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Subject: Hornsea Project Three (UK) Ltd response to Deadline 6 (Part 5)

Dear Kay, K-J

Please find attached the 5th instalment of documents.

Best regards,

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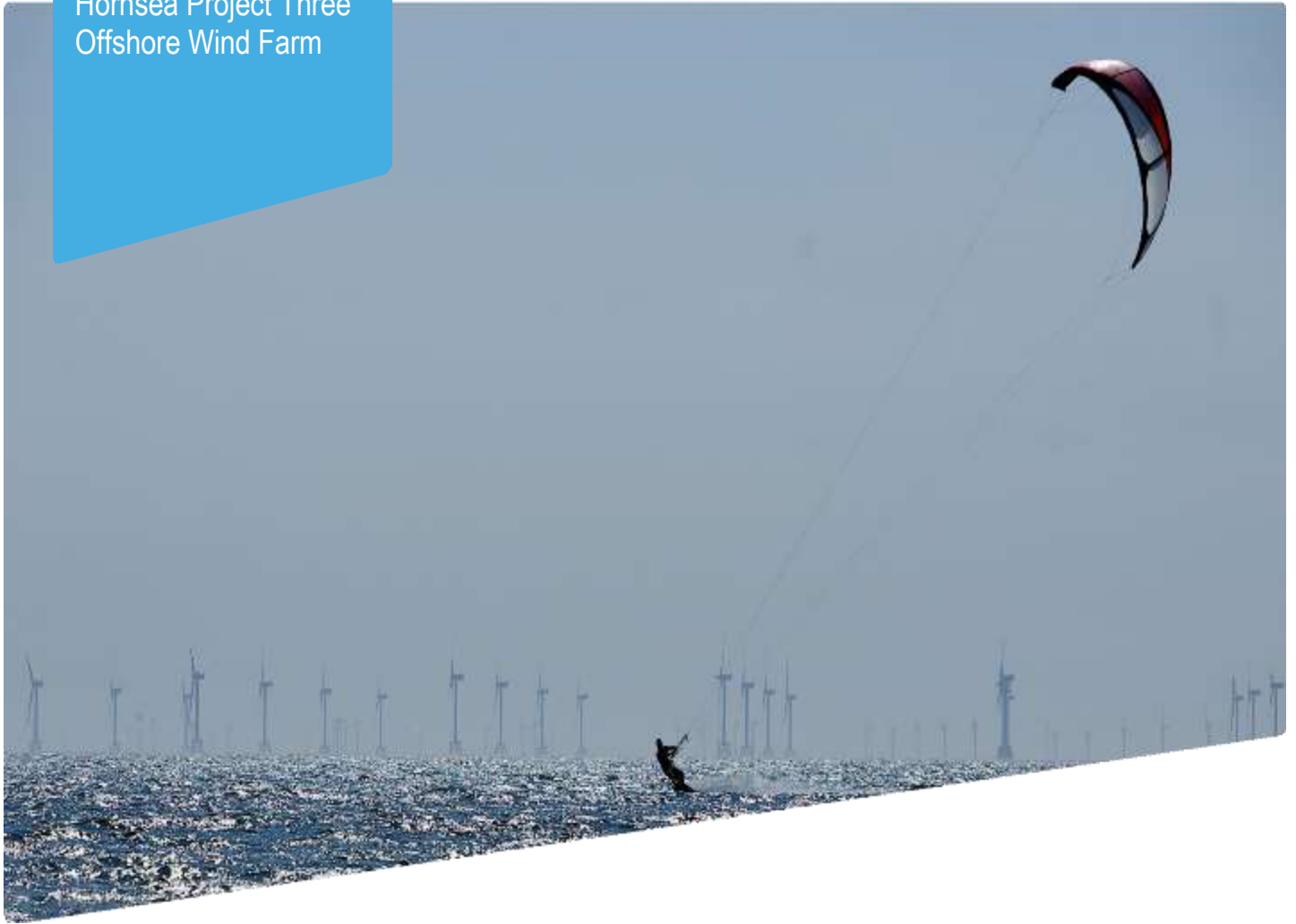
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Appendix 11 to Deadline 6 submission –
Aitken et al., 2014

Date: 8th February 2019

| Document Control | | | |
|----------------------|--|--------|--|
| Document Properties | | | |
| Organisation | Ørsted Hornsea Project Three | | |
| Author | Aitken et al., 2014 | | |
| Checked by | n/a | | |
| Approved by | n/a | | |
| Title | Appendix 11 to Deadline 6 submission – Aitken et al., 2014 | | |
| PINS Document Number | n/a | | |
| Version History | | | |
| Date | Version | Status | Description / Changes |
| 08/02/2019 | A | Final | Submitted at Deadline 6 (8 th Feb 2019) |
| | | | |
| | | | |
| | | | |

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Filey Cliffs Seabird Monitoring Report 2014



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Contents

| | Page number |
|---------------------|--------------------|
| 1. Summary | 3 |
| 2. Introduction | 5 |
| 3. Methods | 7 |
| 4. Results | 9 |
| 5. Discussion | 13 |
| 6. References | 15 |
| 7. Acknowledgements | 16 |

Figures

| | Page number |
|---|--------------------|
| 1. Filey/Cayton seabird colony location | 5 |
| 2. SSSI designations within and adjacent to Filey/Cayton colony | 5 |
| 3. SPM boundaries and Kittiwake productivity plot locations | 7 |
| 4. Filey Brigg Kittiwake tagging site 2014 | 8 |
| 5. Trend in Kittiwake productivity at Filey 2012-2014 | 10 |
| 6. GPS tracking data from Kittiwakes at Flamborough and Filey | 11 |
| 7. KDE contours for Kittiwakes tracked from Filey 2013 | 12 |

Tables

| | Page number |
|---|--------------------|
| 1. Comparison of boat-based whole-colony counts 1986-2014 | 9 |
| 2. Distribution of breeding assemblage using SPM plots in 2014 | 9 |
| 3. Kittiwake productivity results 2014 | 10 |
| 4. Sample size and foraging range data from Flamborough and Filey | 11 |
| 5. Kittiwake productivity results 2013 | 17 |
| 6. Kittiwake productivity results 2012 | 17 |
| 7. Filey whole-colony count results 2014 | 18 |
| 8. Filey whole-colony count results 2013 | 18 |
| 9. Filey whole-colony count results 2012 | 18 |
| 10. Filey whole-colony count results 2011 | 19 |
| 11. Filey whole-colony count results 2002 | 19 |

Appendices

| | Page number |
|---|--------------------|
| 1. Filey Kittiwake productivity 2012-2013 | 17 |
| 2. Filey whole-colony data 2002, 2011-2014 | 18 |
| 3. Kittiwake productivity plot locations | 20 |
| 4. Whole-colony count location and boundaries | 23 |

Summary

The Filey Cliffs seabird monitoring programme is an ongoing partnership between RSPB and Natural England. The programme was set up to monitor and report on the condition of this internationally important seabird colony. The project aims to establish repeatable baseline census monitoring of the colony, and to pursue a number of key areas of research and surveillance required to inform the conservation status of this site. The continued monitoring and research has informed the review of the adjacent Flamborough Head and Bempton Cliffs Special Protection Area (SPA) and Site of Special Scientific Interests (SSSI) and the consultation on the enlarged Flamborough and Filey Coast proposed Special Protection Area (pSPA). It also provides critical data to the conservation agencies to inform marine casework and enable the government to make informed decisions in the establishment of the Marine Protected Area (MPA) network.

The programme of research is coordinated by the RSPB Bempton Cliffs seabird monitoring team lead by the reserve Warden, the Seabird Research Assistant, who is funded by the National Lottery, through the Heritage Lottery Fund, and a team of dedicated volunteer seabird researchers.

