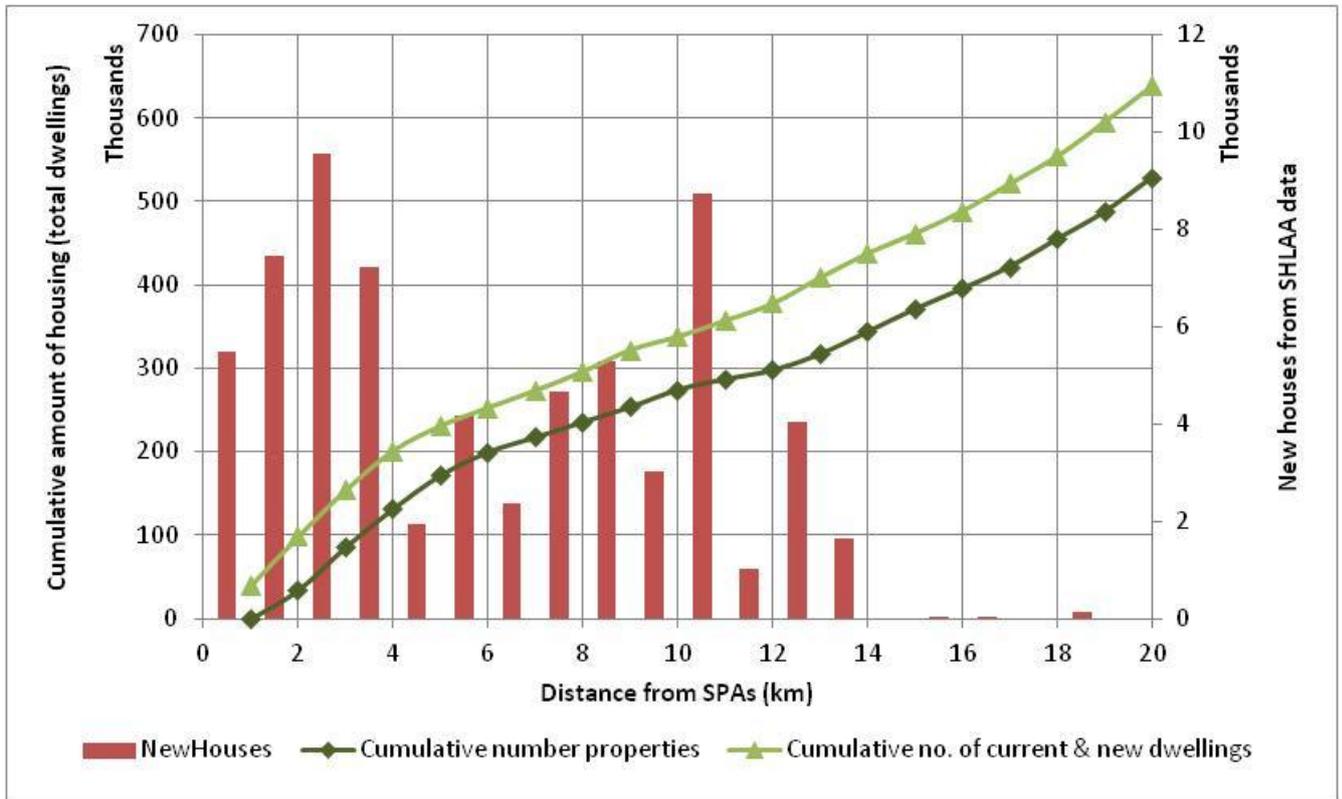


Figure 3: Cumulative amounts of current and new housing (relevant districts only; green lines), and amount of new housing (red bars) in relation to distance from SPAs. All three SPAs merged.

Predicting visitor numbers from housing data

- 3.8 From the original visitor survey we have data relating to the home postcodes of interviewees. Within the GIS we plotted concentric rings (500m bands, out to 20km) around each of the survey points and for each band we used postcode data to work out the current number of houses and also the number of people who had visited from that band. By combining these two data we can show visit rate in relation to distance from the survey point.
- 3.9 In order to calculate the visit rate we used the data on the number of people interviewed (i.e. the sum of the number of people in each interviewed group), and we adjusted this to represent a single day (i.e. people per day). As 16 hours of survey work were conducted at each survey location (and assuming a single day is roughly 12 hours of daylight), then the adjustment factor is 1.33. Only a sample of visitors were interviewed at each survey point. The tally data indicated that 772 groups were counted, while interviews were conducted with 542 and 513 gave valid postcodes. If we assume the visitors that gave postcodes were a random sample of all groups visiting, then to calculate total people per day we need to scale the postcode data up by a factor of 1.5 (calculated from $772/513$).
- 3.10 In order to relate visitors to housing, we used an average occupancy rate per house of 2.36, the national average occupancy rate given by the Office of National Statistics.
- 3.11 We therefore calculated visit rate for each distance band as:

$$\text{Visitrate} = \Sigma((V/1.3)*1.5)/(H*2.36)$$

Where: V=number of people in each group interviewed

H=no houses in band

3.12 In Figure 4 we show the visit rate in relation to distance from the survey location. The plot shows the mean (from 22 survey locations) and the fitted trend line (exponential curve, fitted manually based on r^2 and visual checks). The plot is important as it shows how visit rate declines with distance and provides a means of estimating future visits as a result of new housing.

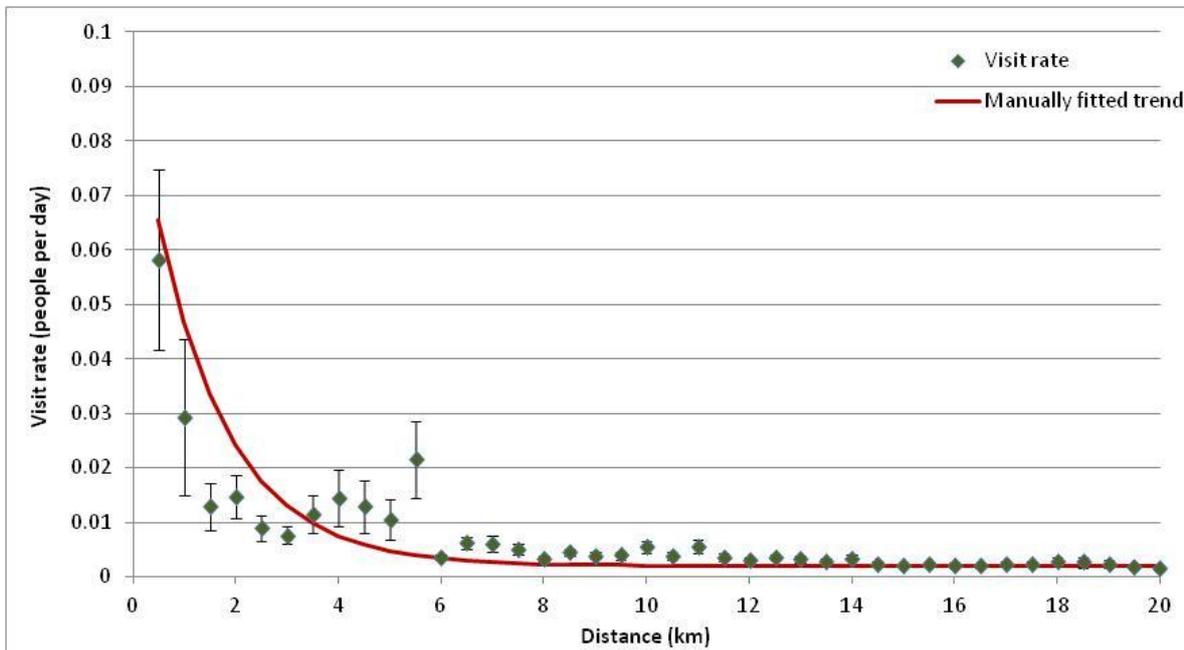


Figure 4: Mean (error bars give standard error) visitor rate for the 22 survey locations in relation to distance from the survey point. Trend line fitted by eye and from r^2 value. $Y=0.09e^{-0.7x}+0.002$. $r^2=0.78$.

3.13 It can be seen from Figure 4 that the number of visits per house drops with distance such that at around 6km the visit rate has dropped to a relatively low level which changes little with distance at greater distance bands. Within 6km of the access points, there is a strong decrease in visitor rates. We summarise this information within Table 4. The final row in the table compares the number of visits originating at the given distance with the number at 0.5km. In other words this figure is the number of houses at the given distance that will be equivalent to a single house at 0.5km. This shows that the number of visits from a house at 0.5km is the same as the number of visits from 14 houses at 5km – i.e. a development of 14 new units at 5km might be expected to have a similar impact to a single dwelling at 0.5km. At 10km from the SPA 31 dwellings would have the same impact as a single dwelling at 0.5km.

Table 4: Summary of estimated number of visits per house to a single access point. Estimates derived using the fitted line in Figure 4. Last row compares the number of visits from a given distance with the number at 0.5km.

