Flamborough and Filey Coast pSPA Seabird Monitoring Programme

2015 Report

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SUMMARY

The Flamborough and Filey Coast seabird monitoring programme is a partnership between the RSPB and Natural England, set up to monitor and report on the condition of this internationally important seabird colony. Established in 2008, the project aims were 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 condition of this site. For 2015 the results of seabird monitoring at Bempton/Flamborough and Filey have been consolidated into a single report covering the Flamborough and Filey Coast proposed Special Protection Area (pSPA).

The results inform the pSPA and underlying Site of Special Scientific Interest (SSSI) condition assessments and provide critical data to inform casework and the establishment of a Marine Protected Area (MPA) network.

In 2015 the seabird monitoring programme was successfully completed by a dedicated team of staff, volunteers, a Seabird Research Assistant who is funded by the National Lottery, through the Heritage Lottery Fund and a residential seabird research volunteer.

2015 was a fairly typical breeding season. Productivity for both auk species was lower than 2014 but close to their six year mean, Guillemot productivity figures were probably affected by Gannet activity on one plot. Bempton/Flamborough Kittiwake productivity slipped back after last year's gain, whilst Filey Kittiwake productivity was steady from a very low base – overall Kittiwake remain a cause for concern. Fulmar aggregate productivity showed a welcome increase with joint highest productivity since 2009. Herring Gull productivity continued the upward trend from last year. Gannet productivity bounced back from last year. The productivity results were as follows:

- Northern Fulmar productivity – 77 pairs were monitored from which 47 chicks fledged, 0.61 chicks per apparently occupied site (AOS).
- Northern Gannet productivity – 260 nests were monitored from which 222 chicks fledged, 0.85 chicks per apparently occupied nest (AON).
- Razorbill productivity – 350 pairs were monitored from which 243 chicks fledged, 0.69 chicks per AOS.
- Common Guillemot productivity – 293 pairs were monitored from which 211 chicks fledged, of 0.72 chicks per AOS.
- Black-legged Kittiwake productivity at Bempton/Flamborough – a remarkable 1058 nests were monitored from which 774 chicks fledged, 0.73 chicks per AON.
- Black-legged Kittiwake productivity at Filey – 257 nests were monitored from which 119 chicks fledged, 0.46 chicks per AON.
- Herring Gull productivity – 109 nests were monitored from which 109 chicks fledged, 1.00 chicks per AON.

The Razorbill study-plots produced a mean count of 576 individuals, a reduction of 62 since the record high mean count in 2014. If a notably low final count made at the end of the count period is excluded the mean count was 599, in line with the general upward trend since the first counts in 2009.

The Common Guillemot study-plot results produced a mean count of 1389 individuals; the second highest mean count recorded since the study was set up (the highest being 1,454 in 2014). As in the case of Razorbills the final count was notably low and if this is excluded the mean is 1430, again in line with the general upward trend since 2009.

Black-legged Kittiwake study-plot results produced a mean count of 1972 AON; a slight increase on last year and highest since 2011.

The Common Guillemot diet composition study was carried out by an MSc student between 29 May and 26 June 2015. A total of 656 prey items were recorded during the study, using larger, but more distant, plots. Clupeids were far the most numerous, accounting 95% of prey items recorded. In 2015 Razorbill diet composition was also recorded. From 216 feeds 546 prey items were recorded of which 90% were Sandeel and 10% Clupeids. The proportion of Clupeids in the Common Guillemot diet is much higher than has been recorded in previous years, although contrast with Razorbills, which predominantly took Sandeels.

The Northern Gannet whole-colony count was successfully completed this year. A total of 12,494 AONs and at least 2100 non-breeding individuals were recorded during the boat-based census, an increase of nearly 13% in AONs since the last count in 2012 and an increase of 59% since 2009.

A count of Black-legged Kittiwake at Filey was also completed. A total of 6546 AONs were recorded during the boat-based census, confirming no significant decline since the 2012 and 2013 counts.

The study of how European Shag use the pSPA throughout the year, intended to assess whether communal winter roosts support nationally significant numbers of wintering Shag at this site, continued. As expected roost numbers dropped over the breeding season but are building in autumn 2015; use of a new watch point may enable more birds to be observed. During the breeding season 18 Shag nests were recorded in part of the SPA, suggesting a small recovery of breeding numbers from the 16 recorded in the whole colony count in 2014. Further investigations will help us build a clearer picture and understanding of how birds use the SPA year-round.

The RSPB Seabird Tracking and Research (STAR) project took place at Flamborough and Filey. The project is now in its sixth year of fieldwork and data collection at Flamborough and its third year at Filey, tracking Black-legged Kittiwake to investigate foraging behaviour and areas during the chick rearing period. The findings from this ongoing tracking project once again highlight that the core foraging area of Flamborough nesting Kittiwake overlaps significantly with the proposed development footprint of the proposed Hornsea offshore wind array and the foraging area of Filey nesting birds overlaps with the proposed Dogger Bank offshore wind farm development area. At a time when both the pSPA population and the UK Kittiwake population generally are under significant pressure it remains critical that every measure is taken to monitor the potential impact of these developments on the pSPA and SSSI features and that adequate mitigation is in place to safeguard the birds and these key foraging areas. 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 Kittiwake nesting at Bempton and Speeton.

This year limited additional tracking work using auto-download tags on Guillemots and Razorbills at Flamborough Head was carried out. Despite very limited time being available, and challenging terrain, tags were successfully deployed on four breeding adults and three tracks or partial tracks recovered. This very exciting work opens up the possibility of assessing how auk species use the SPA and how their key foraging areas may be affected by proposed offshore development.

Recreational disturbance continues to be a threat to the breeding success of the colony. The Flamborough Head and Bempton Cliffs SPA European Marine Site partnership study of disturbance incidents across the SPA identified incidents involving anglers, jet skis, paragliders, civil aircraft and kayakers in 2015.

A voluntary code of conduct for Bempton and Speeton Cliffs incorporating a closed season for cliff-top angling from 1 March to 30 September, developed with local angling groups and supported by review meetings, was considered a success.

Last year two jet ski incidents, involving disturbing/hitting seabirds in the inshore extension of the pSPA, were witnessed. As a result of both incidents, Natural England issued written warning letters which were ignored. As a result they then issued a ‘STOP NOTICE’. This is a piece of legislation not often used which stops people carrying out an activity that is deemed damaging to the environment. This order was upheld by the judge following an appeal by the jet ski operators. A workshop will be held in 2016 with responsible jet ski operators with a view to develop a voluntary code of conduct to avoid similar disturbance incidents in the future.

Meetings were held with the George Cayley Sailwing Club following a disturbance incident involving paragliders at Speeton and Buckton Cliffs. It is hoped that a voluntary code of conduct can be agreed in time for the 2016 breeding season.

INTRODUCTION

Flamborough and Filey Coast pSPA supports the largest mainland seabird colony in England, the only mainland gannetry in England and one of the largest mainland Black-legged Kittiwake colonies in the UK. The landward boundary of the pSPA generally follows the coast at Flamborough Head from South Landing in the south to Speeton in the North with an additional section from the forefront of Filey Brigg headland to Cunstone Nab. The seaward boundary extends approximately 2km parallel to the coast from the landward boundaries before moving seawards and extends approximately 2km into the marine environment (See maps at Appendix 1).

Flamborough Head is a highly protected site both for its wildlife and unique chalk habitats. The site is designated as a European Marine Site, a Special Area of Conservation (SAC), Site of Special Scientific Interest (SSSI), a Heritage Coast site which includes three Local Nature Reserves (LNR), the RSPB Bempton Cliffs nature reserve and the Yorkshire Wildlife Trust Flamborough Cliffs nature reserve.