Again this season there was news of a seabird wreck in the late winter/early spring, this time concentrated in SW England, the Channel Islands and the Atlantic coasts of France and Spain in the Bay of Biscay. It does not appear to have had an adverse effect on auk population of the pSPA, but Kittiwake breeding productivity at Filey remained well below both the national reference mean and the adjacent Flamborough/Bempton area. Poor weather in the second week of July, before many chicks were weatherproof, had an adverse effect, with large numbers of chicks lost, particularly from north facing plots.

A whole-colony population count was successfully completed this year, providing a six-year continuous trend in population data for this site. The total number of individual birds in the breeding seabird assemblage was 16,801 individuals, the lowest count since annual counts started in 2009. Most of the decline is due to a substantial 29% drop in the number of Kittiwake apparently occupied nests (AON) recorded.

Productivity monitoring for Black-legged Kittiwake was undertaken for a third year across five monitoring sites by staff and volunteers from RSPB and Filey Bird Observatory & Group (FBOG). Productivity averaged 0.45 chicks per pair.

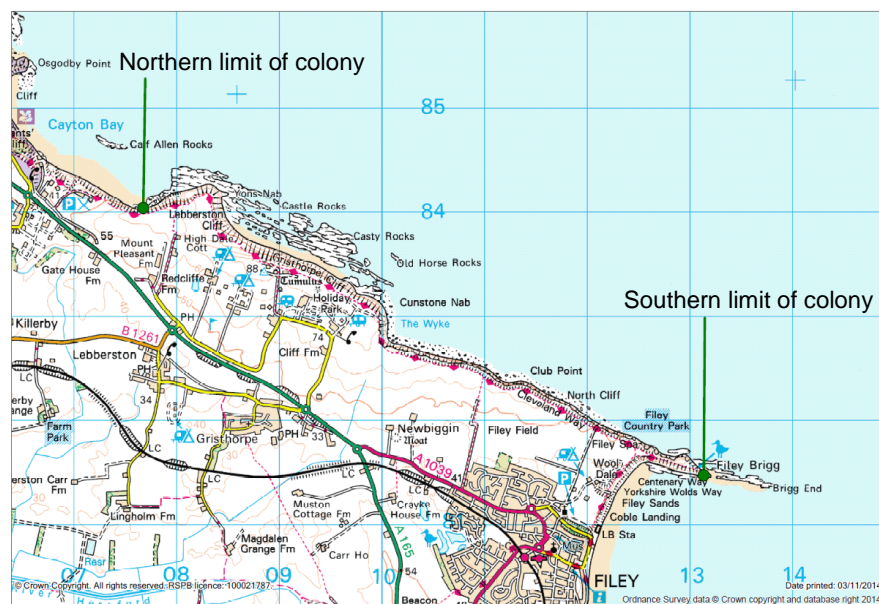
The RSPB's Seabird Tracking and Research (STAR) project took place across Flamborough and Filey. The project is now in its fifth year of fieldwork and data collection at Flamborough and its second year at Filey, tracking Black-legged Kittiwake to investigate foraging behaviour and areas during the chick rearing period. Nineteen GPS tags were deployed at Filey, of which sixteen were recovered. The findings to date indicate that Kittiwakes from Flamborough and Filey forage in different, but overlapping, areas with Filey birds tending to feed further to the north of birds from Flamborough, at least in the short time frame over which foraging behaviour was measured. It was apparent that foraging areas overlapped significantly with areas of seabed zoned for wind energy development at Hornsea and Dogger Bank.

It is proposed to carry out a detailed analysis of the core foraging areas and compare these with known oceanographic features to determine a more accurate foraging hot spot map for the whole SPA. This could be tested by extending the Filey Kittiwake study and rolling out tracking work to include Kittiwakes nesting at Bempton and Speeton. Furthermore, it is recommended that this approach be used to determine core foraging areas of breeding Razorbill and Guillemot, key features of the Flamborough and Filey Coast pSPA, as soon as the technology allows data to be downloaded automatically without having to recapture birds.

Introduction

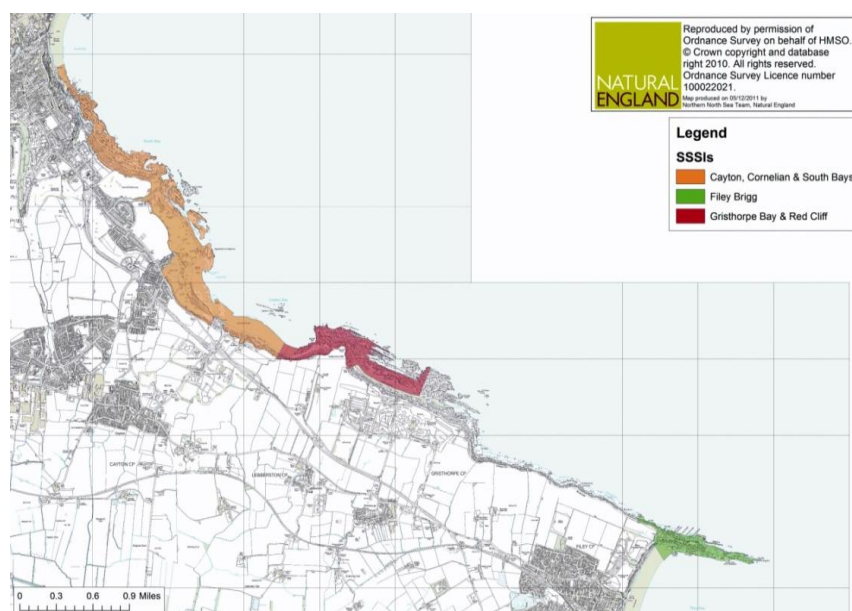
The stretch of coastline between Filey Brigg and Cayton Bay falls within the county of North Yorkshire. It is approximately 7 kilometres long and situated 10 kilometres north of Bempton Cliffs, on the east coast of Yorkshire, UK (Figure 1).

Figure 1 – Filey/Cayton seabird colony location



There are two SSSI designations that fall within the colony; these are the Filey Brigg SSSI to the south, and the Gristhorpe Bay and Red Cliff SSSI to the north (Figure 2).

Figure 2 – SSSI designations within and adjacent to the Filey/Cayton colony



The colony supports a diverse assemblage of breeding seabirds which, with the exception of Northern Gannet (*Morus bassanus*), is similar to the assemblage within the adjacent Flamborough Head and Bempton Cliffs SPA. The cliff height ranges from 160 foot to the south to 270 foot in the north. For the most part, the cliff face is vertical with ledges and crevices providing suitable nesting areas for Northern Fulmar (*Fulmarus glacialis*), Great Cormorant (*Phalacrocorax carbo*), Atlantic Puffin (*Fratercula artica*), Razorbill (*Alca torda*), Common Guillemot (*Uria aalge*), Black-legged Kittiwake (*Rissa tridactyla*) and Herring Gull (*Larus argentatus*). Other sections of cliff line are more gradual and covered in vegetation. These are the result of previous landslips and are largely unsuitable for nesting seabirds.

A key reason for the proposed extension to the pSPA is that the seabirds occurring within the larger area from Cunstone Nab in the north to South Landing at Flamborough Head in the south can be considered as a single population separated by the sandy and/or boulder clay coastal stretch in Filey Bay stretching from Filey Brigg south to Reighton.

Whole-colony counts carried out in 1986 (Williams 1996) and in 2002, as part of Seabird 2000, a major initiative to census all breeding seabirds in Britain and Ireland (Mitchell et al 2004) identified a significant seabird colony nesting on the cliffs to the north of Filey Bay. The significance of this colony came to light in 2008 in response to large numbers of Razorbill and Guillemot being caught and killed in gill nets set by fishermen in the adjacent Filey Bay. It was recognised that birds caught in the nets could have originated from either the Flamborough/Bempton or Filey colony. Unfortunately, at that time there was little current data about the state of the colony at Filey.