Distance (km)	0.5	1	2.5	5	6	7.5	10
Number of visits (per day per person) to a single access point	0.0654	0.0467	0.0176	0.0047	0.0025	0.0033	0.0021
Ratio to visits at 0.5km	1	1.4	3.7	13.9	19.5	26.5	31.4

- 3.14 Applying the rate curve in Figure 4 we can predict the future increase in visitor ‘pressure’ from all the new development (i.e. all that shown in Map 2) and we can compare future levels with current. This is the in-combination effect of development. Ideally this approach would be done by individual access point (i.e. for each access point around the SPA, calculating the housing at different distance bands). In order to provide a simple overview we have assumed it reasonable to apply the curve using the SPA boundary.
- 3.15 Using new housing data for all distance bands up to 20km, the number of person visits that we would estimate to occur currently would be in the region of 11,000 per day. The level of new development (as mapped in Map 2) would result in an estimated additional visits of around 1700 people per day, an overall percentage increase of around 15%. Looking at the closer distance bands only, current housing within 5km of the SPA/Ramsar is estimated to generate around 9200 person visits per day, and this is estimated to rise by around 16% (just under 1500 new person visits per day) with the new housing. Looking at distance bands from 0-10km, current housing is estimated to generate around 9700 person visits per day, and this is estimated to rise by 16% (just under 1600 new person visits per day) with the new housing. We can therefore suggest that access levels in the future, if development as shown in Map 2 occurs, would rise by around 15%.
- 3.16 There are a range of different approaches that we could have used to assess how housing and access are linked. The above approach (based on Figure 4) is relatively simple, intuitive and makes sense from the data in the visitor survey. There are a number of considerations that should be recognised in the application and use of the plot and fitted trend:
- The figures describing the number of visits per person appear relatively low – e.g. 0.065 at 0.5km. This figure of 0.065 is the number of visits, per person per day, to a single access point. If the average occupancy of a property is 2.36 and we assume 200 days in a winter, then this would equate to 31 visits per winter – i.e. a single dwelling at 0.5km from a single access point might be expected to typically ‘generate’ 31 visits to that access point over a winter.

- The plot is derived using a standard household occupancy rate based on national average and assuming a standard visit rate with distance for different dwellings, different SPAs and for urban and rural areas. The distance measurement is the linear ('euclidean' distance) between housing and access point, and therefore does not take into account the transport network. As such it provides a general pattern and general broad trend.
- The data relate to each access point, i.e. we have used distance from postcodes to access points, rather than the SPA boundary. In order to use this approach to estimate changes in visit rates to the SPA from a single development site, the approach has to be applied to all access points in the vicinity of the development. Access points may not necessarily relate to the SPA boundary, some might be outside the SPA and some might be inside the SPA.
- We have fitted the line using the average visit rate for each distance band. Access points will of course vary in their attractiveness and relative 'draw', and this is clear from the visitor survey report (see Figure 4 in that report). Survey locations such as Harty, Shellness and Grain Beach had people travelling relatively far compared to other sites. We would expect (besides distance from home) a number of other factors to influence the draw of sites, these factors might include attractiveness (sea views, sandy beaches etc), features (ability to do different walks; access to the water, sediment type etc), facilities (such as cafe), parking availability, publicity, proximity to other locations, and the range of alternative destinations.
- The data are derived from the visitor survey work, conducted during February and March 2011. The rate we have derived therefore equates to visit rates at this time of year. We believe this is likely to be equivalent to typical winter use, albeit with the survey data collected during a particularly cold winter. Visit rates during holiday periods and over the summer are likely to be different.

Scale of development and particular locations likely to result in changes in access

- 3.17 Table 4 provides a comparison of the implications of development at different distances from the SPAs. One house within 0.5km of an access point is likely to generate as many visits as 20 dwellings at 6km. Within c.6km it is therefore likely that, in combination, even single dwellings will result in increased access to the SPAs. Beyond 6km it is likely that large developments will require particular consideration, and in particular any development north of the M2/A2. Visual inspection of the postcode data in the visitor survey report (e.g. Maps 6 and 7 in that report) would seem to indicate that the majority of current visitors originate from the coastal strip north of that route.
- 3.18 Referring back to the original visitor survey report to also check on people who walked to the site where interviewed, 75% gave a home postcode within 1.5km of the survey point and half gave a postcode with 0.8km. This would suggest that people are likely to access the SPA on foot where they live within approximately 2km.

4. Visitor pressure

Current levels of access

4.1 The disturbance study involved observations from a sample of locations. It is possible to check the number of people recorded during the disturbance study against the comparative scores derived for the whole section as coast. In Figure 5 we compare the mean number of diary events for a particular activity, for survey points within each scoring section, with the scores for that same section. The categories are not always directly comparable, but it would appear the data match well. For example, the plot of walkers indicates a good correlation (Correlation coefficient=0.627, n=22, p=0.005). Similarly the number of dog walkers with dogs off leads counted in the disturbance study correlates with the score for dog walking along the shore (Correlation coefficient=0.568, n=22, p=0.014).

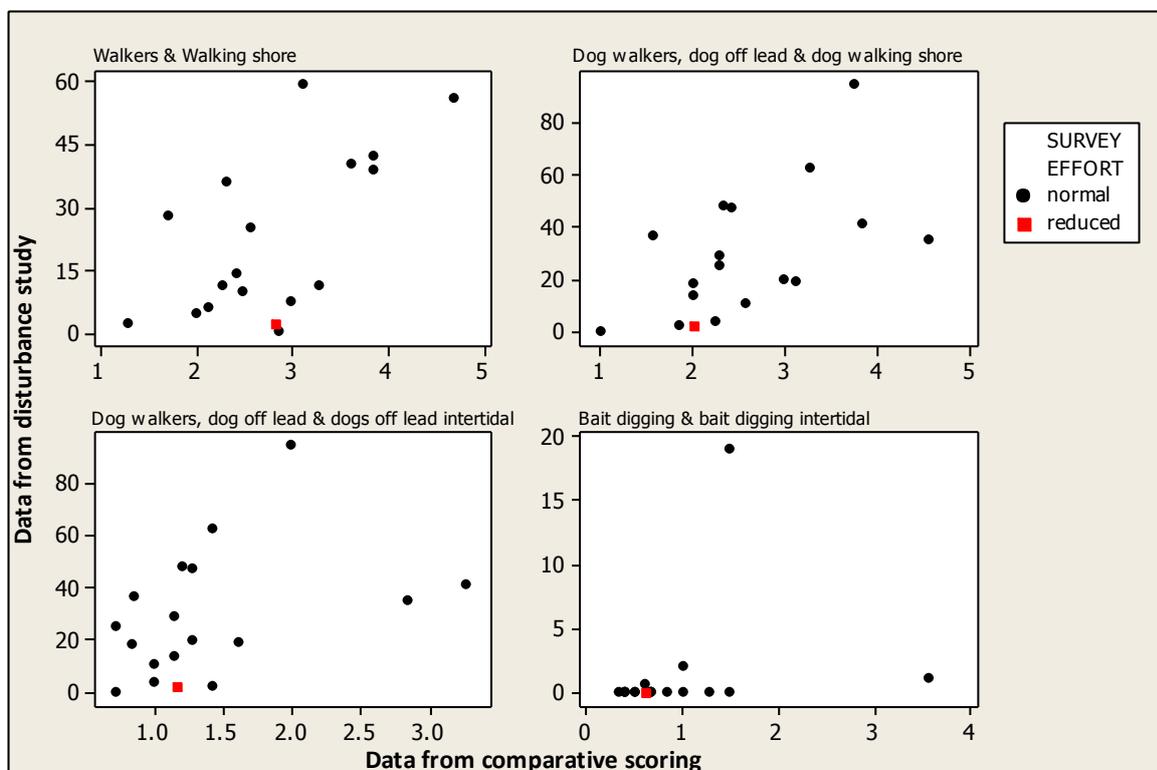


Figure 5: Access data from the disturbance study compared with the data from the comparative scoring work. The captions refer to the category used in the disturbance study & the category used for the comparative scoring. Red symbols indicate survey point 22, where the survey effort was reduced.

4.2 We can therefore have confidence in the access scoring and also some confidence in relating the results from the access scoring work with the bird disturbance study. Using the scores we can gain a strategic perspective on the relative levels of access and intensity of different activities within each SPA. This is useful as if a site has high levels of access over much of its area then disturbance is likely to be much more of an issue than sites where access is focused in only a limited part of the site. By assigning the average scores into bands (0-1, 1-2 etc) we can estimate the percentage of the area of

each SPA that falls within each band (Table 5). Of the three SPAs that we are considering, the Swale SPA forms the largest area (note that we consider only a part of the Thames Estuary & Marshes SPA). For overall ‘busyness’ the Swale has the largest proportion of its area with high scores, with around 16% of the SPA being scored 4.5 or more (averaged across all scores). The Swale also has the highest scores for dogs off leads on the intertidal, with a fifth of the SPA being scored in the 2.5-3.5 band. This would suggest that disturbance is potentially more of an issue on the Swale than the other sites.

Table 5: Area (%) of each SPA falling within a given scoring band for different activity types.