At the north end of the pSPA the Filey Brigg SSSI falls within the pSPA and the Gristhorpe Bay and Red Cliff SSSI is just to the north of the pSPA.

The Flamborough and Filey Coast pSPA qualifies under Article 4.2 of the Birds Directive for the following reasons:-

- It supports over 1% of the biogeographical population of four regularly occurring migratory species: Black-legged Kittiwake (*Rissa tridactyla*); Northern Gannet (*Morus bassanus*); Common Guillemot (*Uria aalge*); and Razorbill (*Alca torda*)

- It is used regularly by over 20,000 seabirds in any season: during the breeding season the area regularly supports over 200,000 seabirds.

Due to the importance of the seabird colony and level of site protection, Natural England and the RSPB proposed in 2008 a project to enable a baseline count, population monitoring and further research to collect data on the health of the colony and the Flamborough Head and Bempton Cliffs SPA and underpinning SSSIs. This proposal led to the establishment of the Flamborough Head and Bempton Cliffs seabird monitoring programme, which began with the 2009 seabird breeding season.

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, completed five consecutive years of colony count data. The results were comparable with earlier counts enabling determination of population trends and comparison with results from the Flamborough Head and Bempton Cliffs SPA. This data supported the proposed extension of the existing SPA to create the pSPA.

The data collected by the enlarged Flamborough and Filey Coast seabird monitoring programme will inform the condition and management of the Flamborough and Filey Coast pSPA and underpinning SSSIs. In addition, the results will also inform current and new planning enquiries and environmental assessments e.g. the proposed Hornsea and Dogger Bank offshore wind arrays that

may have a detrimental impact on the features of the designated sites. It is also hoped that seabird tracking data collected from the colony will inform potential new offshore MPAs.

Data collected will also be used to inform the Seabird Monitoring Programme (SMP) coordinated by Joint Nature Conservation Committee (JNCC), the RSPBs Annual Reserve Monitoring (ARM) programme, the RSPB Bempton Cliffs reserve management plan and the Yorkshire Wildlife Trust's reserve management.

The key aims of the seabird monitoring programme, and how they are currently implemented, are as follows:-

- **Understanding variation and trends in seabird productivity**
  Fulmar, Gannet, Razorbill, Guillemot, Kittiwake and Herring Gull plots have been monitored for breeding productivity annually since 2009.

- **Understanding population numbers and trends**
  Razorbill, Guillemot and Kittiwake study-plot counts have been carried out annually since 2009.
  A whole-colony census was carried out in 2008.
  Single species colony counts are carried out every year on a rotating basis with a view to, where resources and conditions permit, counting each species at least once every five years

- **Understanding the relationship between the colony and the larger marine environment**
  As the relevant technology improves we are also working to better understand foraging behaviours of birds breeding in the colony. We hope to identify preferred foraging areas and trends in provisioning for example, determining key feeding areas for key species and factors influencing their location using range finders, remote tracking, and fish data and benthic mapping data. This includes ongoing seabird tracking, currently focused on Black-legged Kittiwake, and monitoring of Common Guillemot diet composition.

- **Understanding how RSPB Bempton Cliffs relates to wider pSPA and potential impacts on disturbance by developing research proposals to address the following management issues**
  What are the types of human activities that could disturb the colony and what are their effects? Currently recreational disturbance is monitored and recorded by Bempton Cliffs and others on an ad-hoc basis. For those activities that are of particular concern, we hope to develop specific research proposals which assess level of impact

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 including members of Flamborough Bird Observatory and Filey Bird Observatory & Group.

The results of the 2015 Flamborough and Filey Coast seabird monitoring and research programme are detailed in this report.

Background

Bird population data has been collected at Flamborough and Bempton since 1969. In 1969, all species but Shag and Puffin were counted as part of the 'Operation Seafarer' national seabird census. In 1987, all species were counted during the 'Seabird Colony Register' census. All species were counted again in 2000 for 'Seabird 2000' and again in 2008. Whole-colony counts of Northern Gannet were completed in 1970-77, 1981-83, 1985-95, 1997-99, 2002, 2004-05, 2008-09, 2012 and again in 2015. In addition, whole-colony counts for Herring Gull were completed in 2010 and 2014 and for European Shag in 2014.

Before the commencement of the Flamborough Head and Bempton Cliffs seabird monitoring programme in 2009, breeding success data for Bempton/Flamborough was collected for Gannet during 1973-79, 1988-94, 1998, 2005-06 and 2008. Kittiwake breeding success has been monitored continuously since 1986. Razorbill productivity was monitored in 2005-06. Guillemot productivity was monitored in 1991-95, 1998 and 2005-06. Fulmar and Herring Gull breeding success were monitored for the first time in 2009, and is ongoing. Unfortunately, it is not possible to monitor breeding success of Puffin at this colony and only limited monitoring of European Shag is possible depending on nest site use.

At Filey, a whole-colony count was carried out in 1986 (Williams 1996). In 2002 the Seabird 2000 census team identified a significant seabird colony nesting on the cliffs to the north of Filey Bay (Mitchell et al 2004). 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 Filey Bay. It was recognised that birds caught in the nets could have originated from either the Flamborough/Bempton or Filey colonies. Unfortunately, at that time there was little current data about the state of the colony at Filey.

Raw Data

Access to the productivity and population monitoring data collected during the seabird monitoring programme is available to researchers and conservation organisations by arrangement with the RSPB Bempton Cliffs office.

METHODS

The Flamborough and Filey Coast seabird monitoring programme follows the methods and guidelines set out in the '*Seabird monitoring handbook for Britain and Ireland'* (Walsh et al., 1995) – ("the Handbook"). The Handbook summarises census and productivity monitoring techniques for seabirds relevant to colonies in Britain and Ireland. The appropriate methods are followed for each species at this colony taking into account the resources available and the physical geography of the colony. Please refer to the Handbook for more details on methodologies for each species and survey undertaken.

Productivity monitoring

Productivity monitoring was completed for a seventh year running for six of the eight breeding seabird species found in the colony: Northern Fulmar, Northern Gannet, Razorbill, Common Guillemot, Black-legged Kittiwake and Herring Gull. Unfortunately, it is not possible to monitor Atlantic Puffin at this colony. In 2015 a small number of European Shag nests were monitored for the first time.

All productivity monitoring was based on marking apparently occupied sites (AOSs) or apparently occupied nests (AONs) on a laminated photograph of the relevant plot. For a detailed description of the relevant methodology, please refer to the section of the Handbook for the relevant species.

The productivity monitoring plots were originally selected when the Flamborough Head and Bempton Cliffs seabird monitoring programme was established in 2009. Plots were selected with a view to providing, where possible, a sample size in the region of 50 AOS or AON per plot and a total sample in excess of 250 AOS/AON for each species while providing safe vantage points for the observer with little or no disturbance to breeding seabirds. In 2011 five additional monitoring plots for Black-legged Kittiwake were established at Filey Cliffs; in 2014 one of these was dropped and an additional plot added on Filey Brigg. Indicative maps of the productivity plot locations are included in Appendix 2.

This year, as well as presenting species productivity data by aggregating the results of each plot (total chicks fledged / total nests (or sites) monitored) we also present productivity calculated as the mean of the individual plot results for each species.

Northern Fulmar (*Fulmarus glacialis*)

Five productivity plots were monitored. Plots are photographed in early May and AOSs are marked on the laminated photographs over 3 visits over the late May/early June period. A final visit is made in mid-August and large chicks present at that time are assumed to fledge.