In 2009, a boat-based whole-colony count of the breeding seabird assemblage nesting on the cliffs between Filey and Cayton was carried out by the RSPB. The results suggested that the total number of breeding seabirds in the colony exceeded 20,000 birds, and as such, under the EU Birds Directive met SPA qualifying criteria. In response to this evidence the RSPB, with funding support from Natural England, have now completed five consecutive years of colony count data. The results are comparable with earlier counts enabling determination of population trends and comparison with results from the Flamborough and Bempton SPA.

In addition to this, recommendations were made to carry out productivity monitoring for Black-legged Kittiwake as the colony currently supports more than 1% of the UK Kittiwake population. In order to build up a more detailed understanding of the colony and its importance against other colonies around the UK, continued annual census and productivity monitoring at this site will enable the assessment of population changes, trends, and variations in colony assemblage over time.

The results from the 2014 seabird monitoring programme are detailed in this document with the intention of providing all raw data and monitoring procedures to enable interpretation by others in the future.

Methods

The Filey seabird monitoring programme followed the guidelines and methodologies set out in the 'Seabird monitoring handbook for Britain and Ireland. By Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., & Tasker, M.L. 1995'. JNCC / RSPB / ITE / Seabird Group, Peterborough.

The handbook summarises the current census and productivity monitoring techniques for seabirds. The appropriate methods were followed according to resources and practicality at this site. Please refer to the '*Seabird monitoring handbook for Britain and Ireland, 1995*' for details on individual methodologies.

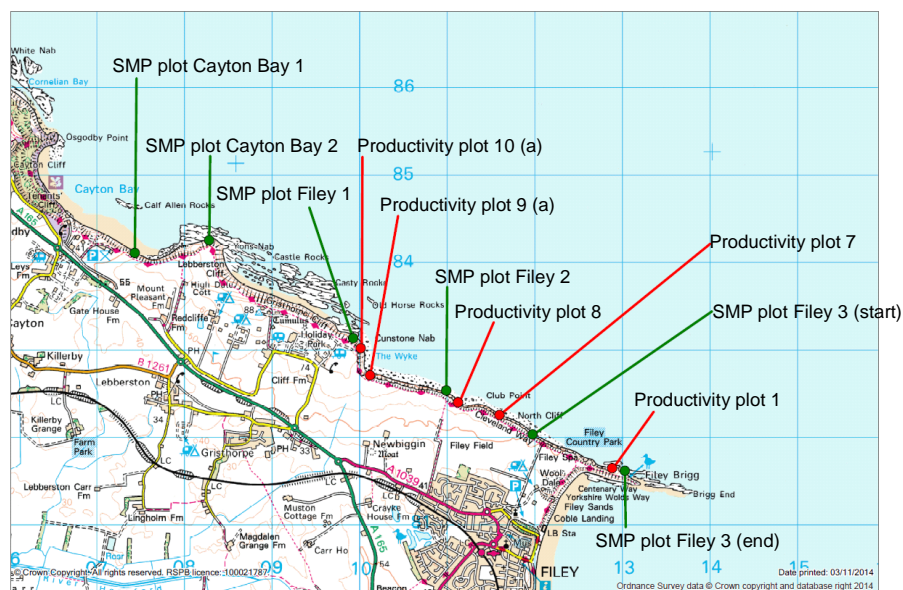
Whole-colony count

The count was conducted on 1st June 2014 and took six and a half hours to complete. It was a boat-based census, comparable to previous years, and was carried out by RSPB staff with assistance from Filey Sailing Club. The colony is divided into five recording areas, taken from the JNCC Seabird Monitoring Programme (SMP) website; within these recording areas, 24 sub-sections have been established to assist the counts. For full SMP and sub-section boundaries, see Appendix 4.

Productivity monitoring

Black-legged Kittiwake productivity monitoring was carried out by RSPB staff and volunteers for the first time in 2012, following the seabird monitoring handbook; these were completed again in 2013 and 2014. Historically, monitoring had been undertaken by FBOG (Syd Cochrane pers. comm.) however, did not follow the methodologies set out in the handbook. A three year data set for Kittiwake productivity now exists, comparable to other UK colonies. In 2011, five productivity plots were established providing an adequate sample size of 250+ AONs as well as providing safe vantage points for the observer with little or no disturbance to breeding seabirds (see Figure 3). Following the numbering of the potential plots these were numbered 7, 8, 9(a), 10(a) and 10(b). In 2014, an additional plot was established on Filey Brigg (Plot 1) to replace plot 10(b) which was not monitored this year.

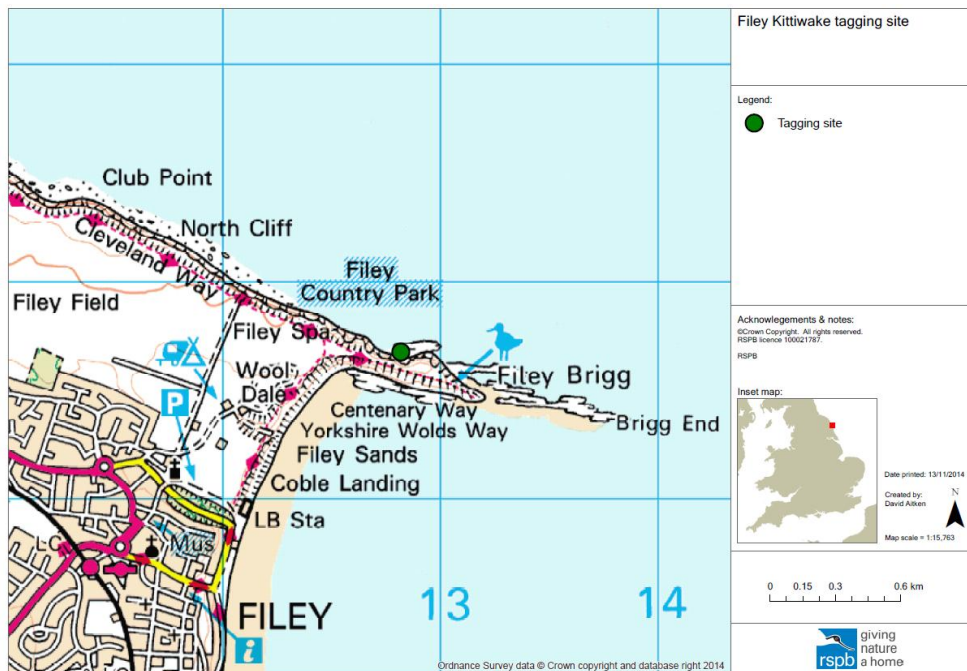
Figure 3 – SMP boundaries (green) and Kittiwake productivity plot locations (red)



Kittiwake tracking

Tracking took place at Filey for a second consecutive year (Figure 4). Fieldwork was carried out by Dr Guy Anderson, RSPB Principal Research Manager and David Aitken, RSPB Bempton Cliffs Warden. Tags were deployed on breeding (incubating or chick rearing) adult Kittiwakes following strict protocols to minimise disturbance caused by catching and tagging birds. GPS tags were used to obtain high resolution (one position every 100 seconds to an accuracy of approximately 25m) location data. Modified IgotU gt120 GPS tags (Mobile Action) were used to reduce weight and increase water resistance for use on Kittiwakes. Tags varied in weight depending on the size of battery installed in the tag. Tags, including attachment material, weighed between 11g and 19g. Adult Kittiwakes typically weight 400g and so tags were between 2.75% and 4.75% of body weight. The upper end of this exceeds the current recommended tag burden (set at 3%) which after consideration was deemed to be acceptable since deployments were very much shorter in duration than most tagging upon which the recommendations are set. It is also well within the ~50g known to be regularly carried by this species as food brought back to chicks. Tags were attached to plumage on the mantle using Tesa Tape and deployments were typically between one and four days in duration. The bird must be re-caught and tag removed in order to recover the data. Breeding success and trip lengths were observed to monitor the effect of tagging. No differences were observed between tagged birds and undisturbed birds in either of these measures (Gough, 2012. MSc thesis).