Activity type scored	SPA	Average Score						Total
		0-0.5	0.5-1.5	1.5-2.5	2.5-3.5	3.5-4.5	>4.5	
Overall busyness	Medway	0	475 (10)	2701 (59)	731 (16)	540 (12)	155 (3)	4603 (100)
Dogs off lead on the intertidal	Medway	668 (15)	3240 (70)	540 (12)	155 (3)	0 (0)	0 (0)	4603 (100)
Parking Score	Medway	1805 (39)	1376 (30)	728 (16)	419 (9)	122 (3)	155 (3)	4603 (100)
Overall busyness	Thames	0	0 (0)	3019 (68)	1410 (32)	0 (0)	0 (0)	4429 (100)
Dogs off lead on the intertidal	Thames	798 (18)	3631 (82)	0 (0)	0 (0)	0 (0)	0 (0)	4429 (100)
Parking Score	Thames	210 (5)	2813 (64)	1007 (23)	0 (0)	0 (0)	399 (9)	4429 (100)
Overall busyness	Swale	0	0 (0)	2518 (44)	2332 (40)	0 (0)	931 (16)	5781 (100)
Dogs off lead on the intertidal	Swale	1381 (24)	3194 (55)	0 (0)	1207 (21)	0 (0)	0 (0)	5781 (100)
Parking Score	Swale	0 (0)	1767 (31)	472 (8)	3249 (56)	294 (5)	0 (0)	5781 (100)

4.4 The disturbance study did not show a clear pattern with the levels of human activity and the response of birds to disturbance: neither the number of birds recorded flushed nor the number of flight events showed a significant correlation with the number of people recorded. Instead a more complex pattern is present. Rather than simply levels of disturbance relating to access levels per se, other factors, such as the distance people were from the birds (which in turn relates to the site features, location of paths etc), species present; flock size; whether or not (and how many) dogs were present; where the people were (i.e. mudflats, shore or on the water) and the tide state were all important. Given this complexity it is not possible to relate the percentages in Table 5 to actual disturbance. If visitor numbers per se were directly linked to disturbance and if we were able to identify threshold visitor levels at which disturbance were to occur, then it would be simple to use the percentages to gain a strategic perspective of the areas where disturbance is taking place and where it might occur in the future.

Likely changes in recreational activities and locations where use may be concentrated

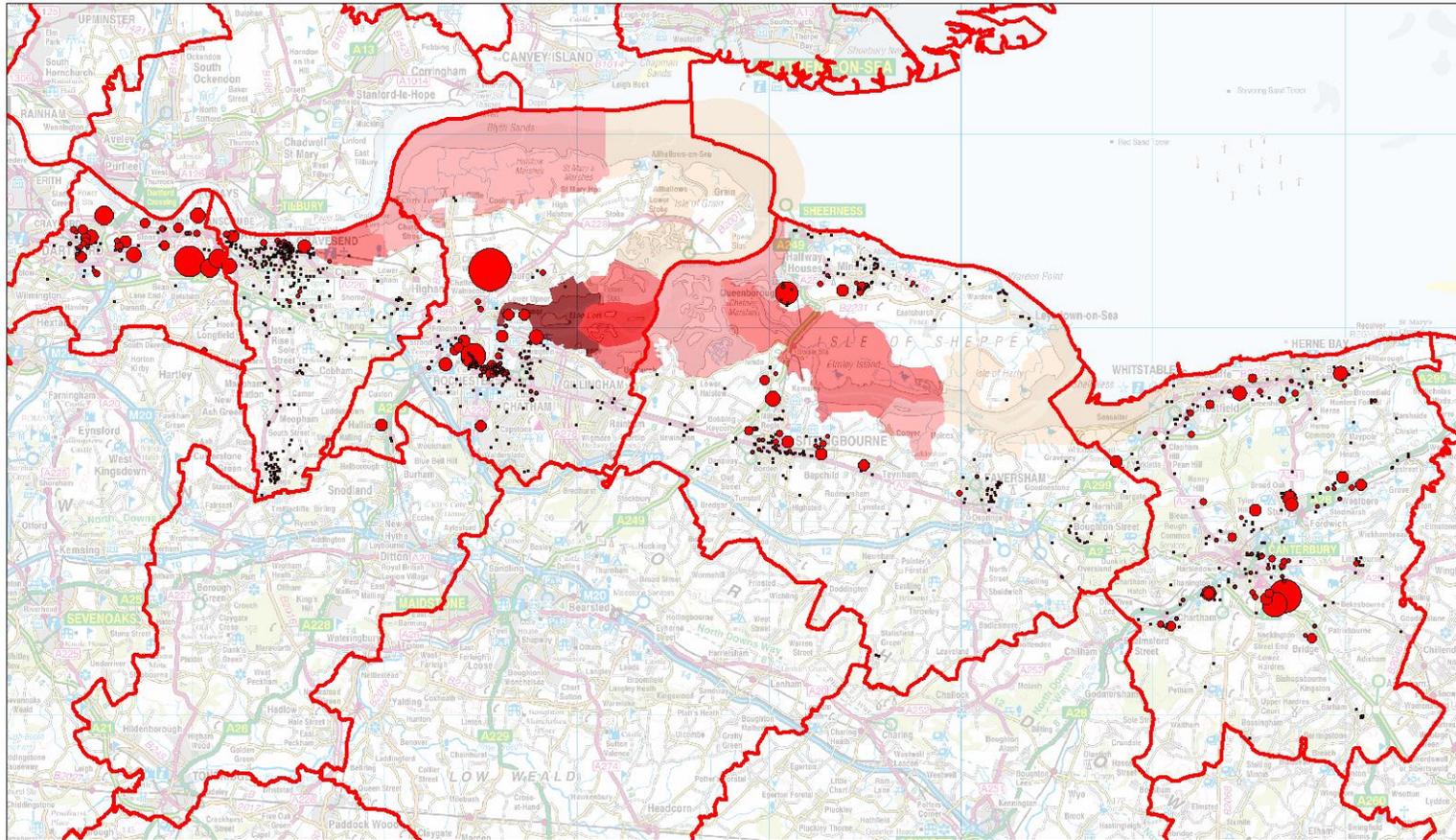
4.5 From consideration of visitor rates in relation to distance, we can assume that development within a 6km radius of access points is likely to particularly result in increased access levels. This of course does not mean that development at distances beyond 6km will have no impact. Development within c.6km radius of access points is likely to result in increased use for activities such as dog walking, jogging, cycling and to some extent outings with friends (see figure 5 in the visitor survey report), activities that relate to day-to-day use of local greenspace. Development beyond 6km is likely to

result in fewer visits per property, and will involve more sporadic trips, where people potentially make a conscious choice to visit the coast and activities might include some dog walks, walking, family outings, wildlife watching and potentially more specific activities such as watersports, wildfowling or fishing.

- 4.6 We can use the 6km radius to identify which sections will see a change in access. In Map 3 we have used the sections from the access scoring work, and for each section calculated the number of units from the SHLAA data and other housing data provided by the local authorities. It can be seen that the most ‘pressure’ is likely to be on the Medway (particularly the area adjacent to Gillingham, Rochester and Werburgh) and on the Thames to the east of Gravesend. These areas are likely to see an increase in ‘local use’, i.e. activities such as dog walking, cycling, walking.
- 4.7 Development at locations such as Canterbury lie outside our 6km radius, and therefore, for example, the outer Swale is a pale colour within Map 3. However there are large volumes of development at distances beyond the 6km. We might therefore expect to see increased recreational use, with more occasional visits (per household) for more specific activities, for example activities that are water-based or for which the coast has a specific draw, such as wildfowling. At these kind of distances, people are not likely to be drawn to their nearest part of the coast, but particular locations will then draw visitors according to the features – i.e. the nature reserves are likely to draw people for the wildlife interest. Watersports users will be drawn to the locations where they can launch their craft, access the water or where the conditions are right for the activity.
- 4.8 In Map 4 we highlight locations where particular relevant activities are focused. These features are:
- Marinas/boat yards/sailing clubs (data from Cruickshanks 2011); indicating areas where boat use may be focused.
 - Slipways and jetties (data from Cruickshanks 2011); indicating where access to the water is possible, e.g. for casual users
 - Car-parks (see Cruickshanks 2011 for details)
 - Areas scored highly for kitesurfing, windsurfing, dogs off-leads on the intertidal, powerboats/RIBs/Personal Water Craft (“PWC”), with the dots indicating sections with high scores in the comparative scoring.
 - Nature Reserves (NNRs, RSPB reserves and Kent Wildlife Trust Reserves: data from Cruickshanks 2011). These will draw wildlife watchers and birdwatchers.
- 4.9 Map 4 therefore shows some of the features which may draw people from larger distances, beyond the 6km, and some of the activities shown are ones particularly linked to disturbance. Using Map 4, and cross referencing to potential development locations, we can highlight:

- The mouth of the Swale (kite/windsurfing, dog walking with dogs off leads on the intertidal),
- The upper parts of the Swale and boating activities
- The upper parts of the Medway (around Gillingham, Upnor and the Riverside Country Park) where considerable infrastructure is present and lots of boating activity including powerboats, RIBs etc.
- Birdwatchers and wildlife watchers are likely to be drawn to Sheppey, Oare Marshes, Cliffe and Northward Hill.