Northern Gannet (*Morus bassanus*)

Five productivity plots were monitored between late April and late October. Plots are photographed in mid to late April and up to 50 or 60 AONs are marked on the laminated photographs. The plots are then visited every 7 – 10 days. Average visit time early in the season is 2 – 3 hours per plot, but reduces once chicks get larger and are more visible. Presence of an egg or chick is recorded (if seen) each visit.

Razorbill (*Alca torda*)

Eight productivity plots were monitored between late April and the end of July. Plots are photographed in late April/early May and up to 50 to 70 AOSs are marked on the laminated photographs over two visits. Plots are then visited every third day. Additional sites may be added over the course of the season, especially if it has been hard to get 50 AOSs. Presence of an egg or chick is recorded (if seen) each visit. Average visit time early in the season is 2 – 2.5 hours, but reduces once chicks get larger and are more visible.

Common Guillemot (*Uria aalge*)

Six productivity plots were monitored between late April and end of July. Plots are photographed in late April/early May and up to 50 to 60 AOSs are marked on the laminated photographs over two visits. Plots are then visited every third day. Additional sites may be added over the course of the season, especially if it has been hard to get 50 AOSs. Presence of an egg or chick is recorded (if seen) each visit. Average visit time early in the season is 2 – 2.5 hours, but reduces once chicks get larger and are more visible.

Black-legged Kittiwake (*Rissa tridactyla*)

Twenty-six productivity plots were monitored between May and August, 21 – 1058 AONs across Bempton and Flamborough and five – 257 AONs at Filey. Plots are photographed in early to mid May and up to 50 or 60 AONs are marked on the laminated photographs. Plots are then visited every week, ideally on the same day so visits are 7 days apart. Presence and number of eggs or chicks at each AON is recorded (if seen) each visit. Volunteers are also asked to record chick size using standard codes, but not all do. Average visit time varies according to the volunteer, but 1 to 1.5 hrs per visit is probably typical.

Herring Gull (*Larus argentatus*)

Five productivity plots were monitored between May and August. Two of the plots are linear and include all safely observable nests found on a defined stretch of cliff. One linear plot is at Bempton and one is at Flamborough. Plots are photographed around early/mid May and AONs are marked on the laminated photographs over two visits. Additional AONs may be added over the course of the season. Plots are then visited every week, ideally on the same day so visits are 7 days apart. Presence and number of eggs or chicks at each AON is recorded (if seen) each visit. Volunteers are also asked to use size codes for chicks. Average visit time varies according to the volunteer, but 1 to 2 hrs per visit is probably typical; the linear plots which require a walk from nest to nest.

European Shag (*Phalacrocorax aristotelis*)

In 2015 informal productivity monitoring was carried out on 8 European Shag nests at Breil Nook (7) and Saddle Nook (1) Flamborough alongside the nearby auk productivity monitoring plots. These nests were not selected at random – being the nests it was possible to see from existing seabird monitoring points – and 3 of them were in recesses in the cliff and not always possible to see clearly. The nest sites were marked on laminated photographs of the cliffs and checked approximately weekly from 30 April until the end of July. No more than 30 minutes per visit was spent. Presence and number of eggs or chicks (to the extent visible) were recorded each visit.

Study-plot counts

The size and nature of the Flamborough and Filey Coast colony mean that annual whole colony population monitoring is not practicable. Accordingly, study-plots for population monitoring of Razorbill, Common Guillemot and Black-legged Kittiwake were established at Bempton and Flamborough in 2009. Plots were selected to be dispersed through the colony as randomly as possible given the need to provide a safe vantage point and minimize disturbance to breeding birds. Counts have been conducted each year since 2009. In 2011 counts of Razorbill and Common Guillemot were abandoned due to an early breeding season.

For each species the same plots are used each year as required by the Handbook; plot boundaries, based on clear cliff features, are marked on laminated photographs of the relevant area of cliff. Indicative maps of the study-plot locations at Bempton and Flamborough are included in Appendix 3.

The Handbook suggests that study-plot counts are not recommended for general use when counting Black-legged Kittiwake, as population changes may not be detected due to movements within the colony or colony extensions, or losses rather than through changes of density across the colony. However, as Flamborough and Bempton holds one of the largest mainland populations in the UK, it is important that trends are monitored.

Razorbill study-plot counts

Seven study-plots were counted between 0800 and 1600 on five occasions during the period from 1 June to 22 June.

Common Guillemot study-plot counts

Seven study-plots were counted between 0800 and 1600 on five occasions during the period from 1 June to 22 June.

Black-legged Kittiwake study-plot counts

Seven study-plots were counted between 0800 and 1600 on at least two occasions during the period from 1 June to 22 June.

Whole-colony counts

Northern Gannet (*Morus bassanus*)

The Northern Gannet whole-colony census was completed over two days on 7 and 11 June and took approximately 14 hours to complete. It was a boat-based survey and was undertaken by RSPB staff with assistance from Filey Sailing Club and the use of their RIB. Survey methods followed the methodologies and guidelines set out in the Handbook. For the purpose of boat based surveys the Bempton to Flamborough section of the Flamborough and Filey Coast pSPA is divided into 178 sub-sections, comprising 15km of coastline; Northern Gannet nests are dispersed along the area from Speeton Cliffs to the Northern end of Danes Dyke.

Filey Black-legged Kittiwake (*Rissa tridactyla*)

A count of the Black-legged Kittiwake at Filey was completed on 12 June and took approximately 5 hours to complete. It was a boat-based survey and was undertaken by RSPB staff with assistance from Filey Sailing Club and the use of their RIB. Survey methods followed the methodologies and guidelines set out in the Handbook. 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.

Common Guillemot diet study

In 2015 an MSc student from Leeds University supervised by Dr Keith Hamer carried out her project on Guillemot and Razorbill diet at Bempton/Flamborough. The study was carried out from 29 May to 26 June 2015 to cover the peak chick rearing season. The Guillemot productivity plots at Grandstand South and Carter Lane Two were used for observations of 28 to 50 Guillemot or Razorbill chicks. Individual breeding sites were marked on laminated photographs of the relevant area of the cliff. Observations were made between 0530 and 0800 and 1730 and 2000 on most days during the survey period – a few sessions were missed because weather made observations impractical or due to other commitments. The observations were rotated between plots/species over a 4 day cycle to get equal no. surveys under morning and evening conditions at both sites. During each session the observer watched the cliff face without binoculars or a telescope, for birds flying in and landing, focusing predominantly on areas where the nests were located. When birds landed, the observer used a telescope (RSPB HD 82mm with 25-50x zoom eyepiece) to identify the species of each prey item, to assign it to a size category (small, medium, large) and to estimate its size (mm). As Razorbills may bring in multiple prey items per feed, the number of prey items and species/size information for each item was recorded. Identification and sizing was done using an identification guide created for the RSPB STAR project and modified for this study. Size categories were based on the size of the prey in relation to the bill (Jeavons, 2015).