Figure 4 – Filey Brigg Kittiwake tagging site 2014



Results

Whole-colony counts

A six year continuous data set of colony assemblage counts carried out between 2009 and 2014 now exists – these are shown below and are compared to the 1986 (Williams 1996) and 2002 counts (Table 1).

The results provide the lowest number of Kittiwake since counts restarted in 2009, with a 29% reduction in the number of AONs recorded. By contrast, Guillemot were at their highest recorded level, with 39% more individuals recorded. Razorbill numbers fell after three consecutive years of increases. Puffin* recovered from an exceptionally low count last year. Herring Gull slipped after an increase last year, while Fulmar continue to decline. There are no breeding Shag at Filey, however, four individuals, one adult and three juveniles, were present at the time of the count.

Table 1 – Comparison of boat based whole-colony counts 1986-2014

| | 1986 (14 June) | 2002 | 2009 (20 June) | 2010 (21 May) | 2011 (3 June) | 2012 (18 June) | 2013 (3 June) | 2014 (1 June) |
|---------------------|-------------------|--------------|-------------------|------------------|------------------|-------------------|------------------|------------------|
| Fulmar | 252 pairs | 243 AOS | 410 AOS | 842 AOS | 771 AOS | 558 AOS | 576 AOS | 494 AOS |
| Cormorant | 25 pairs | 23 AOS | 42 AOS | 20 AOS | 38 AOS | 29 AOS | 21 AOS | 27 AOS |
| Shag | 0 | 0 | 0 | 0 | 4 ind. | 2 ind. | 2 ind. | 4 ind. |
| Herring Gull | 200 pairs | 110 AOS | 339 AOS | 240 AOS | 245 AOS | 190 AOS | 251 AOS | 212 AOS |
| Kittiwake | 5666 pairs | 5120 AOS | 6413 AOS | 6420 AOS | 7777 AOS | 6832 AOS | 6935 AOS | 4960 AOS |
| Guillemot | 416 pairs | 470 ind. | 2695 ind. | 3100 ind. | 3007 ind. | 2717 ind. | 3064 ind. | 4256 ind. |
| Razorbill | 104 pairs | 72 ind. | 613 ind. | 814 ind. | 1120 ind. | 1325 ind. | 1403 ind. | 1118 ind. |
| Puffin* | 36 ind. | 35 ind. | 19 ind. | 15 ind. | 32 ind. | 47 ind. | 11 ind. | 37 ind. |
| Total ind. | 13362 | 11569 | 17735 | 18973 | 21825 | 19309 | 20046 | 16801 |

* Surveying Puffins with this technique is not recommended owing to their secretive nature and inaccessible cliff habitat. Year on year counts may offer some understanding in trends over time.

Distribution of birds at Filey

The spatial distribution of the birds comprising the breeding assemblage in 2014 is shown in Table 2. For comparison, tables showing the distribution of the assemblage in 2002 and each year from 2011 - 2014 are shown in Appendix 2.

Table 2 – Distribution of breeding assemblage using SPM plots in 2014

| Cayton Bay to Filey Brigg Whole-colony Count 2014 | | | | | | | |
|---|---------|---------|---------|----------|----------|-------|------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 105 | 972 | 3179 | 0 | 0 | 4256 | 4256 |
| Razorbill (Ind.) | 119 | 291 | 708 | 0 | 0 | 1118 | 1118 |
| Northern Fulmar (AOS) | 170 | 125 | 77 | 49 | 73 | 494 | 988 |
| Black-legged Kittiwake (AON) | 845 | 2563 | 1536 | 0 | 16 | 4960 | 9920 |
| Herring Gull (AON) | 82 | 64 | 31 | 18 | 17 | 212 | 424 |
| Atlantic Puffin (Ind.) | 0 | 1 | 36 | 0 | 0 | 37 | 37 |
| Great Cormorant (AON) | 14 | 10 | 3 | 0 | 0 | 27 | 54 |
| European Shag (Ind.) | 0 | 0 | 4 | 0 | 0 | 4 | 4 |
| Total | | | | | | | 16801 |

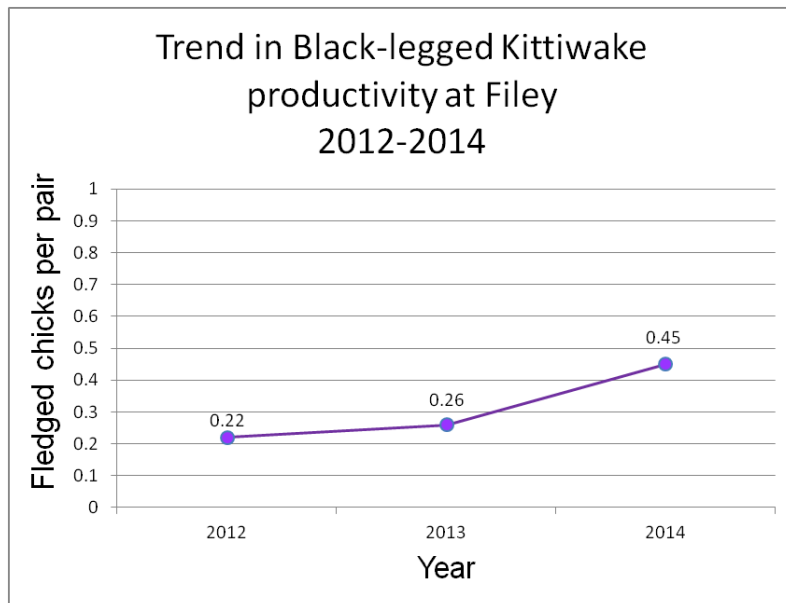
Productivity monitoring

Overall productivity for Kittiwake averaged 0.45 chicks per pair. A total of 255 AONs were monitored across five plots, of which 114 chicks successfully fledged (Table 3, Figure 5). The national reference mean for Kittiwake is 0.68 chicks per pair, recorded between 1986-2005 from between thirty and sixty-one colonies annually (Mavor et al. 2008).

Table 3 – Kittiwake productivity results 2014

| | Plot 1 | Plot 7 | Plot 8 | Plot 9 (a) | Plot 10 (a) | Total |
|------------------------------|--------|--------|--------|------------|-------------|-------------|
| Nests fledging 0 chicks | 19 | 35 | 36 | 32 | 43 | 165 |
| Nests fledging 1 chick | 24 | 12 | 13 | 11 | 6 | 66 |
| Nests fledging 2 chicks | 7 | 3 | 1 | 10 | 3 | 24 |
| Nests fledging 3 chicks | 0 | 0 | 0 | 0 | 0 | 0 |
| Total fledged | 38 | 18 | 15 | 31 | 12 | 114 |
| Total AON | 50 | 50 | 50 | 53 | 52 | 255 |
| Productivity per plot | 0.76 | 0.36 | 0.30 | 0.58 | 0.23 | 0.45 |

Figure 5 – Trend in Kittiwake productivity at Filey 2012-2014



For monitoring plot locations and recording boundaries, see Appendix 3.