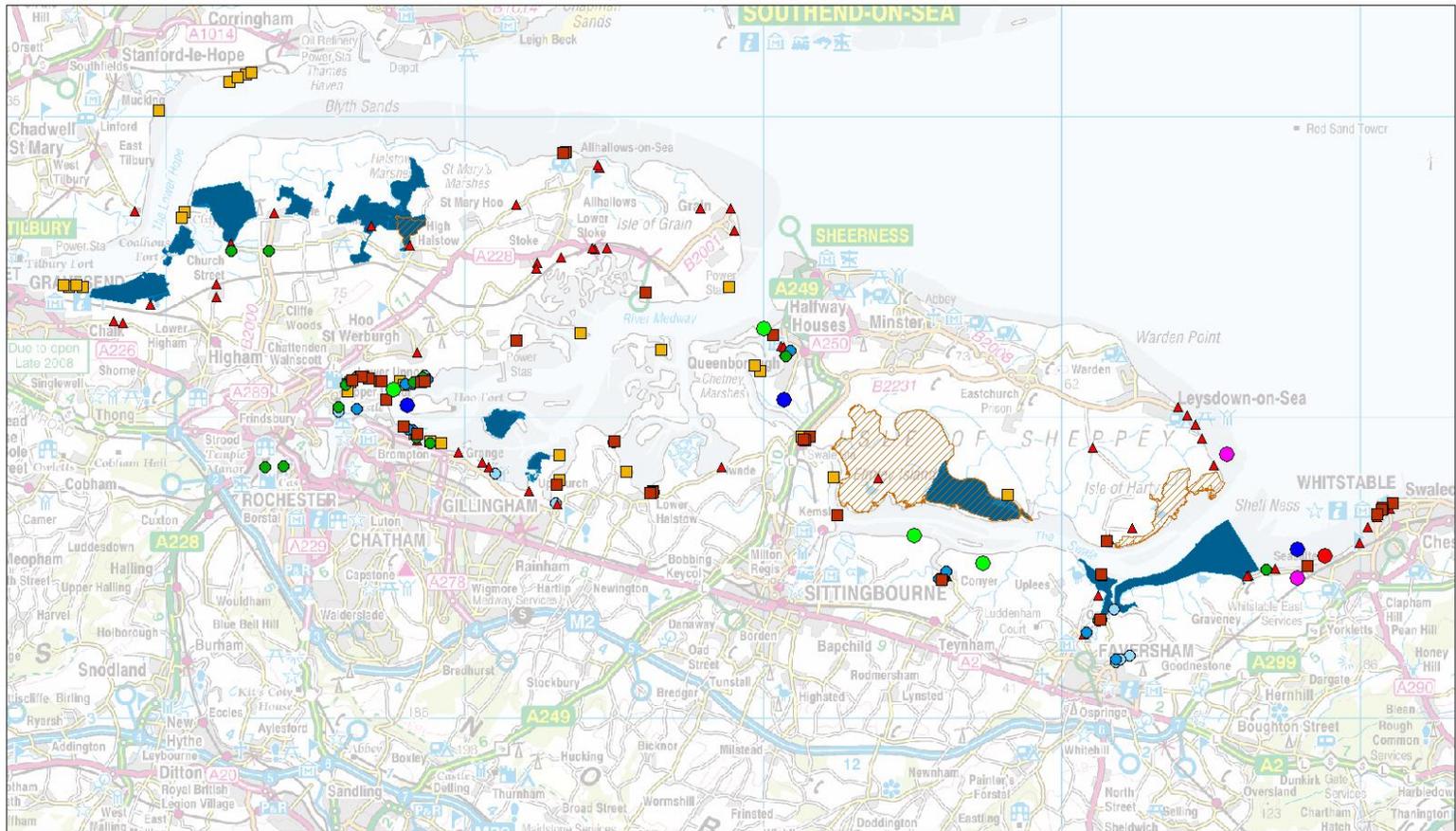
4.10 One activity that it is difficult to predict the level of change is wildfowling. Wildfowling caused around 2% of the major flight events observed during the bird disturbance study, and were recorded at Harty, Oare Marshes and Conyer. This low level of recording may be due to the approach used in the disturbance study (wildfowling is particularly concentrated around dawn and dusk, whereas the disturbance study fieldwork was distributed through the day, and also included times outside of the wildfowling season). It is therefore difficult to be confident about the level of impact of this activity. Only one wildfowler was interviewed within the visitor survey. While a number of sections were scored for wildfowling taking place we have limited information on the likely changes in wildfowling as a result of new development. Natural England issues consents for wildfowling to take place, and these consents are based on specific levels of activity in specific areas. As such wildfowling is not likely to increase in a similar fashion to other activities.



**Map 3: Sections (from scoring report)
and no. of potential new houses within 6km**

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Potential New Development		Number of new houses within 6km	
	5,000 houses		16,000 to 18,000 (3)
	2,500 houses		12,000 to 16,000 (1)
	500 houses		8,000 to 12,000 (8)
			4,000 to 8,000 (10)
			0 to 4,000 (11)



Map 4: Locations where particular activities focused

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Selected Activities (from comparative scoring report)

- Dogs off lead on intertidal
- other boats/watercraft
- powerboats/RIB/PWC
- wind/kite surfing
- Slipways
- Jetties
- Sailing Clubs
- Marinas
- Boatyards
- ▲ Carpark
- NNR
- KWT/RSPB

Special interests

- 4.11 In Map 5 we show the relevant SPAs and highlight particular areas that are particularly important to wintering birds. The intertidal mudflats are all potentially used by birds, and without understanding the distribution of prey within the mudflats all intertidal areas are shown. We also highlight:
- Wader roost sites (from the GGKM roost survey, as shown in Liley & Fearnley 2011).
 - Key reserves (NNRs, RSPB reserves and Kent Wildlife Trust Reserves: data from Cruickshanks 2011 and also in Map 4 of this report). These are sites where high numbers of birds can sometimes be present.
- 4.12 It can be seen that a number of the roost sites are islands, which potentially provide secure roost sites, many of which will be largely free of disturbance, at least from most shore-based activities. However, many are low-lying and therefore vulnerable to flooding and sea-level rise. Disturbance from wildfowling, boating and other water-based activities may also occur.

Spare capacity

- 4.13 A further important consideration is the extent to which any areas might be able to absorb additional numbers of people without adding to the pressure on the birds and the SPA. This is difficult to determine without detailed site assessments. In particular it would be useful to know the prey availability within different areas.
- 4.14 There are a number of areas with access restrictions, i.e. where public access is limited. These are clearly shown in Map 21 of the comparative scoring report (which shows 10 out of the 33 sections having some restrictions, most notably those towards the outer part of the Medway and near Sheerness). While it might seem intuitive that these areas could perhaps support some access, this is probably not appropriate. Many of the sections identified as having access restrictions include islands and offshore areas, and one has no shoreline at all. Diffuse access over wide areas is difficult to manage, control and influence and, more importantly, it is necessary to ensure there are areas with no disturbance. It is probably no coincidence that many of the sections with access restrictions are also the ones supporting wader roosts (see Map 5 in this report).
- 4.15 Where access levels are already very high, then it is likely that increased use of these areas will involve the least impact for the birds. The particular issues with these locations is more likely to be their ability to ‘take’ more visitors, in terms of parking capacity and whether people will use them if they become busier.⁶
- 4.16 Looking in detail at the busier sites, there was little evidence to suggest that the distribution of birds was related to levels of access, at least at the sites surveyed in the bird disturbance study. Across all sites there was no significant correlation with bird

⁶ Note that around one third of respondents in the visitor survey indicated that if the site (where interviewed) became busier they would visit for less time or less often (see Table 9 of visitor survey report).

numbers (or densities) and the mean level at sites of access or the actual count of people made during a count. However, there were no visits where high numbers of people were counted and high numbers of birds also occurred. The sites with the high levels of access, in the south-eastern part of the Medway, are those where bird declines have been most marked (see paragraph 2.7). This would suggest that birds are perhaps avoiding the busiest sites – and the lack of significant correlation is due to the fact that there are a few locations with high levels of access.

- 4.17 There was also some indication from the disturbance study that the response of birds was different at the busier sites (see Figure 7 of the disturbance study report). The proportion of events resulting in major flights was less at the busier sites, potentially indicating that people behaved differently at these locations; that the birds were at lower densities; that the birds were distributing themselves to as to avoid the disturbance, or possibly even becoming habituated.
- 4.18 We produce a different plot using the data from the disturbance study in Figure 6. We show the rate at which birds were flushed (major flights) at each survey point and the level of access (x axis), and three data points stand out and are labelled. At these locations the level of access was high and the rate at which birds were flushed was low. These locations are Riverside Country Park (location 11), The Strand, Gillingham (location 12) and Lower Upnor (location 13). A check of the responses at these locations (see Figure 6 of the bird report) indicates that the majority of observations at these sites involved 'no response' from the birds. Birds were therefore apparently not being disturbed and not undertaking major flights; it appears they are responding differently. It might be therefore argued that these sites could be ones where additional access levels could be accommodated.
- 4.19 We are highly cautious about such an approach. The three sites fall in the part of the Medway that has seen the particular declines in bird numbers and the counts of birds here during the disturbance study were comparatively low. This may explain the low flush rate - where numbers are low birds may be able to distribute themselves so as to avoid areas where they are flushed. These are potentially the locations where access is currently having an impact, and increases in access may have further impacts or reduce the potential to resolve the existing problems.