European Shag roost counts and nest counts

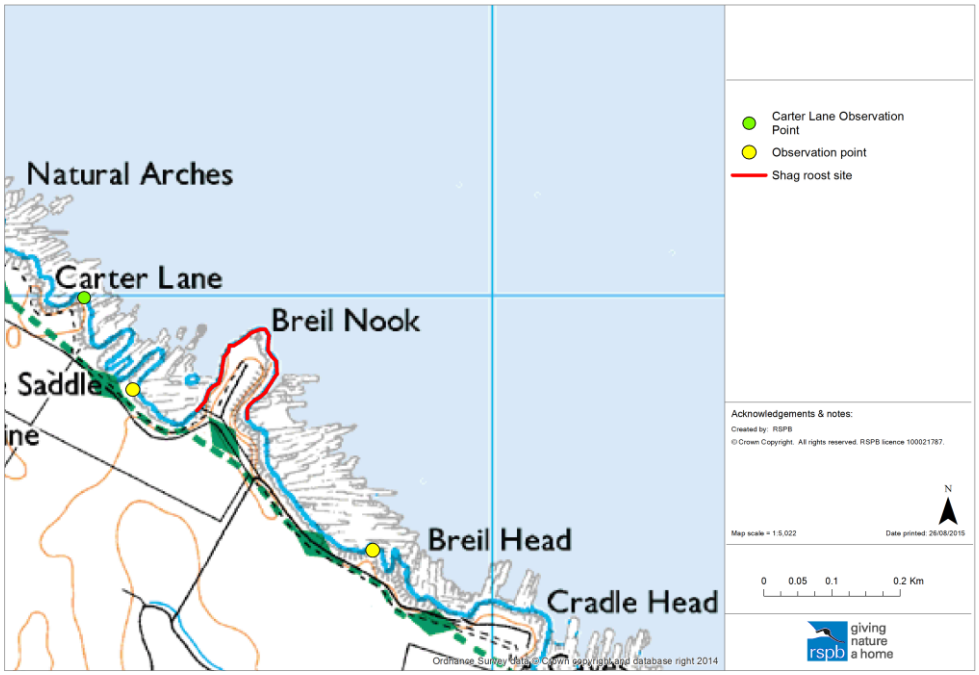
The investigation of the use of the Shag roost identified in 2014 at Breil Nook, Flamborough Head is ongoing.

The aims of the project are to:-

- Determine whether Shag recorded on Flamborough Bird Observatory (FBO) seawatches are from local roost sites
- Undertake independent roost counts to assess population size throughout the year
- Use findings to help inform conservation status of Shag within the pSPA and SSSI

Land based counts by RSPB staff of the communal Shag roost at Breil Nook, Flamborough (Map 1) are conducted monthly over the autumn and winter months. The counts are made from specified observation points either side of Breil Nook to enable an observer to view from a safe location and to be able to see as much of the communal roost as possible; in 2015 an additional point at Carter Lane was used which is more distant but enables the observer to see more of the roost. Counts are made from an hour before dusk until dark, using binoculars and telescope, recording all birds

already present and birds that subsequently arrive into the roost. The day after the counts are made the number of Shag recorded on the FBO seawatch are also noted. In addition, darvic colour-ring data is collected, where practicable, and fed back to the Centre for Ecology & Hydrology's winter Shag distribution project.



Map 1: European Shag roost count locations

In 2015 a member of the RSPB East Riding Local Group volunteering on the RSPB Seabird Cruises operating from Bridlington worked with RSPB staff to identify European Shag nest sites between Flamborough Head and the Bempton Cliffs Reserve. This was not a formal whole-colony count but the number of nests in these areas was observed on multiple trips, and records compared with land based counts.

Black-legged Kittiwake tracking

Tracking work has taken place at Flamborough Head between 2010 and 2015 and at Filey Brigg in 2013-2015. This year, fieldwork was carried out between 21 June and 1 July by Dr Guy Anderson, RSPB Principal Research Manager and David Aitken, RSPB Bempton Cliffs Warden. IgotU gt120 GPS tags (Mobile Action) were deployed on breeding (late incubation or early chick rearing stage) adult Kittiwakes following strict protocols to minimise disturbance caused by catching and tagging birds. GPS tags were used to obtain high-resolution location data (one position every 100 seconds to an accuracy of approximately 25m). Some of the tags were modified for use on lighter birds by substituting their batteries for lighter ones. All tags were sealed in waterproof casing to allow deployment on seabirds. Including attachment material, tags weighed either around 19g (heavier batteries) or 17g (lighter batteries). 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. If for any reason the bird cannot be recaptured, the tag (and tape) will fall off between 2 days and 2 weeks later. In previous years, 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, 2010).

Auk tracking

In early June 2015 a team led by Emily Scragg, RSPB Conservation Scientist did additional tracking work on Guillemots and Razorbills at Flamborough Head. Tags were deployed on four breeding adults (two Razorbills and two Guillemots) during late incubation or early chick rearing following strict protocols in order to minimise disturbance to breeding birds. Purpose built Mataki tags with remote download capabilities were set to obtain frequent (600 second interval) GPS locations. Tags were sealed in a waterproof casing and attached to birds' mantle feathers using tape. The combined weight of all materials attached to the bird was around 19g, which represented just under 3% of their body mass. Tags downloaded their data remotely to base stations which were set up and left out at the cliffs; on return a few weeks later the base stations were removed and their data downloaded. Data was retrieved from three out of the four tags. Tags attached using this method drop off birds a short period after deployment, so are not a long-term burden for the birds. No differences have been observed between tagged and untagged bird breeding success for similar tags with the same attachment method in previous years of RSPB seabird tracking research.

Recreational disturbance

The European Marine Site (EMS) study into recreational activity has identified recreational disturbance as an ongoing issue across the pSPA. Recreational disturbance can include: anglers descending the cliffs to access the foreshore; cliff-top angling during the breeding season; boat, jet ski and kayak use; and paragliders, powered hang gliders and low flying aircraft. Wherever possible, disturbance events are recorded and photographed. The information is passed to the EMS project officer, Heather Davison, who is gathering data on recreational disturbance across the pSPA in an attempt to build a better picture of the activities taking place, the frequency that they occur and the possible impact they may have on the pSPA. A future challenge is to determine how to assess the impact of these activities on the breeding seabird assemblage and then manage this impact.

RESULTS

Productivity monitoring

Northern Fulmar (*Fulmaris glacialis*)

Overall productivity for Fulmar averaged 0.63 chicks per pair. A total of 77 AOSs were monitored across five plots, from which 47 chicks successfully fledged (Table 1, Figure 1). The mean productivity for Fulmar recorded between 1986-2005 from between thirteen and forty-one colonies annually was 0.41 chicks per pair, (Mavor et al. 2008).

Table 1: Fulmar productivity 2015

Plot	AOS	Fledged chicks	Productivity ch/pr
New Roll-up	6	3	0.50
Old Dor	32	18	0.56
Newcombe	9	8	0.89
Breil Nook	15	11	0.73
Swineshaw Hole	15	7	0.47
Aggregate productivity	**77**	**47**	**0.61**
Mean of plot productivity ch/pair		**0.63**	**±0.0793 SE**

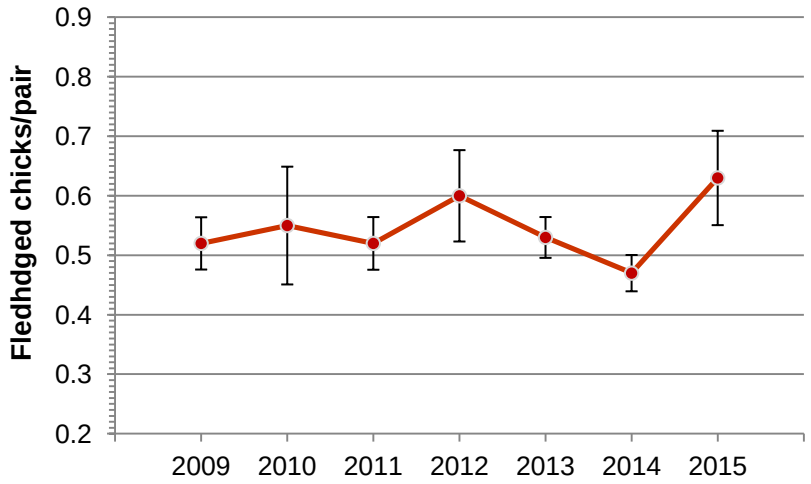


Fig. 1: Fulmar productivity 2009 – 2015, mean of plot productivity results plus/minus SE.