Kittiwake tracking

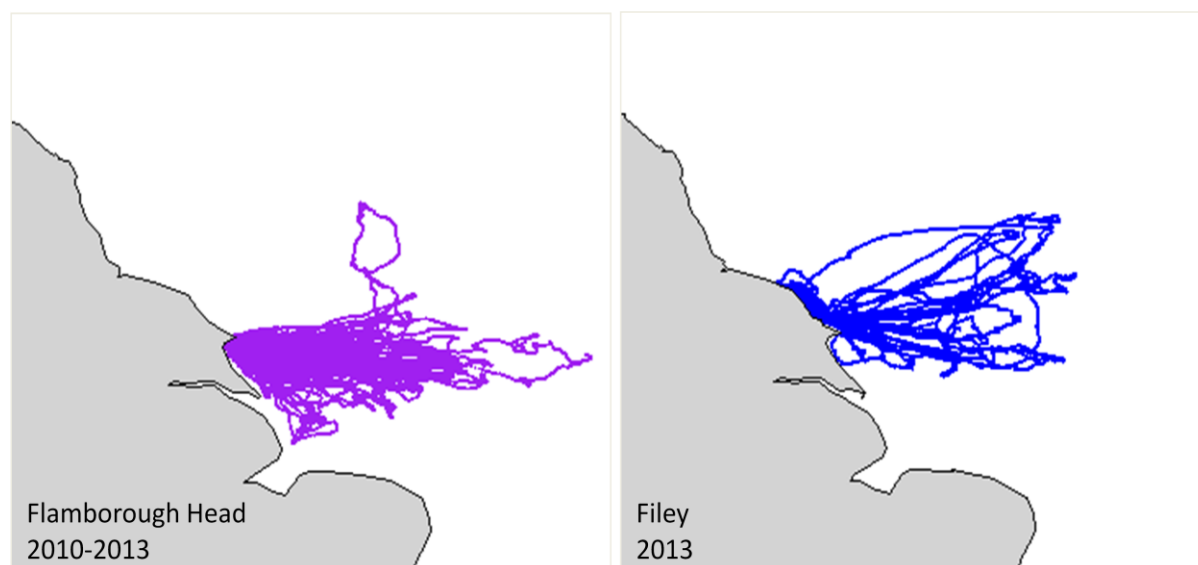
Tracking took place between 22nd June and 1st July. Nineteen GPS tags were deployed at Filey, of which sixteen were recovered. At Filey, 32 adult Kittiwake have been successfully tracked over 2 years (Table 4). Data from 2014 are currently being processed and screened for errors and so are not included in this report.

Table 4 – Sample size and foraging range from tracked birds at Flamborough and Filey

| Site | Year | No. tags retrieved with data | Max Foraging range (km) | Mean (\pm sd) of individual bird Max (km) | | |
|------------------|------|------------------------------|-------------------------|--|-------|------|
| Flamborough Head | 2010 | 25 | 123.6 | 74.1 | \pm | 41.1 |
| | 2011 | 17 | 136.4 | 58.2 | \pm | 40.2 |
| | 2012 | 8 | 219.4 | 156.4 | \pm | 28.2 |
| | 2013 | 19 | 145.5 | 55.7 | \pm | 31.9 |
| | 2014 | 17 | To be calculated | | | |
| Filey | 2013 | 17 | 172.2 | 101.2 | \pm | 52.3 |
| | 2014 | 15 | To be calculated | | | |

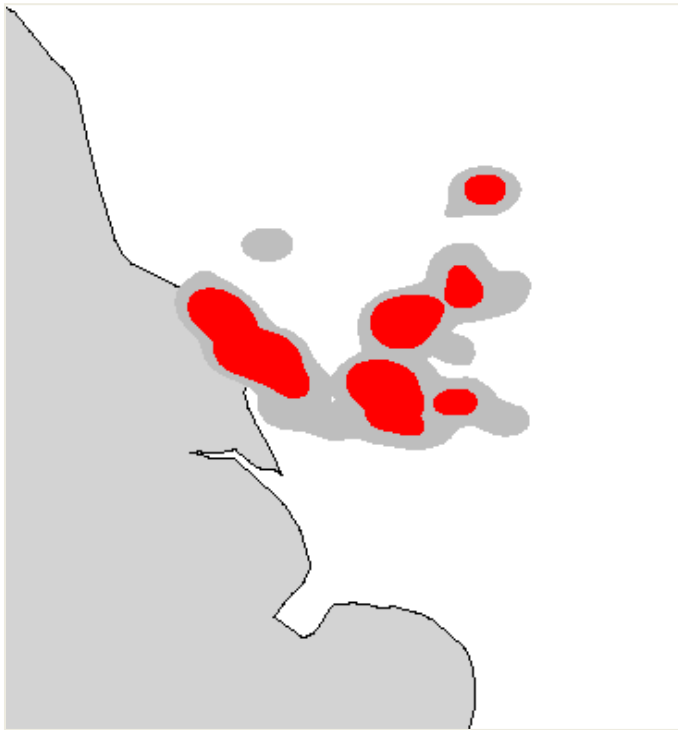
Initial indications are that Kittiwake from Flamborough and Filey forage in different, but overlapping, areas with Filey birds tending to feed further to the north of birds from Flamborough, at least in the short time frame over which foraging behaviour was measured (Figure 6).

Figure 6 – GPS tracking data from Kittiwakes at Flamborough and Filey



Kittiwake tracking data were filtered to remove points where birds were within 1km of the colony or travelling faster than 14km/hr. This removes points which are close to the nest and points likely to be commuting birds. Kernel density estimates (KDEs) were calculated from the remaining points and the 50% (core) and 90% (use) contours plotted (Figure 7). Differences were observed between years of the study. In all years an area close to the colony was used by a high density of birds as well as areas located further to the east. These are currently being examined to investigate how foraging behaviours relate to changes in colony level productivity.

Figure 7 – KDE contours for Kittiwakes tracked from Filey 2013



It was apparent that foraging areas overlapped significantly with areas of seabed zoned for wind energy development. The hot spots within this data are now being mapped against oceanographic features both at Flamborough and Bempton and at other Kittiwake colonies in the UK to determine whether core foraging areas can be accurately predicted. These results should be available in 2015.

Discussion

Repeatable whole-colony population monitoring and Kittiwake productivity monitoring is now well established at Filey. Continued annual census and productivity monitoring of this site will enable assessment of changes in population size, trends, and variations within the Filey colony assemblage over time and comparisons with the Flamborough Head and Bempton Cliffs sections of the Flamborough and Filey pSPA.

After completing a sixth consecutive year of whole-colony counts, results show the lowest recorded population size since 2009 (although still higher than in 1986 and 2002). The principal reason for the fall is a 29% decline in recorded Kittiwake AONs. A change in the counting team personnel may account for some variation, but if confirmed this decline would be a real cause for concern. Attention will be focused on the Kittiwake count next year in order to confirm these figures. It is also possible that late winter storms in the last two years have had a detrimental effect on our Kittiwakes without causing wrecks similar to the auk wrecks observed on the east coast of the UK in 2013 and in the southwest of England and Bay of Biscay in 2014.

Another area of concern is the continued year on year decline in breeding Fulmar numbers since 2010. This decline was highlighted in the 2013 Filey Report and Fulmar reached a new low this year. Razorbill numbers also appear to have fallen after five successive years of increases. This may be due to the widely publicised seabird wreck in the Bay of Biscay in late winter and early spring, although Guillemot numbers at Filey increased by nearly 1200 individuals, a remarkable 39% increase on 2013. There is speculation that some of these may be birds displaced from Bempton Cliffs by the expansion of breeding Gannet onto Guillemot breeding ledges; further research will be required to confirm this.

Five Kittiwake productivity monitoring plots were completed. Each produced fledging data, averaging 0.45 fledged chicks per pair. The results for 2014 show a substantial (42%) increase on the 0.26 fledged chicks per pair recorded in 2013, though 2014 was still the third consecutive year that Kittiwake productivity at Filey was below the national reference mean of 0.68 chicks per pair. Productivity also remained lower than the adjacent Flamborough and Bempton colony, where productivity for Kittiwake averaged 0.78 fledged chicks per pair in 2014.

The 2013 Report highlighted technical issues in monitoring two of the more distant Kittiwake monitoring plots. Heat haze and wind made it difficult to accurately record eggs and young chicks. This was discussed with the JNCC SMP team early in the season and it was agreed that once it could be established that a breeding attempt was being made by the birds at a particular nest site the focus should be on the number of fledged chicks – large chicks being easier to monitor on the distant plots.