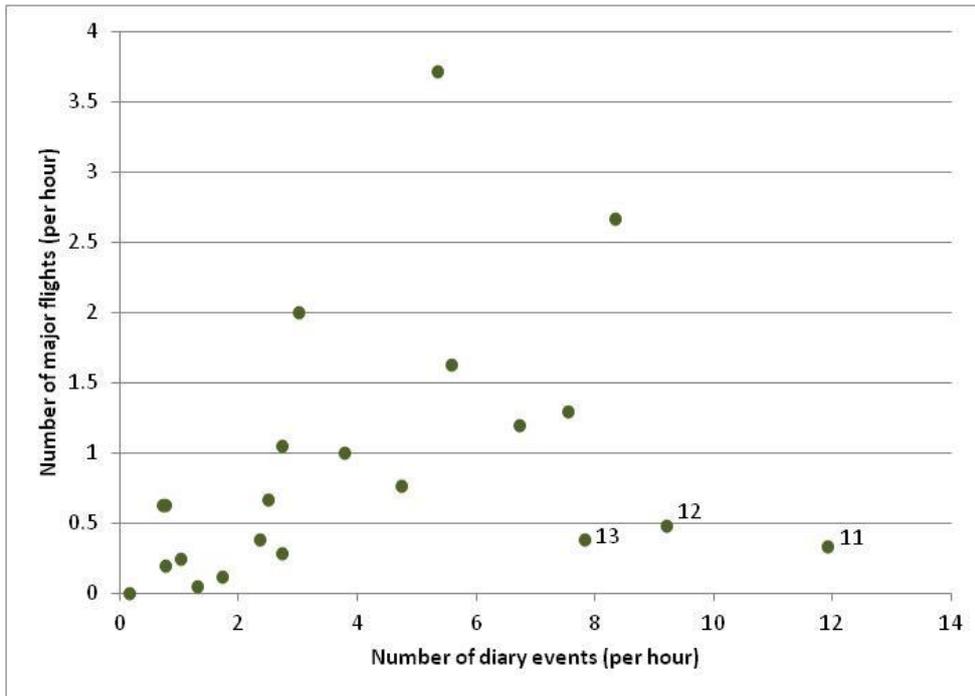
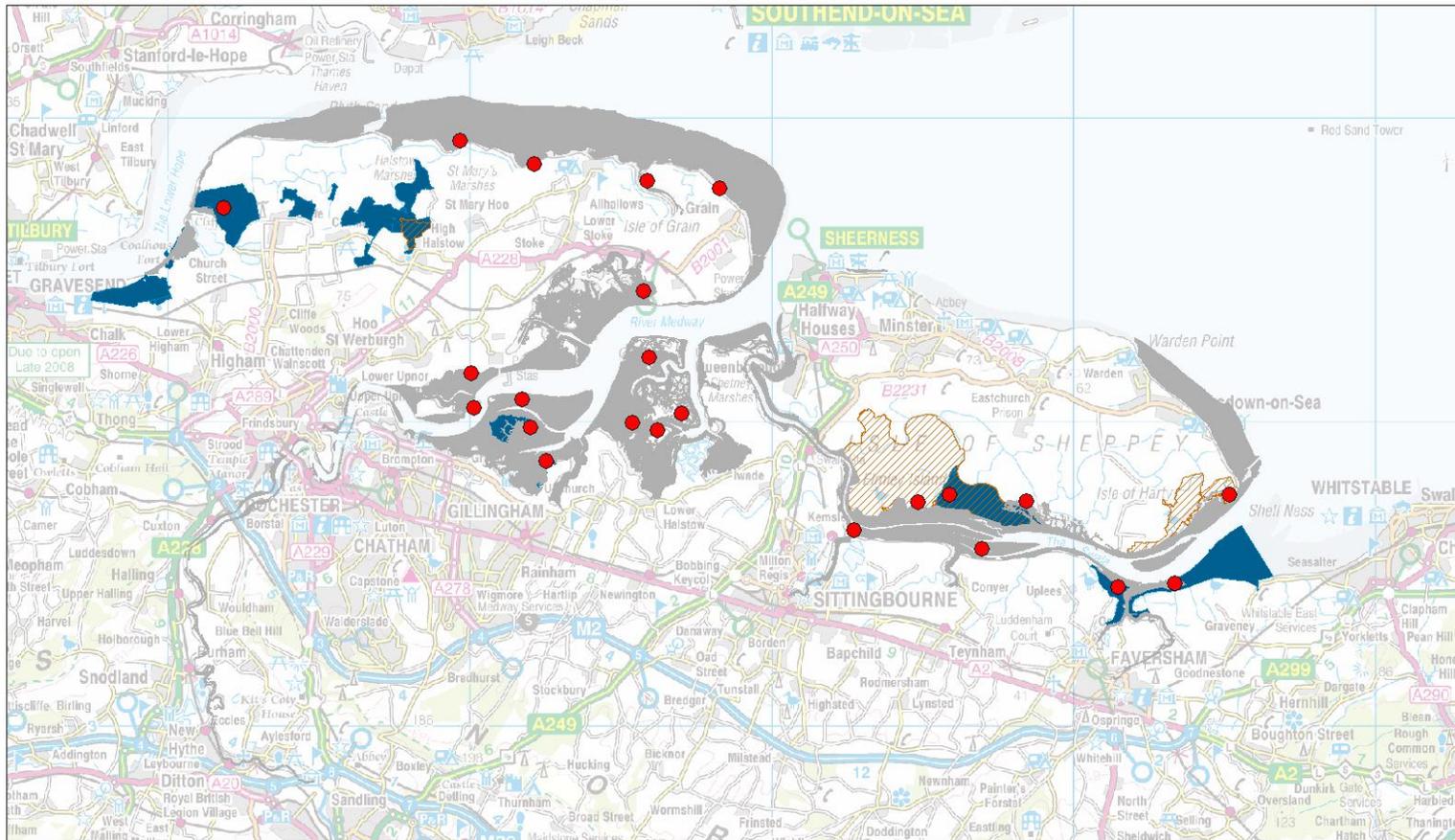


Figure 6: Number of major flights (per hour) and number of diary events (per hour) from the bird disturbance study data. Diary events equate to the total number of groups of visitors, craft etc recorded at each survey point. The three data labels refer to survey locations (see main text).



Map 5: Key locations/features

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- | | | | |
|---|----------|---|--------------------------------------|
|  | NNR |  | Bird Roost Sites |
|  | KWT/RSPB |  | Mudflats (data from Natural England) |

5. Mitigation and Avoidance

Introduction: Need for Mitigation and Avoidance

5.1 Following the previous sections of this report, and the evidence already collated for North Kent, we are in a position to identify where access might change, which locations are potentially vulnerable and what activities might be expected to occur as a result of new development. Disturbance results in behavioural responses from the birds, and it is not possible, with the available data, to rule out likely significant effects (from future changes in access levels) on the integrity of the European sites. We can identify the following key points relevant to mitigation:

- Dog walking, and in particular dog walking with dogs off leads, is currently the main cause of disturbance (by far). Besides dog walking, all activities (i.e. the volume of people) are potentially likely to contribute to additional pressure on the SPA sites, but activities on the mudflats or the water should be of particular focus for mitigation.
- Development within 6km of access points to the SPA is particularly likely to lead to increase in recreational activities on the SPA. Local greenspace use such as dog walking, cycling, jogging, walking and to some extent family outings will originate from people living within this radius.
- Beyond 6km from access points onto the SPA, large developments or large scale changes to housing levels will also result in increased recreational use. It would appear that visitors to the North Kent coast mostly originate from a zone north of the M2/A2 between Gravesend and Herne. People living within this broad coastal strip (i.e. beyond 6km from SPA access points and north of the M2/A2) are likely to visit for more coastal specific activities. Assuming users will be drawn to particular features/areas, then we can highlight the mouth of the Swale (kite/windsurfing, dog walking with dogs off leads on the intertidal, bait digging); the upper parts of the Swale (boating activities); the upper parts of the Medway around Gillingham, Upnor and Rochester (where considerable infrastructure is present and lots of boating activity including powerboats, RIBs etc) and nature reserves at Sheppey, Oare Marshes, Cliffe and Northward Hill.
- It is difficult to be confident in identifying areas that can absorb additional recreational pressure. It may be that existing areas with high levels of access (such as Riverside Country Park and the Strand, Gillingham) may warrant consideration.
- Areas currently undisturbed, and in particular the main roost sites should be protected from additional recreational pressure

5.2 Within 6km of access points to the SPA (and beyond 6km for large developments) new development will result in increased levels of access to the SPAs. Small development, beyond 6km from access points onto the SPA, and any development south of the

M2/A2 can be assumed not to have a likely significant effect on the European sites (in terms of recreational disturbance). Development within 6km, or large development between 6km and the M2/A2 will need to provide mitigation to provide confidence that there will be no adverse effects on integrity as a result of disturbance. A suite of management measures should therefore be considered to avoid potential adverse effects caused by future development.

Overview of Possible Measures

- 5.3 A range of measures are possible to minimise disturbance, for example careful siting of development, influencing which sites people visit, where people go within sites and how they visit. We set out a summary list of possible options in Table 6. These options range from soft measures and proactive work with local residents, to enforcement. Conclusive evidence that the different measures work is limited, but within the table we summarise examples and, where available, reference studies showing the effectiveness of the different options.
- 5.4 It is important to recognise that access to the countryside is important, bringing widespread benefits including health, education, inspiration, spiritual and general well-being (English Nature 2002; Bird 2004; Pretty *et al.* 2005, 2007; CABE Space 2010; Moss 2012). While mitigation measures might seek to control or limit access in some areas, the overall aim should be to enhance existing recreation experience and provide recreation opportunities such that access and nature conservation interests are not in conflict.