Northern Gannet (*Morus bassanus*)

Overall productivity for Northern Gannet averaged 0.85 chicks per pair. A total of 260 AONs were monitored across five plots, from which 222 chicks successfully fledged (Table 2, Figures 2 and 3). The mean productivity for Northern Gannet recorded between 1986-2005 from between three and six colonies annually was 0.69 chicks per pair, (Mavor et al. 2008).

Table 2: Northern Gannet productivity 2015

Plot	AOS	Fledged chicks	Productivity ch/pr
Jubilee Corner	53	38	0.72
Nettletrip	57	50	0.88
Staple Newk 1	48	42	0.88
Staple Newk 2	52	47	0.90
Staple Newk 3	50	45	0.90
Aggregate productivity	**260**	**222**	**0.85**
Mean of plot productivity ch/pair		**0.85**	**±0.0349**

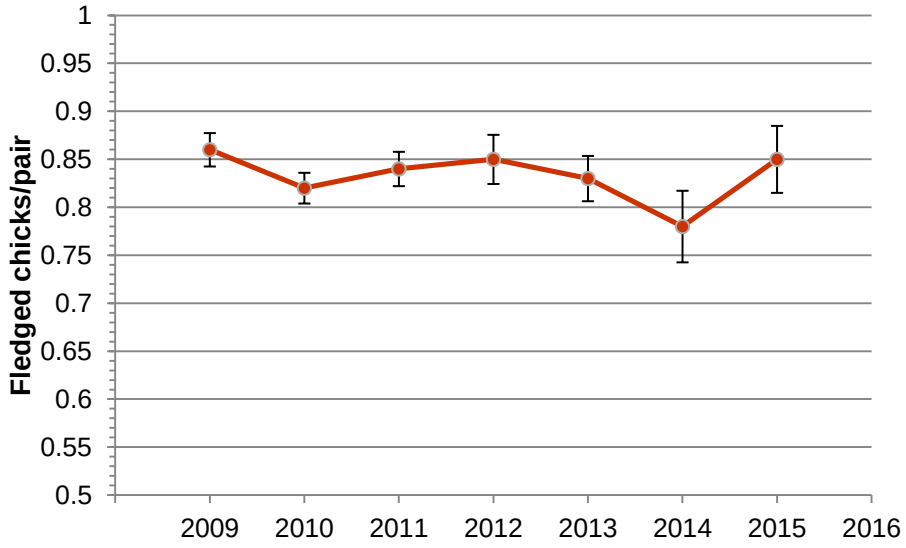


Fig. 2: Northern Gannet productivity 2009 – 2015, mean of plot productivity results plus/minus SE.

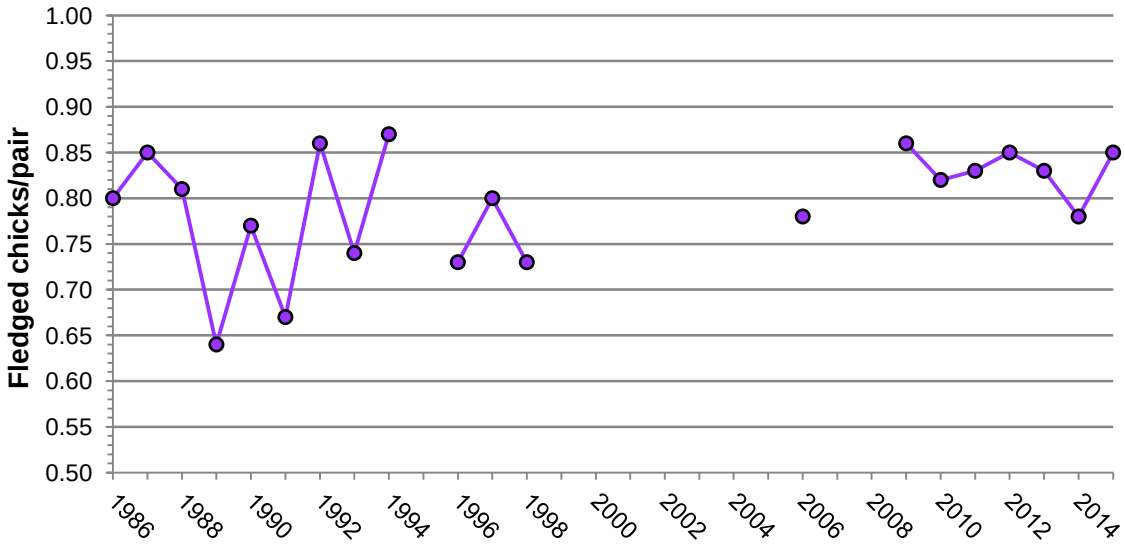


Fig. 3: Northern Gannet productivity 1986 to 2015, aggregate productivity.

Razorbill (*Alca torda*)

Overall productivity for Razorbill averaged 0.66 chicks per pair. A total of 350 AOSs were monitored across eight plots, from which 243 chicks successfully fledged (Table 3, Figures 4 and 5). The mean productivity for Razorbill recorded between 1986-2005, from between one and seven colonies annually, was 0.65 chicks per pair, (Mavor et al. 2008).

Table 3: Razorbill productivity 2015

Plot	AOS	Fledged chicks	Productivity ch/pr
Grandstand Gully	16	8	0.50
Grandstand North	25	17	0.68
Grandstand South	19	9	0.47
Newcombe	66	45	0.68
Back of Newcombe	53	40	0.75
Saddle Nook	43	34	0.79
Breil Nook	62	51	0.82
Swineshaw Hole	66	39	0.59
Aggregate productivity	350	243	**0.69**
Mean of plot productivity ch/pair		**0.66**	**±0.0459 SE**

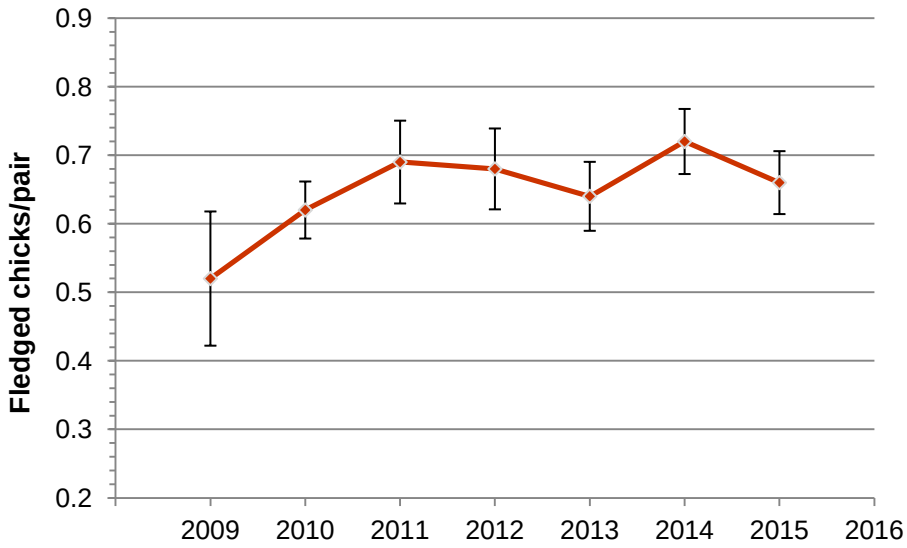


Fig. 4: Razorbill productivity 2009 – 2015, mean of plot results plus/minus SE.