Ongoing uses of tracking data

These data, together with the Flamborough results now represent some of the most complete information available on the foraging behaviour of breeding Kittiwakes for any colony nationally. However, it is important to consider that the data are only representative of a small number of birds, relative to the size of the population and only inform us about foraging during the few short weeks in the years in which tracking has taken place. Therefore, areas which have been used for foraging over the

course of this study cannot be considered the full extent of important foraging areas over the longer term.

The initial phase of data collection has a) measured accurate foraging ranges for Flamborough and Filey Kittiwakes b) shown the extent of variation between years c) identified foraging hot spots for tracked birds and d) observed significant overlaps with development zones. This is not the full extent to which the data is intended to be used and currently the RSPB is analysing the habitat preferences of the tracked birds in order to predict generalisations about foraging behaviour beyond the years and colonies where tracking data has been collected. This is part of two wider projects (FAME, Future of the Atlantic Marine Environment and STAR, Seabird Tracking and Research) in which birds have been tracked at 30 colonies in the UK.

Identifying Kittiwake key foraging areas and possible marine protected area boundaries

The UK Kittiwake breeding population has undergone a 50% decline in the last forty years, mirroring a similar decline in the Flamborough and Bempton Cliffs SPA, one of the largest Kittiwake breeding colonies in the UK. The cause of this decline is not fully understood but may be linked to an increase in surface sea temperatures in the North Sea, during this period. During this same period the biomass of Arctic plankton species have reduced dramatically and populations of Lesser Sand-eel, the staple food of Black-legged Kittiwake, have similarly declined (Frederiksen et al, 2004).

At a time when the UK Kittiwake population is undergoing such a dramatic decline it is critical that the legal protection offered to nesting Kittiwake is broadened to incorporate key foraging areas and to safeguard declining stocks of their key prey species, Lesser Sand-eel. The Birds Directive states that the SPA should include the most suitable territories of the SPA feature. To date, the Government have focussed on designated nesting areas and inshore maintenance areas only. ESAS data has been used to determine where key foraging areas might be located but the Minister has publically criticised the quality of this data. The six years of tagging data for nesting Kittiwake at Flamborough, and two years of Filey data, are now, for the first time, enabling us to develop a more comprehensive understanding of where these core foraging areas are located. By comparing these foraging hot spots with known oceanographic features it may be possible to develop a kernel-density model that accurately predicts the core foraging hot spots across the whole of the SPA which in turn can be ground-truthed. This data can then be used to inform the boundaries of a possible offshore mSPA for Kittiwake at Flamborough and Filey as well as potential Lesser Sand-eel Marine Conservation Zones (MCZ) which could help safeguard both species.

Kittiwake core foraging areas and the possible impact of offshore wind arrays

In 2013 the core foraging areas of Kittiwakes, feeding nestlings at Flamborough and Filey, were once again shown to overlap significantly with the development footprint of the proposed Hornsea offshore wind array. Similarly, the foraging areas of Kittiwake nesting at Filey also showed some overlap with the proposed Dogger Bank offshore wind array. This overlap raises the possibility of collision risk and/or displacement of feeding birds due to avoidance of the wind-farm which could ultimately result in reduced Kittiwake breeding success and a negative impact on the SPA features.

It is crucial that if consent is given for the wind arrays to go ahead, that monitoring is carried out by the developers to determine the impact on the SPA and pSPA features and that measures can be taken to mitigate any potential damage.

Tagging – the next steps

It is proposed to carry out a detailed analysis of the core foraging areas and compare these with marine environmental features to determine a more accurate foraging hot spot map for the whole SPA. This could be tested by extending the Filey Kittiwake study and rolling out the tracking work to include Kittiwakes nesting at Bempton and Speeton. Furthermore, it is recommended that this approach be used to determine core foraging areas of breeding Razorbill and Guillemot, key features of the Flamborough and Filey Coast pSPA, as soon as the technology allows data to be downloaded automatically without having to recapture the birds.

Kittiwake productivity monitoring and Kittiwake whole-colony census is set to take place in 2015; the colony count forming part of the wider Kittiwake whole-colony count across the whole pSPA. Tracking work will take place again, funding permitting.

References

Frederiksen, M., Wanless, S., Harris, M.P., Rothery, P. and L.J. Wilson (2004) The role of industrial fisheries and oceanographic change in the decline of North Sea Black-legged Kittiwakes *Journal of Applied Ecology*, **41**:1129-1139

Mavor, R.A., Heubeck, M., Schmitt, S. and M. Parsons (2008). *Seabird numbers and breeding success in Britain and Ireland, 2006*. Peterborough, Joint Nature Conservation Committee. (UK Nature Conservation, No. 31)

Mitchell, P.I., S.F. Newton, N. Ratcliffe & T.E.Dunn (2004) *Seabird Populations of Britain and Ireland*, ISBN 0-7136-6901-2, P&AD Poyser, London

Walsh, P.M., Halley, D.J., Harris, M.P., del Nevo, A., Sim, I.M.W., and M.L. Tasker (1995). *Seabird monitoring handbook for Britain and Ireland*. JNCC / RSPB / ITE / Seabird Group, Peterborough

Williams, D. (1996) *Bird-watching in Filey*

Acknowledgements

Special thanks go to Syd Cochrane and Mark Pearson, members of Filey Bird Observatory & Group, for their continued commitment to monitoring Black-legged Kittiwake.

Support from Ruth Jeavons, RSPB residential volunteer seabird researcher based at Bempton Cliffs, helped achieve productivity monitoring at Filey.

We are grateful to the following for their roles in collecting tracking data: David Aitken, Guy Anderson, Mark Bolton, Nigel Butcher, Sarah Davis, Elizabeth Mackley, Alice Macmillian, and Ellie Owen and to the FAME, Future of the Atlantic Marine Environment and STAR, Seabird Tracking and Research projects in which birds have been tracked at 30 colonies in the UK. Special thanks to Ellie Owen for analysing the data and drafting the seabird tracking section of the report as part of the STAR project.

Thanks also to Chris Place, Dave Warburton and Filey Sailing Club for their continued flexibility and commitment to the monitoring programme, enabling us to carry out our boat-based whole-colony counts.

Access at Blue Dolphin Holiday Park allowed us to reach important sections of the colony for essential monitoring works.

Thanks go to Natural England for vital funding support, allowing us to carry out a programme of monitoring works at the Filey colony as well as granting permissions to undertake Kittiwake tracking.

Additional funding for the tracking work has been provided by The Joint Nature Conservation Committee, The East Yorkshire Ringing Group and the East Yorkshire RSPB Local group.

Finally, the Heritage Lottery Fund for its support to the Bempton seabird monitoring programme - enabling the programme of monitoring and research to be carried out across the pSPA.