Table 6: Options to Reduce Disturbance Impacts

Management option	Description	Examples and Notes
1. HABITAT MANAGEMENT		
New habitat creation	Creation of new habitat for the interest feature in areas away from human disturbance. Potential to be carried out in combination with managed realignment schemes and/or disposal of dredgings.	Effectiveness of ‘refuges’ shown by Madsen, in Denmark (Madsen 1993, 1998). Artificial roost sites have been created, for example at Hartlepool (Burton, Evans, & Robinson 1996)
2. PLANNING & OFF-SITE MANAGEMENT MEASURES		
Site development away from sensitive sites	Much recreational use to sites is local, for example from people living within a short drive or walk of sites. Planning development at a strategic level is a way to reduce the long term future pressures of increased recreation from development. Needs to be taken into account during formulation of Local Development Frameworks.	Relevant core strategies for authorities adjacent to The Thames Basin Heaths SPA, the Dorset Heathlands SPA and the Breckland SPA all have development exclusion zones.
Planning conditions on adjacent development (land)	Urban design and planning conditions (such as Section 106 agreements) can ensure that planting, screening, careful routing, provision of access infrastructure (boardwalks, marked paths, steps etc) are incorporated into new developments to influence visitor flows within sites and minimise the potential of people to cause disturbance.	Design for development adjacent to Poole Harbour at the site of the old power station included a ditch to deter access (Hoskin <i>et al.</i> 2007).
Provide alternative recreational facilities	Provision may need to be combined with other measures such as education and management on the designated site. Likely to need to be carefully designed and targeted to provide a viable alternative. Targeting for dog walkers would need to ensure dog friendliness (Edwards and Knight, 2006) and suitable routes (e.g. Liley <i>et al.</i> , 2006c, Liley <i>et al.</i> , 2006d). For water-based activities, gravel pits or similar may need careful landscaping and particular types of infrastructure.	‘SANGS’ (suitable alternative natural greenspace) have been promoted around the Thames Basin Heaths and the Dorset Heathlands SPAs. Currently little evidence has been collated to demonstrate effectiveness (Clarke, Sharp, & Liley 2008; Liley, Underhill-Day, & Sharp 2009; Sharp 2010). In coastal environments likely only to work in circumstances where use is not coastal specific, e.g. local daily dog walk.
Provision of designated access points for water sports	Provision of public slipways, trailer & vehicle access to shore etc in predetermined locations where boat access is likely to be away from nature conservation interest.	
Attract visitors to less sensitive areas; discourage access to sensitive areas	Provision of attractions/facilities such as toilets, food, improved walking surfaces, hides etc. Manage demand through car-park costs and capacities, restriction of on-road parking by wardening. Establish coast paths where there are gaps to minimise access to beach, realign footpaths where necessary.	Few examples exist where such infrastructure has been reviewed and designed across a wide area to focus visitor pressure away from sensitive areas.
3. ON-SITE ACCESS MANAGEMENT		
Restrict/prevent access to some areas within the site	Potential to restrict access at particular times, e.g. high tide and particular locations (roost sites). Temporary fencing, barriers, diversions etc all possible.	Enclosures to provide safe nesting areas for terns and breeding waders exist at numerous sites such as Holme NNR, Scolt Head NNR, Dawlish

Management option	Description	Examples and Notes
		Warren, Pagham Harbour LNR and Walberswick NNR. There are few examples of successful exclusion of people in the winter from roost sites etc. At Dawlish Warren a warden is present through the winter at high tide and visitors are redirected according to where the birds are.
Provide dedicated fenced dog exercise areas	Allowing dogs off leads etc in particular locations that are not sensitive for nature conservation or other reasons may increase their attractiveness to dog walkers.	Dedicated dog exercise facilities exist at Sutton Heath in the Suffolk Sandlings SPA. The enclosure is outside the SPA and draws visitors from a wide area (Cruickshanks, Liley, & Hoskin 2010b).
Zoning	Designated areas for particular activities. Often zones are set out in a code of conduct and prevention of use for the areas outside the zones is enforced through byelaws.	Dedicated ‘zones’ for particular activities exist on various estuary sites around the UK.
Infrastructure to screen, hide or protect the nature conservation interest	Screens, hides, embankments etc are commonly used to direct visitors along particular routes and screen people from birds or other features vulnerable to disturbance. Such infrastructure can also provide enhanced viewing facilities and opportunities for people to get close to wildlife without causing disturbance. Path design can enhance the extent to which people stray or roam from the path. Boardwalks etc. can protect vulnerable habitats.	Wide range of techniques and infrastructure. Many nature reserves commonly use such infrastructure to allow access and good viewing of wildlife. Less potentially relevant on greenspace sites where people are not necessarily visiting to view/experience wildlife.
Management of car-parking	Car-park spaces can be redistributed around a site, parking closed in some areas, parking fees modified (e.g. encouraging people not to stay too long) or a permit system be instigated to limit use of car-parks	Car parks have been temporarily closed as part of CRoW access restrictions on some sites (e.g. sites in Breckland with breeding stone curlews) and have been permanently reduced in size or closed at a number of sites such as the New Forest (to considerable public opposition) and Burnham Beeches (very successful). Evidence from Cannock suggests that results can be unpredictable (Burton & Muir 1974).
Path design and management	Surfacing, path clearance and other relatively subtle measures may influence how people move around a site and which routes they select.	Work in the Pennines demonstrated that path resurfacing resulted in a change in people’s behaviour and a resulting reduction in disturbance (Pearce-Higgins & Yalden 1997).
4. EDUCATION, COMMUNICATION TO PUBLIC AND SITE USERS		
Signs and interpretation and leaflets	Provision of informative and restrictive signs, and interpretive boards. Directions to alternative less sensitive sites. General information on the conservation interest to highlight nature conservation interest/importance.	Interpretation boards, signs and leaflets are widely used around the UK. Provision of signage and wardening have been shown to result in enhanced breeding success for little terns in Portugal (Medeiros <i>et al.</i> 2007).
Codes of Conduct	Guidance on how to behave to minimise impacts is promoted at a range of	On the Humber a generic code of conduct includes different sections for

Management option	Description	Examples and Notes
	sites, through websites, leaflets, interpretation etc. These are sometimes enforced by byelaws and other control measures (see section 5).	each type of activity and the code is available as a leaflet or a download from the Humber Management Scheme website ⁷ . Scottish Natural Heritage have produced comprehensive guidance titled the Marine Wildlife Watching code, covering cetacean boats, otters, seabirds etc ⁸ .
Wardening	In addition to an enforcement role (see 4e above) wardens can provide a valuable educational role, showing visitors wildlife etc.	Many sites have wardens who fulfil a range of roles, including interacting with the public and education. Can be both on-site and off-site (e.g. school visits).
Provision of information off-site to local residents and users.	Local media, newspapers etc can provide means to highlight conservation importance of sites and encourage responsible access. Educational events, provision of items for local TV/other media. Information can be made available in local shops, tourist centres etc. Potential to promote non-designated sites, for example through web / leaflets listing, for example, dog friendly sites.	In Dorset, Natural England provide a dog-users website which gives information to dog walkers, it includes codes of conduct and highlights places to walk, indicating which sites requires dogs to be on a lead and when ⁹ . Many estuaries have management partnerships that host regular forum meetings, estuary festivals and other events that bring local users together and can provide a means of conveying information.
Contact with relevant local clubs	Agreed codes of conduct and self-policing can be set up with individual groups and provide a means of ensuring users are aware of how to act responsibly (e.g. water-sports club revoking membership for anyone caught speeding (Defra, 2004)).	A range of examples exist, for example the Jersey Canoe Club has a code of conduct for wildlife encounters ¹⁰ ; In Pembrokeshire a marine code exists in addition to legislation as a voluntary agreement to which all major local wildlife tour boat operators, sub aqua diving organisations, jet ski organisations, sailors and sea kayakers etc. have signed up to ¹¹
Establishment of Voluntary Marine Reserves (VMRs)	By agreement of interested parties.	There are a number of sites around England, such as Purbeck, Looe St. Abbs and Seven Sisters.
Off-site education initiatives, such as school visits etc	Proactive education work with local communities, raising awareness and highlighting local issues.	