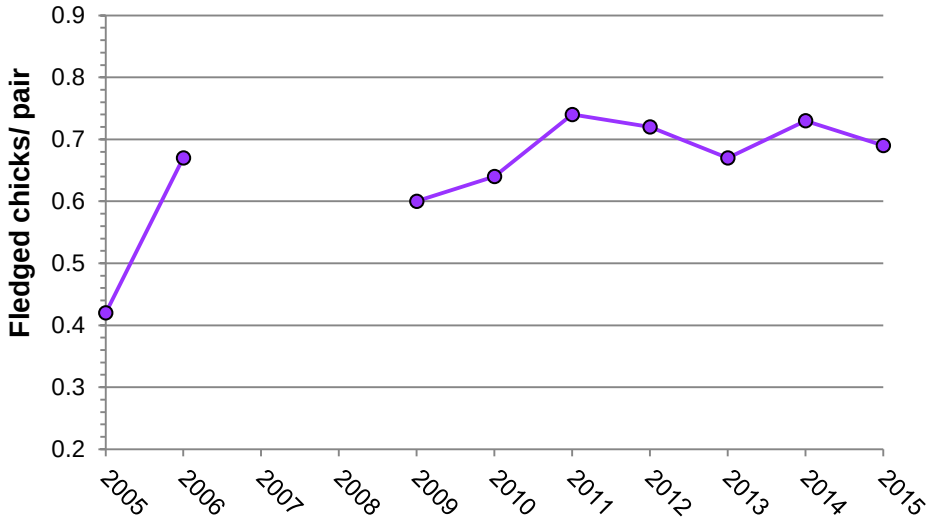


Fig. 5: Razorbill productivity 2005 – 2015, aggregate productivity.

Common Guillemot *(Uria aalge)*

Overall productivity for Guillemot averaged 0.72 chicks per pair. A total of 293 AOSs were monitored across six plots, from which 211 chicks successfully fledged (Table 4, Figures 6 and 7). The mean productivity for Common Guillemot recorded between 1986-2005 from between three and fifteen colonies annually was 0.69 chicks per pair, (Mavor et al. 2008).

Table 4: Common Guillemot productivity 2015

Monitoring site	AOS	Fledged chicks	Productivity ch/pr
Nettletrip	50	25	0.50
Grandstand North	42	28	0.67
Grandstand South	54	40	0.74
Carter Lane 1	49	41	0.84
Carter Lane 2	45	32	0.71
Breil Nook	53	45	0.85
Aggregate productivity	**293**	**211**	**0.72**
Mean of plot productivity ch/pair		**0.72**	**±0.0525 SE**

The relatively low productivity this year was affected by one plot, Nettletrip, which had unusually low productivity. On this plot a number of eggs, and some chicks, were lost as a result of activity by prospecting Northern Gannets, which were regularly observed displacing Common Guillemots from breeding ledges. It is possible that Northern Gannet activity means that this plot cannot be considered representative of Common Guillemot breeding in the larger colony. If the mean of plot results is calculated excluding this plot it is 0.76 ± 0.0326 SE.

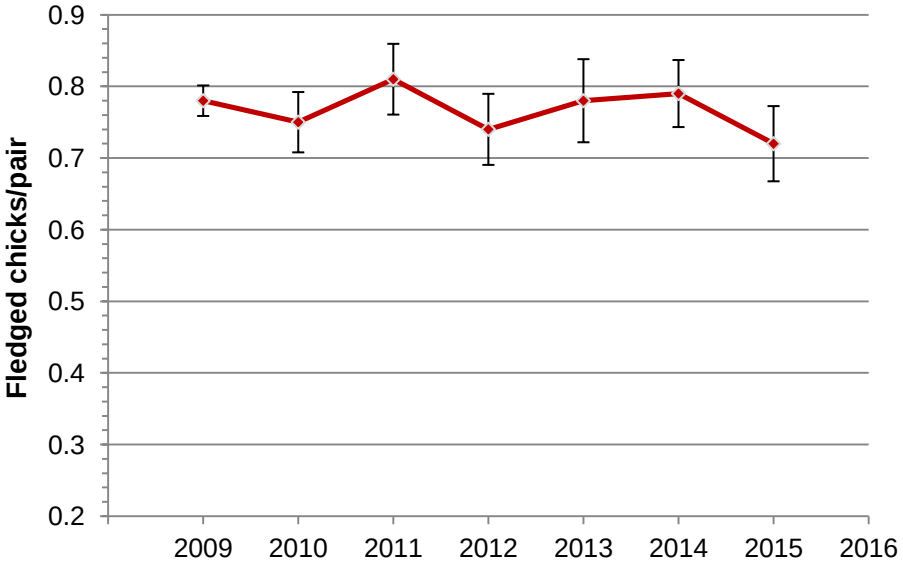


Fig. 6: Common Guillemot productivity 2009 – 2015, mean of plot results plus/minus SE.

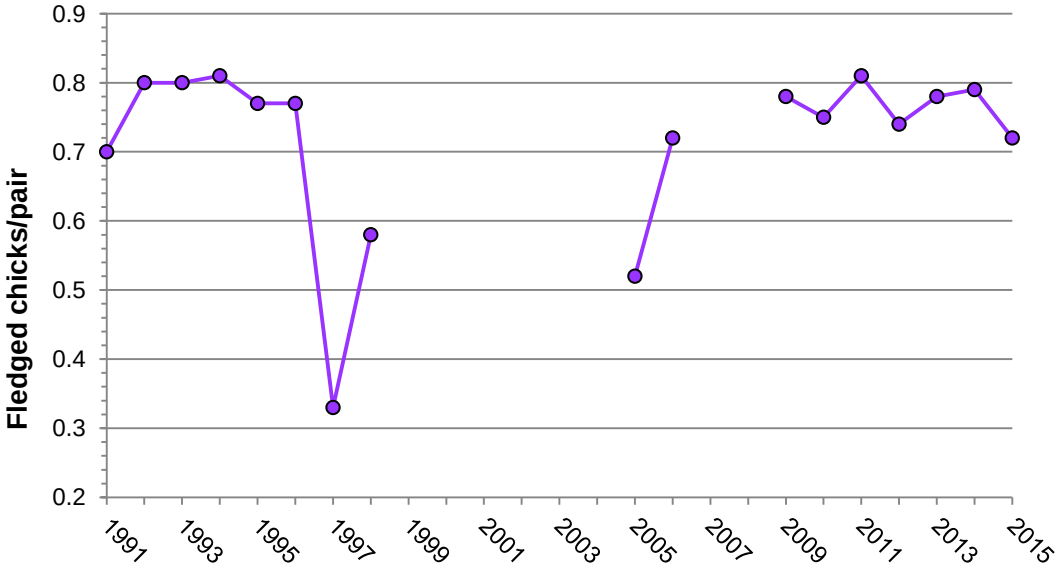


Fig. 7: Common Guillemot productivity 1991 – 2015, aggregate productivity.

Black-legged Kittiwake *(Rissa tridactyla)* – Bempton and Flamborough

Overall productivity for Kittiwake at Bempton and Flamborough averaged 0.73 chicks per pair. A total of 1058 AONs were monitored across 21 plots, from which 774 chicks successfully fledged (Table 5, Figures 8 and 9). The mean productivity for Kittiwake recorded between 1986-2005 from between thirty and sixty-one colonies annually was 0.69 chicks per pair, (Mavor et al. 2008).