Appendix 1: Filey Kittiwake productivity 2012-2013Table 5 – Kittiwake productivity results 2013

| | Plot 7 | Plot 8 | Plot 9 (a) | Plot 10 (a) | Plot 10 (b) | Total |
|------------------------------|--------|--------|------------|-------------|-------------|-------------|
| Nests fledging 0 chicks | 40 | 34 | 38 | 43 | 19 | 174 |
| Nests fledging 1 chick | 9 | 14 | 8 | 4 | 5 | 40 |
| Nests fledging 2 chicks | 1 | 1 | 4 | 3 | 0 | 9 |
| Nests fledging 3 chicks | 0 | 0 | 0 | 0 | 0 | 0 |
| Total fledged | 11 | 16 | 16 | 10 | 5 | 58 |
| Total AON | 50 | 49 | 50 | 50 | 24 | 223 |
| Productivity per plot | 0.22 | 0.33 | 0.32 | 0.20 | 0.21 | 0.26 |

Table 6 – Kittiwake productivity results 2012

| | Plot 7 | Plot 8 | Plot 9 (a) | Plot 10 (a) | Plot 10 (b) | Total |
|------------------------------|--------|--------|------------|-------------|-------------|-------------|
| Nests fledging 0 chicks | 33 | 26 | 0 | 0 | 0 | 59 |
| Nests fledging 1 chick | 5 | 14 | 0 | 0 | 0 | 19 |
| Nests fledging 2 chicks | 10 | 8 | 0 | 0 | 0 | 18 |
| Nests fledging 3 chicks | 0 | 0 | 0 | 0 | 0 | 0 |
| Total fledged | 25 | 30 | 0 | 0 | 0 | 55 |
| Total AON | 51 | 51 | 50 | 50 | 50 | 252 |
| Productivity per plot | 0.49 | 0.59 | 0.00 | 0.00 | 0.00 | 0.22 |

Appendix 2: Filey whole-colony data 2002, 2011-2014Table 7 – Filey whole-colony count results 2014

| Cayton Bay to Filey Brigg Whole-colony Count 2014 | | | | | | | |
|--|----------------|----------------|----------------|-----------------|-----------------|--------------|-------------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 105 | 972 | 3179 | 0 | 0 | 4256 | 4256 |
| Razorbill (Ind.) | 119 | 291 | 708 | 0 | 0 | 1118 | 1118 |
| Northern Fulmar (AOS) | 170 | 125 | 77 | 49 | 73 | 494 | 988 |
| Black-legged Kittiwake (AON) | 845 | 2563 | 1536 | 0 | 16 | 4960 | 9920 |
| Herring Gull (AON) | 82 | 64 | 31 | 18 | 17 | 212 | 424 |
| Atlantic Puffin (Ind.) | 0 | 1 | 36 | 0 | 0 | 37 | 37 |
| Great Cormorant (AON) | 14 | 10 | 3 | 0 | 0 | 27 | 54 |
| European Shag (Ind.) | 0 | 0 | 4 | 0 | 0 | 4 | 4 |
| Total | | | | | | | 16801 |

Table 8 – Filey whole-colony count results 2013

| Cayton Bay to Filey Brigg Whole-colony Count 2013 | | | | | | | |
|--|----------------|----------------|----------------|-----------------|-----------------|--------------|-------------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 87 | 694 | 2283 | 0 | 0 | 3064 | 3064 |
| Razorbill (Ind.) | 148 | 326 | 929 | 0 | 0 | 1403 | 1403 |
| Northern Fulmar (AOS) | 171 | 154 | 95 | 78 | 78 | 576 | 1152 |
| Black-legged Kittiwake (AON) | 1030 | 3523 | 2382 | 0 | 0 | 6935 | 13870 |
| Herring Gull (AON) | 98 | 55 | 33 | 32 | 33 | 251 | 502 |
| Atlantic Puffin (Ind.) | 1 | 0 | 10 | 0 | 0 | 11 | 11 |
| Great Cormorant (AON) | 13 | 7 | 1 | 0 | 0 | 21 | 42 |
| European Shag (Ind.) | 0 | 0 | 2 | 0 | 0 | 2 | 2 |
| Total | | | | | | | 20046 |

Table 9 – Filey whole-colony count results 2012

| Cayton Bay to Filey Brigg Whole-colony Count 2012 | | | | | | | |
|--|----------------|----------------|----------------|-----------------|-----------------|--------------|-------------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 66 | 661 | 1990 | 0 | 0 | 2717 | 2717 |
| Razorbill (Ind.) | 156 | 370 | 799 | 0 | 0 | 1325 | 1325 |
| Northern Fulmar (AOS) | 169 | 123 | 92 | 80 | 94 | 558 | 1116 |
| Black-legged Kittiwake (AON) | 839 | 3272 | 2696 | 25 | 0 | 6832 | 13664 |
| Herring Gull (AON) | 60 | 43 | 20 | 34 | 33 | 190 | 380 |
| Atlantic Puffin (Ind.) | 1 | 3 | 43 | 0 | 0 | 47 | 47 |
| Great Cormorant (AON) | 9 | 8 | 12 | 0 | 0 | 29 | 58 |
| European Shag (Ind.) | 0 | 0 | 2 | 0 | 0 | 2 | 2 |
| Total | | | | | | | 19039 |

Table 10 – Filey whole-colony count results 2011

| Cayton Bay to Filey Brigg Whole-colony Count 2011 | | | | | | | |
|---|---------|---------|---------|----------|----------|-------|------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 80 | 708 | 2219 | 0 | 0 | 3007 | 3007 |
| Razorbill (Ind.) | 144 | 251 | 725 | 0 | 0 | 1120 | 1120 |
| Northern Fulmar (AOS) | 261 | 177 | 116 | 123 | 94 | 771 | 1542 |
| Black-legged Kittiwake (AON) | 1418 | 3941 | 2418 | 0 | 0 | 7777 | 15554 |
| Herring Gull (AON) | 101 | 57 | 40 | 24 | 23 | 245 | 490 |
| Atlantic Puffin (Ind.) | 7 | 2 | 23 | 0 | 0 | 32 | 32 |
| Great Cormorant (AON) | 4 | 19 | 15 | 0 | 0 | 38 | 76 |
| European Shag (Ind.) | 0 | 0 | 4 | 0 | 0 | 4 | 4 |
| Total | | | | | | | 21825 |

Table 11 – Filey whole-colony count results 2002

| Cayton Bay to Filey Brigg Whole-colony Count 2002 | | | | | | | |
|---|---------|---------|---------|----------|----------|-------|------------------|
| Species | Filey 1 | Filey 2 | Filey 3 | Cayton 1 | Cayton 2 | Total | Total Individual |
| Common Guillemot (Ind.) | 100 | 320 | 50 | 0 | 0 | 470 | 470 |
| Razorbill (Ind.) | 40 | 22 | 10 | 0 | 0 | 72 | 72 |
| Northern Fulmar (AOS) | 170 | 27 | 5 | 21 | 20 | 243 | 486 |
| Black-legged Kittiwake (AON) | 1800 | 3200 | 120 | 0 | 0 | 5120 | 10240 |
| Herring Gull (AON) | 60 | 20 | 5 | 20 | 5 | 110 | 220 |
| Atlantic Puffin (Ind.) | 20 | 5 | 10 | 0 | 0 | 35 | 35 |
| Great Cormorant (AON) | 23 | 0 | 0 | 0 | 0 | 23 | 46 |
| Total | | | | | | | 11569 |

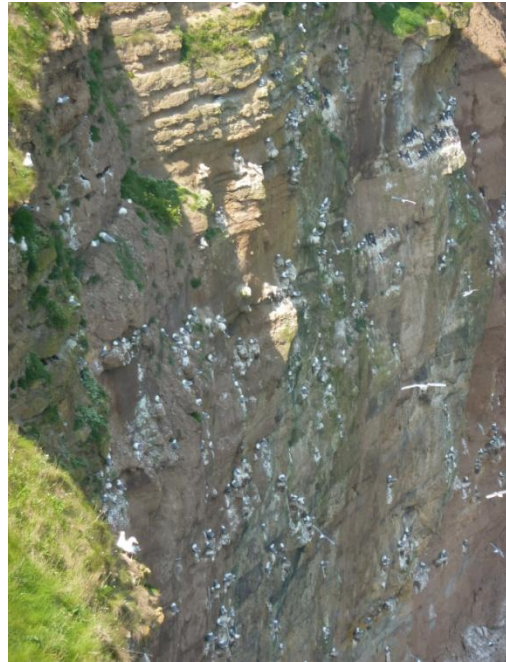
Appendix 3: Kittiwake productivity plot locations

Plot: 7

Observer: Syd Cochrane

Dates monitored: 13 June – 18 July

Visit requirements: Once a week



Plot: 8

Observer: Mark Pearson

Dates monitored: 12 June – 31 July

Visit requirements: Once a week



Plot: 9 (a)