⁷ <http://humberems.co.uk/downloads/Codes%20of%20Conduct%20PDF.pdf>

⁸ <http://www.marinecode.org/documents/Scottish-Marine-Code-web.pdf>

⁹ <http://www.dorsetdogs.org.uk/>

¹⁰ http://www.jerseycanoeclub.co.uk/docs4dl/wildlife_coc.pdf

¹¹ <http://www.pembrokeshiremarinecode.org.uk/code%20conduct.htm>

5 ENFORCEMENT		
Dog control orders	Orders to keep dogs on leads, restrict specific access at certain times etc ¹² .	Difficulties in getting measures agreed, particularly when people have been using an area for a long period. Difficulties in policing. Peer pressure could be effective. Examples include Stanpit Marsh (Christchurch Harbour), the Hayle Estuary (RSPB Reserve) and Chichester Harbour.
Covenants regarding keeping of pets in new developments	Covenants prohibiting the keeping of cats and / or dogs for example in flats where a management company could enforce the restriction.	In a review of planning appeal decisions in the Thames Basin Heaths SPA (Hoskin and Tyldesley, 2006), a number of cases rejected the use covenants as ineffective and / or unenforceable and in ten appeals, such covenants were found to be insufficient to avoid harm to the SPA because they would not deter other recreational visits not related to dog walking.
Legal enforcement	Byelaws can be established by a range of bodies including local authorities, the MOD, National Trust, Parish Councils etc. Other options include special nature conservation orders or prosecution under SSSI legislation.	Policing of watercraft zoning, speed limits etc, with fines or other penalties for infringement ¹³ . Enforcement facilitated when a system of permits and vessel registrations is in place. Byelaws also often used for activities such as kite surfing (e.g. the Hayle Estuary and at Seaforth). Byelaws exist at a range of sites to control bait digging, e.g. The NNR part of Teesmouth and Cleveland Coast SPA/EMS
Wardening	Wardens have both educational (see 5b below) and enforcement roles. With respect to the later, wardens can provide direct contact and intervene when they observe particular activities (such as dogs off the lead on mudflats). The ability of a warden to control disturbing activities is clearly related to whether control measures are in place, and their nature. The more specific and statutory in nature the control, the greater the potential for enforcement by a warden.	Many sites have wardens who fulfil a range of roles, including interacting with the public dealing with disturbance issues. At Teesmouth and Cleveland Coast SPA/EMS, one targeted patrol per week allows NE on-ground presence to be demonstrated, but is very resource intensive.
Limiting visitor numbers	Visitor numbers capped, for example through tickets, permits or a similar system.	Commonly used in the past at various nature reserves around the UK such as Minsmere. Widely used in American National Parks.

12 See defra guidance at: <http://www.defra.gov.uk/environment/quality/local/legislation/cnea/documents/dogcontrol-orders.pdf>

13 Model byelaws provided at: http://www.mcga.gov.uk/c4mca/cons_mca_guidance_pleasure_boat_model_byelaws_amenda.pdf

Specific Recommendations for North Kent

- 5.6 In Table 7 we provide an overview of potential options that could be considered as mitigation. Specific details and fully worked up costs and plans for a package of measures are beyond the scope of this report. Drawing from Table 6 we have selected a series of measures which we feel are appropriate and relevant, and we have suggested where they might be targeted and illustrative costs. They are largely strategic options, that are likely to be beyond the scope that single developments can provide. We hope these will form a foundation that can be further built on; we recognise that local input, local stakeholder involvement and further consideration is essential to the successful design and implementation of any mitigation measures. We have not indicated likely timescales for implementation, however we have highlighted measures that are relatively easy to implement and also measures that we believe are particularly important, in that they are likely to bring the most benefit. Mitigation measures can be phased so that not all measures will be necessary immediately, and therefore those that are the most important and easiest to implement would be the ones to consider first.
- 5.7 Within the table we have included monitoring. Monitoring is important as there is relatively little evidence for the effectiveness of the different measures (see limited references in Table 6). Monitoring will provide the ability to test the effectiveness of measures and where measures are not successful, may be able to identify modifications. It will also provide an early warning of where impacts may occur within the European sites and allow additional measures to be targeted accordingly.

Table 7: Examples of Targeted Mitigation Options. Initial ideas requiring further detailed consideration. Costs are very approximate and indicative, they are estimated approximately drawing from existing costed mitigation plans relating to the Dorset Heaths (http://www.rspb.org.uk/Images/Dorsetheathlands_tcm9-256254.pdf)

Mitigation Measure	Areas to Target	User Group	Indicative cost	Likely to be easy to implement	Importance (star indicates important)	Notes/rationale
Set back development at distances greater than 6km from SPA access points	All				*	Would resolve much of the issues relating the SPAs
Secure roost site	Off-shore islands	all	?		*	Providing refuges for roosting birds, for example securing off-shore islands or similar could be an effective long term strategy.
Additional green infrastructure	Gravesend, Upper Medway (Gillingham, Rochester etc), Sittingbourne, Whitstable	Dog walkers	£2,000,000		*	“SANGs” designed to absorb local recreational use, and draw users who might otherwise use SPA. Dog gym or similar features potentially cost £3-5000 within a site. Land purchase costs difficult to estimate, also potential need to secure management in perpetuity.
Additional green infrastructure	Gravesend, Upnor, Rochester, Sittingbourne	Joggers, cyclists, walkers?	£200,000			Provision of promoted routes and enhanced infrastructure set back from coast and providing attractive options for a range of different route lengths. High costs reflect possible need to upgrade pavements, provide road crossings etc.
Awareness raising of issues relating to disturbance and dogs: leaflet and	All. Focus on SPA sites near Gravesend, the Upper Medway, Sittingbourne and	Dog walkers	£15,000	✓	*	Promoting simple messages - the need to keep dogs under close control, why disturbance is an issue, birds present. Leaflets and website that site-based staff can promote. Website potentially promoting dog

website	Whitstable.					friendly locations.
Enhanced wardening presence/site based staff	All	All	£150,000 p.a.;			Potential for dedicated team of mobile wardens or site based staff at existing sites (RSPB, KWT, local authority staff?). Costs assume 5 posts each for 9 months p.a. at c.£30,000 per person (including support costs, transport etc). Would not necessarily be required in perpetuity. Could be linked to existing voluntary wardening scheme. Wardens would provide face-face contact with visitors. May be merit in increasing cost and having year-round wardening.
Direct contact with bait diggers and promotion of a code of conduct	Swale, to west of Whitstable	Bait Diggers	£2,000?	✓		Could be undertaken by site-based staff. Existing code of conduct not currently available on the internet.
Signage, access infrastructure	Potentially all	All shore based users	£50,000			Interpretation boards and other on-site infrastructure such as screening, redesigning paths etc to influence how people move through sensitive areas and how they behave. Requires site based assessments to identify locations where potential to improve existing infrastructure or where there are gaps.
Contact with watersport users, liaison, data collection and development of codes of conduct	Whitstable/outer Swale/ Sheerness	Kitesurfers, windsurfers, PWC.	£5000?	✓		Face-face meetings with local users, identifying where and when users go into the SPA. Potentially developing voluntary code of conduct ¹⁴ and considering options to back up with legal enforcement
Project focused on Canoeists	Medway and Swale	Canoes	£15,000			Direct contact with local clubs, development of code of conduct, assessment of sites where launching

¹⁴ There is already a good code of conduct for PWC that covers the whole of Kent: <http://www.msep.org.uk/downloads.php>

						undertaken, potential for signage etc
Map and assess parking and all access points onto SPA	All	Range of users	£3000	✓		Small dedicated piece of work mapping and assessing all parking options around the SPA. Useful to inform development of mitigation with respect to parking etc. Would need to assess quality of parking, current charging, nearby options etc
Modifications to parking at selected locations	? Needs initial work (see above)	Range of users	£500,000?			Potential to use banks, ditches, dragon's teeth etc to reduce informal parking in some areas, enhance parking at other locations through additional parking bays etc. Would require initial review (see above) to identify options.
Monitoring of access levels	All	All	£10,000 p.a.	✓	*	Different options. Standardised counts of parked cars at multiple locations and standardised recording of foot access (potentially through automated counters and face-face interviews/counts) to determine changes over time.

Assessment of Individual Development Sites

- 5.8 In addition to the strategic measures outlined above, various measures can be tailored to individual developments and the area around development locations. Ideally any large development would be able to provide such tailored mitigation measures, considered on a site-by-site basis alongside the wider measures set out in Table 7.
- 5.9 In this section we provide guidance on how individual development sites might be considered within a Habitat Regulations Assessment. This is intended to help inform how those involved with masterplans and large development sites may draw on the available information and data to consider the impacts and mitigation measures. It is important that there is clear understanding of where such assessments might be necessary and how development will need to ensure that costs for off-site mitigation can be met.
- 5.10 Let us consider a hypothetical development site at around 2km from the SPA of 200 dwellings. Such a development might be expected to generate around 27 person visits per winter day to each access point at 2km. This could roughly be around 15 groups of people and 25 dogs¹⁵. Access points that are closer, for example 1km, would be expected to have around 52 additional person visits per winter day. These figures are derived using the equation in Figure 4. These figures are based on averages from the visitor survey and should be considered ‘typical’ based on the kind of survey points used in the visitor survey. The in-combination effects of these changes can be considered by cross-referencing to the overall figures for change in access as a result of development (the 16%) and by cross-referencing to the maps within this report and the overarching scoring report.
- 5.11 Visitors would be expected to use the SPA for normal greenspace activities, dog walking, cycling, jogging etc. In addition residents would be expected to drive – particularly within 6km – to nearby parts of the SPA, potentially drawn to access points that offer good parking, attractive walks etc and are easily accessible.
- 5.12 Some access points further afield with a specific ‘offer’ such as birdwatching, fishing, particular scenery, facilities etc., may also draw residents.
- 5.13 It is necessary therefore to map all access points around the development and assess them. Visit rates will be lower for some access points (for example ones that are muddy, difficult to reach, where there are other access points very close etc). Some may be particularly busy. Each access point should be assessed and mapped in relation to footpaths, road network etc. If one of the access points was included in the visitor and bird fieldwork this will provide additional information on activities, routes of visitors and home postcodes.
- 5.14 Consideration of the nearest parts of the SPA should include the scale of parking, existing use by visitors, whether people access the intertidal and levels of existing

¹⁵ 542 interviews were conducted in the visitor survey, involving 930 people and 502 dogs. Average group size is therefore 1.7 people and 0.9 dogs.

access. The greatest impacts are likely to be where levels of access are currently low, where the number of new units is high; where the development is close to the SPA; where there are no (or few) options for access apart from the SPA; where there are good parking options nearby to access the SPA; where access is directly onto the intertidal/shore, or where there are launching facilities.