Table 5: Bempton/Flamborough Black-legged Kittiwake productivity 2015

Plot	AOS	Fledged chicks	Productivity ch/pr
Jubilee Far	50	37	0.74
Bartlett Nab Near	51	47	0.92
Bartlett Nab Far	50	36	0.72
Grandstand North Near	50	40	0.80
Grandstand North Near Edge	50	39	0.78
Grandstand North Mid	50	40	0.80
Grandstand North Far Edge	50	53	1.06
Grandstand North Low	50	34	0.68
Old Dor	50	29	0.58
Newcombe	50	4	0.08
Back of Newcombe	56	53	0.95
Carter Lane 1	50	22	0.44
Carter Lane 2	51	35	0.69
Saddle Nook 1	50	38	0.76
Saddle Nook 2	50	47	0.94
Saddle from Breil	50	36	0.72
Breil Nook North	50	49	0.98
Breil Nook South	50	30	0.60
Back of Breil Nook	52	29	0.56
Swineshaw Hole	48	33	0.69
Lighthouse	50	43	0.86
Aggregate productivity	**1058**	**774**	**0.73**
Mean of plot productivity ch/pair		**0.73**	**±0.0466 SE**

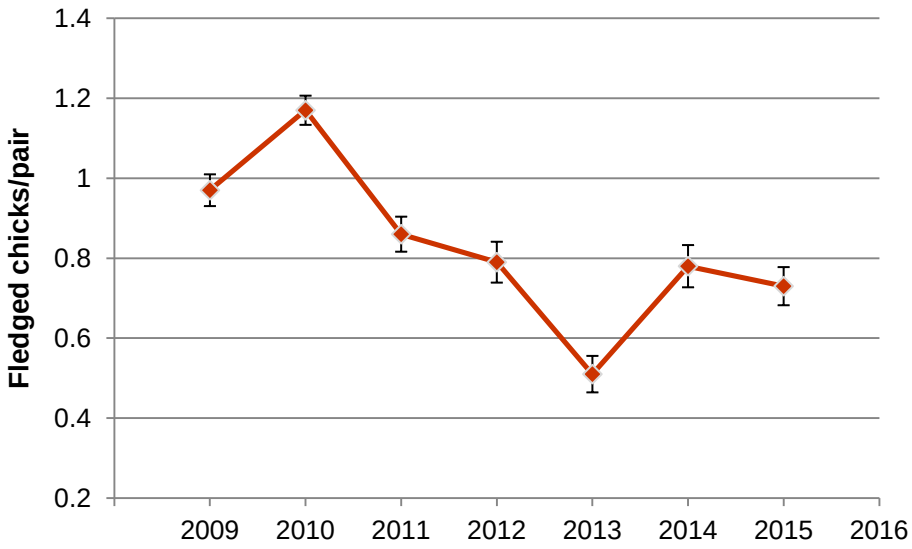


Fig. 8: Bempton/Flamborough Kittiwake productivity 2009 – 2015, mean of plot results plus/minus SE.

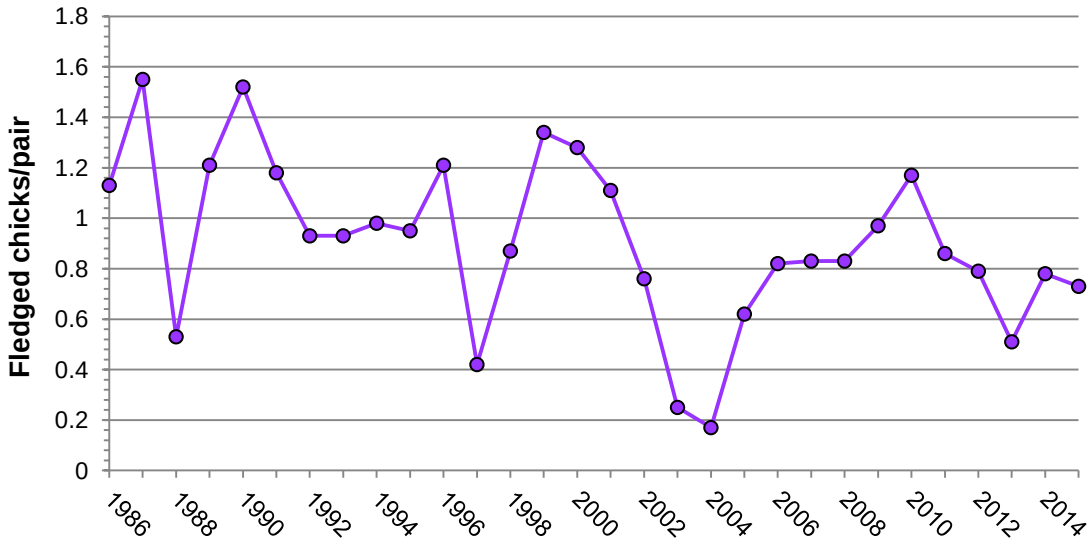


Fig. 9: Bempton/Flamborough Kittiwake productivity 1986 – 2015, aggregate productivity.

Black-legged Kittiwake *(Rissa tridactyla)* – Filey Cliffs

Overall productivity for Kittiwake at Filey averaged 0.47 chicks per pair. A total of 257 AONs were monitored across 5 plots, from which 119 chicks successfully fledged (Table 6 and Figure 10). The mean productivity for Kittiwake recorded between 1986-2005 from between thirty and sixty-one colonies annually was 0.69 chicks per pair, (Mavor et al. 2008).

Table 6: Filey Black-legged Kittiwake productivity 2015

Plot	AOS	Fledged chicks	Productivity ch/pr
Plot 1	50	33	0.66
Plot 7	47	33	0.70
Plot 8	48	20	0.42
Plot 9(a)	58	22	0.38
Plot 10(a)	54	11	0.20
Aggregate productivity	**257**	**119**	**0.46**
Mean of plot productivity ch/pair		**0.47**	**±0.0927 SE**

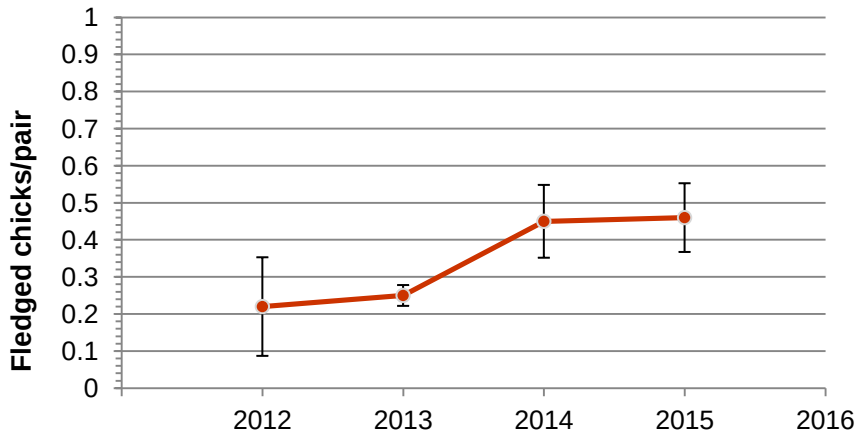


Fig. 10: Filey Kittiwake productivity 2012– 2015, mean of plot results plus/minus SE.

Note that in 2012 productivity on 3 plots was 0.0 due to landslip.