Observer: Michael Babcock

Dates monitored: 5 June – 5 August

Visit requirements: Once a week



Plot: 10 (a)

Observer: Ruth Jeavons

Dates monitored: 31 May – 5 August

Visit requirements: Once a week



Plot: 10 (b)

Observer: Not monitored in 2014

Dates monitored: n/a

Visit requirements: Once a week



Plot: 1 (Filey Brigg)

Observer: Syd Cochrane

Dates monitored: 10 June – 16 July

Visit requirements: Once a week



Appendix 4: Whole-colony count location and boundaries



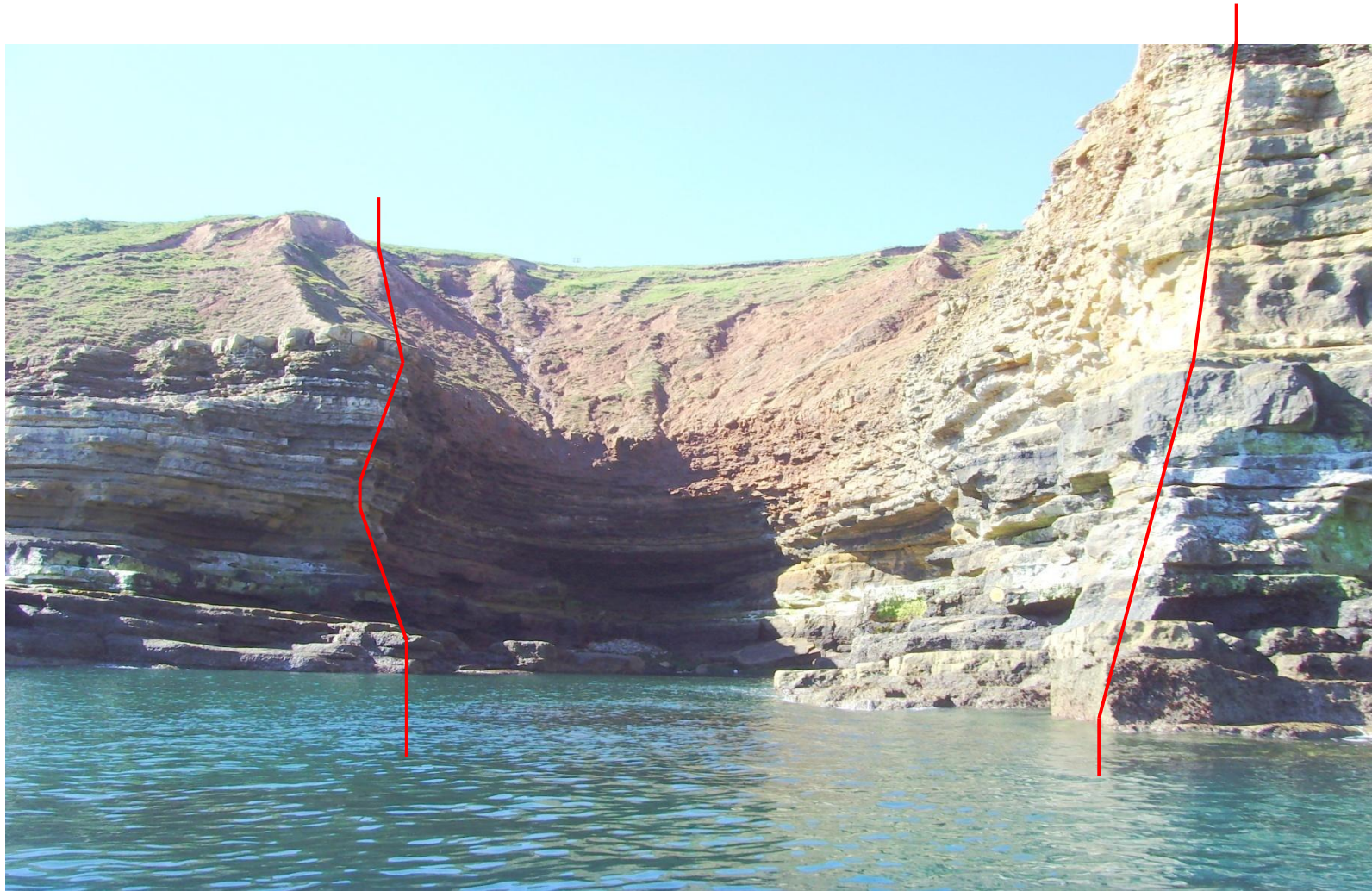
SMP Location: Filey 3 - Plot 1



SMP Location: Filey 3 - Plot 2



SMP Location: Filey 3 - Plot 3



SMP Location: Filey 3 - Plot 4



SPM Location: Filey 3 - Plot 5



SPM Location: Filey 3 - Plot 6



SMP Location: Filey 3 - Plot 7



SMP Location: Filey 3 - Plot 8



SMP Location: Filey 3 - Plot 9



SMP Location: Filey 3 - Plot 10



SMP Location: Filey 3 - Plot 11



SMP Location: Filey 3 - Plot 12

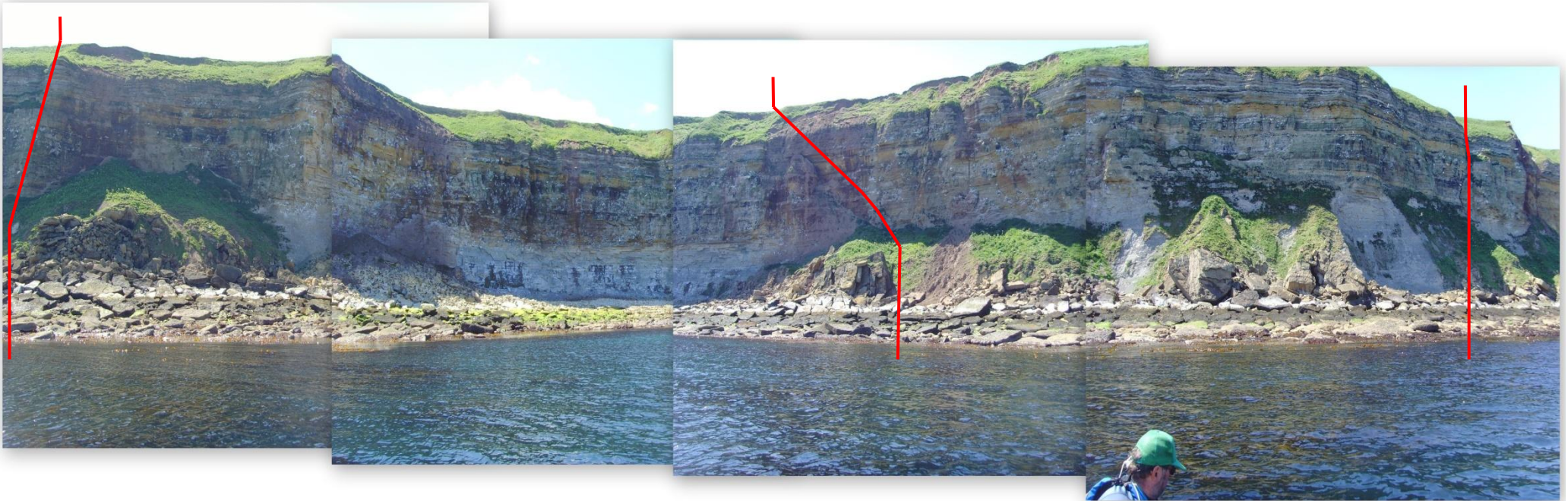


SMP Location: Filey 2 - Plot 1



SMP Location: Filey 2 - Plot 2

SMP Location: Filey 2 - Plot 3 & 4 (Cunstone Nab)



Plot 3

Plot 4 - (Cunstone Nab)