- 5.15 It may be possible to position houses within the development site so that they are away from SPA access points and link to local footpaths in such a way that direct access to shore is avoided. New foot access that does not provide direct access onto shoreline is potentially necessary and areas for dogs to be exercised away from the SPA should be provided. New visitor survey work may help identify where people tend to walk and existing popular local circuits (note this depends on people currently visiting and using the area). This will help inform where there are options to provide additional facilities and direct users away from the SPAs.

- 5.16 Typical dog walking routes (from the visitor survey) were 3.3km. This provides an indication of the path lengths and scale of provision necessary. Simply ensuring 3.3km of existing footpath routes are available within the local area will not be adequate mitigation. Dog walkers will be drawn to the coast for the attractive scenery and perception that there is space and interesting terrain for the dog. Alternatives in or close to the development will need to recreate this.

- 5.17 If there are no options to redirect new residents or provide enhanced local green infrastructure away from the SPA, then additional green infrastructure within a wider radius may work as mitigation, if it reduces the overall level of access onto the nearby SPA, such that there is no net increase in access.

- 5.18 Table 2 within this report will help provide information on types of activity currently causing disturbance. Further cross reference with information in this report (e.g. Map 5) will inform where on-site mitigation measures may be beneficial within the SPA. These may be difficult for local developers to secure.

- 5.19 Additional measures as appropriate should be selected from Table 6 to minimise disturbance impacts.

- 5.20 Interpretation material and welcome packs for residents in the new development should link to the assessment of local access points and information gathered in the steps above.

- 5.21 Other checks (not relevant to disturbance issues to the wintering waterfowl interest, but nonetheless potentially material to any HRA) should include: proximity to Ramsar boundary and presence of Ramsar Interest; access onto grazing marsh, lagoons and other areas potentially part of, or used by the SPA bird interest; checks on breeding bird interest; check of building design (potential to influence flight lines, predator perches, light pollution); run-off and water-quality implications from waste water treatment.

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Appendix 1

Species totals (taken from Cruickshanks 2011) for species included in the SPA designations. Thresholds indicate the count where a site is deemed to be internationally or nationally important for a given species (see Holt *et al.* 2011). Brackets indicate counts that are incomplete (i.e. not all WeBS sectors were counted)

Species	International Threshold	GB Threshold	Thames		Medway		Swale	
			Peak Count 04/05 - 08/09	Mean 04/05 - 08/09	Peak Count 04/05 - 08/09	Mean 04/05 - 08/09	Peak Count 04/05 - 08/09	Mean 04/05 - 08/09
White-fronted Goose	10,000	58					430	332
Dark-bellied Brent Goose	2,000	981	22,047	12,771	1,834	1,436	2,310	2,051
Shelduck	3,000	782	2,318	2,064	2,360	2,155	2,207	1,936
Wigeon	15,000	4,060	9,293	5,374			16,651	12,244
Gadwall	600	171	471	438			(198)	127
Teal	5,000	1,920	5,433	4,911			(5,783)	4,981
Mallard	20,000	3,520					2,972	2,410
Pintail	600	279			812	761	731	642
Shoveler	400	148	524	428	(509)	269	331	274
Little Grebe	4,000	78	499	403			(191)	102
Great-crested Grebe	3,600	159						
Cormorant	1,200	230	654	538				
Mediterranean Gull	6,600		71	40	(18)	12		
Moorhen	20,000	7,500	383	374				
Coot	17,500	1,730						
Oystercatcher	10,200	3,200	33,659	26,350	(4,160)	2,937	5,225	4,279
Avocet	730	35	1,663	1,395	(1,027)	1027	1,290	686
Ringed Plover	730	330	1,998	1,186	332	332	(605)	(605)
Golden Plover	9,300	4,000	7,401	5,004			17,327	14,671

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Species	International Threshold	GB Threshold	Thames		Medway		Swale	
			Peak Count 04/05 - 08/09	Mean 04/05 - 08/09	Peak Count 04/05 - 08/09	Mean 04/05 - 08/09	Peak Count 04/05 - 08/09	Mean 04/05 - 08/09
Grey Plover	2,500	530	13,028	5,673	(1,586)	1,302	1,631	1,631
Lapwing	20,000	206	18,662	16,863			23,479	16,129
Knot	4,800	2,500	83,716	42,871	4,304	3,461	5,002	3,927
Dunlin	13,300	5,600	40,838	37,251	(10,633)	9,126	9,181	7,366
Black-tailed Godwit	470	150	8,081	5,311	(1,120)	(1,120)	1,782	1,589
Bar-tailed Godwit	1,200	620	8,629	5,870			922	716
Whimbrel	6,800	6,800						
Curlew	8,500	1,500	6,993	4,549				
Greenshank	2,300	6	259	183	(35)	(35)	(55)	26
Redshank	2,800	1,200	5,081	4,313	1,068	1,237	1,715	1,527
Turnstone	1,500	500	1,090	844			(515)	(515)
Little Tern	490		154	84				
Common Tern	1,900		(553)	373				

Appendix 2

Results of Medway Swale Estuary Partnership survey of recreation groups: Groups that indicated that their membership was increasing.

Name	What activity does your organisation participate in?	How many members do you have?	% of members who travel more than 10 miles to take part in activities?	How is contact maintained amongst members?	What is the busiest time of year for your organisation?	Key locations on the estuary where your activities take place
2nd Whitstable Sea Scouts	sailing, PWC, rowing, motor boating, fishing, training, diving, swimming, windsurfing, kitesurfing, water skiing	60	20%	newsletter, email, internet forum	summer	Whitstable, Long Beach. East of the harbour & Swale Estuary
Arethusa Venture centre	almost no sailing on the river (use Basin 2 at Chatham Maritime), paddle sports - kayaking & canoe	n/a	65%	newsletters etc.	spring & summer	mainly upriver from buoy 30A, up as far as Thunderbold Pier, sometimes as far as Rochester Bridge
Chatham Maritime Marina	sailing, motor boating	n/a - but 300 berth holders	75%	email	summer	River Medway
Cruising Association - Kent Section	sailing, motor boating	4500 (400 in Kent, 100-150 in Medway & Swale estuaries)	80%	newsletter (via email), email, internet forum, website	spring, summer, autumn & Winter	Medway & Swale Estuaries, Thames & Essex
Cuxton Marina Limited	sailing, motor boating, marina operators	250	75%	face to face interaction	summer	all over the estuary
Gravesend Rowing Club	rowing	approx. 70	10%	email	spring & summer	from New Bridge, Gravesend Promenade up as far as Cliffe Creek
Highway Marine Limited	sailing, motor boating, fishing, training, yacht brokerage, boatyard	n/a	80%	newsletter, email, telephone, texts	spring	Kentish Stour in Sandwich Town, Kingsferry Lakes and Foreshore (old ferry road i.o.s)
Hollowshore Cruising Club	sailing, motor boating	137 memberships(230 individuals)	50%	newsletter, email	summer & autumn	The Swale, the Medway, North Kent Coast to Ramsgate, Thames to London, estuary NEwards as far as the Deben
Kingsferry Boat Club	sailing, motor boating, fishing	c.50	10%	newsletter, email	summer	East & West Swale, Medway, Thames Estuary
Medway Towns Rowing Club	rowing, training	124	5%	email	spring & summer	M2 to Rochester Bridge

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Medway Towns Sea Cadet Unit	sailing, rowing, motor boating, rowing, training, diving & swimming. Also seamanship, marine engineering, BTEC, Duke of Edinburgh's award scheme, cooking, stewarding, first aid, communications, adventurous training, field gun competition, watersports (as above plus kayaking & canoeing) & others	45	2%	email, verbally & printed at twice weekly parades, facebook	summer	Chatham Dockyard to Otterham Quay
Medway Water Sports Trust	sailing, motor boating, fishing, training	there is not actually a membership	15%	email	spring, summer & autumn	Gillingham Reach, general area Rochester Bridge to Kingsnorth power station
SEGAS Sailing Club	sailing, motor boating, canoeing	100	0%	newsletter, email, website & clubhouse notice board	spring, summer & autumn	Gillingham Reach (Strand down stream to Kingsnorth Power Station), from Rochester Bridge to Queenborough, Swale, Thames and East Coast rivers
Strood Yacht Club	sailing, motor boating	193	n/a	newsletter, email	spring, summer & autumn	Queenborough, Canvey Island, Red Sands Tower
Upnor Sailing Club	sailing, fishing, training	130	75%	newsletter, email, internet forum	spring, summer & autumn	Medway River (Stangate, Queenborough, The Swale and parts of the east coast)
Whitstable Cruising Club	sailing	28	30%	newsletter, email, post, telephone	spring, summer & autumn	The Swale, Thames & Medway Estuary's
Whitton Marine Limited	commercial & leisure moorings, dry dock engineers etc.	60	15%	newsletter	spring & summer	Hoo Creek, Cookham Reach to estuary, Folly Point
Wilsonian Sailing Club	sailing, motor boating, training, dinghy sailing club and RYA, recognised training centre	224	60%	newsletter, email, internet forum	summer	River Medway from Cockham Reach to Saltpan Reach