Herring Gull (*Larus argentatus*)

Overall productivity for Herring Gull averaged 0.95 chicks per pair. A total of 109 AONs were monitored across five plots, from which 109 chicks successfully fledged (Table 7, Figure 11). It is notable that the mean of plot results of 0.95 ± 0.2009 SE is lower than the aggregate productivity of 1.00, with the mean reduced in particular by poor breeding performance at the Bempton Cliffs Reserve.

Table 7: Herring Gull productivity 2015

Monitoring site	AOS	Fledged chicks	Productivity ch/pr
Jubilee to Old Dor	16	8	0.50
Newcombe North	15	9	0.60
The Saddle Rock	22	36	1.64
Breil Nook Stack	19	20	1.05
Newcombe to Breil	37	36	0.97
Total	**109**	**109**	**1.00**
Mean of plot results		**0.95**	**± 0.2009 SE**

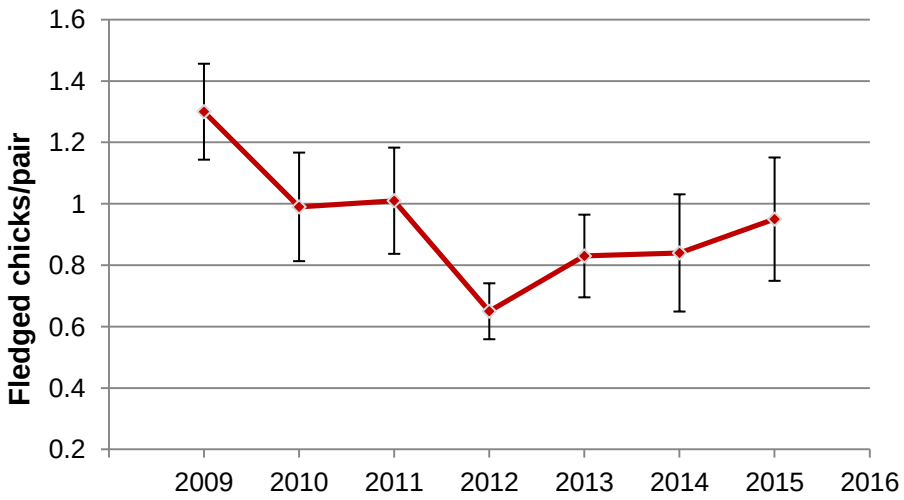


Fig. 11: Herring Gull productivity 2009 – 2015, mean of plot results plus/minus SE.

European Shag (*Phalacrocorax aristotelis*)

Eight European Shag nests in the area of Breil Nook, Flamborough Head were monitored. Due to the lines of sight involved it was not always possible to see the chicks clearly, but it is estimated that at least 19 and probably 24 chicks fledged. Accordingly, productivity was a minimum of 2.38 and probably 3 chicks per pair.

Study-plot counts

Razorbill study-plot counts

Seven study-plots were each counted on five separate occasions in the first three weeks of June. The third count provided the highest total of 662 individuals (IND); the fifth count produced the lowest total of 482 IND (Table 8). The mean count for Razorbill was 576; this is a reduction of 62 since the record high count in 2014. If the notably low fifth count, made towards the end of the count period, is excluded the mean count is 599, in line with the general upward trend since the first counts in 2009.

Table 8: Razorbill study plot count results

Count	2009 Total Ind	2010 Total Ind	2012 Total Ind	2013 Total Ind	2014 Total Ind	2015 Total Ind
1	338	316	476	552	584	592
2	365	344	455	584	694	535
3	320	348	629	556	565	662
4	309	358	591	624	591	607
5	328	343	522	613	754	482
Mean	332	342	535	586	638	576

Common Guillemot study plot counts

Seven study-plots were each counted on five separate occasions in the first three weeks of June. The third count provided the highest total of 1494 IND; the fifth count provided the lowest total of

1226 IND (Table 9). The mean count for Guillemot was 1389; the second highest mean count recorded since the study was set up. As in the case of Razorbills the fifth count is notably low and if this is excluded the mean is 1430.

Table 9: Common Guillemot study plot count results

Count	2009 Total Ind	2010 Total Ind	2012 Total Ind	2013 Total Ind	2014 Total Ind	2015 Total Ind
1	1191	1164	1120	1193	1411	1396
2	1138	1123	980	1226	1486	1410
3	1069	1151	1228	1333	1327	1494
4	1101	1114	1205	1323	1475	1420
5	1126	1103	926	1318	1573	1226
Mean	1125	1131	1092	1279	1454	1389

Black-legged Kittiwake study plot counts

Seven study-plots were each counted on two separate occasions in the first three weeks of June. The second count provided the higher total of 1977 AONs. The mean of the two counts was 1972 AONs, an increase of 15 on last year (Table 10).

Table 10: Black-legged Kittiwake study plot count results

Visit	2009 AON Total	2010 AON Total	2011 AON Total	2012 AON Total	2013 AON Total	2014 AON Total	2015 AON Total
1	1585	1967	2035	1967	1554	1917	1966
2	1541	1938	2067	1952	1508	1996	1977
Mean	1563	1953	2051	1960	1531	1957	1972

Common Guillemot diet study

A total of 656 Common Guillemot prey items were recorded during the study. Clupeids were far the most numerous, accounting for 624 prey items. Sandeel – 28, Gadoid – 3 and a single cephalopod made up the balance. In 2015 Razorbill diet composition was also recorded. From 216 feeds 546 prey items were identified of which 490 were Sandeel and 56 were Clupeids.

The proportion of Clupeids in the Common Guillemot diet is much higher than has been recorded in previous years, although Razorbills seemed to be able to find Sandeels (Figure 12).

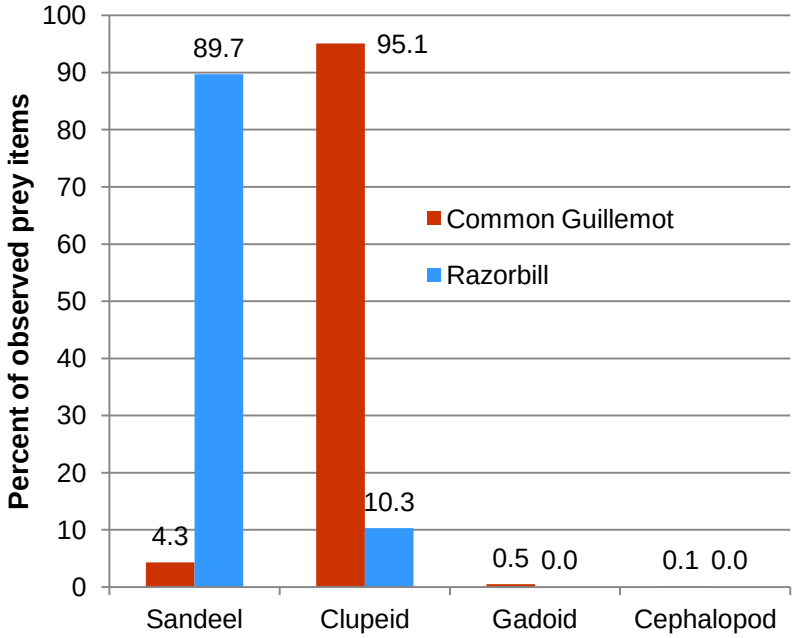


Fig. 12: 2015 Common Guillemot and Razorbill diet composition – percentage of observed prey items by species – at Bempton Cliffs/Flamborough Head. Common Guillemot n = 656 prey items; Razorbill n = 546 prey items.

Northern Gannet whole colony count

The Northern Gannet whole colony count recorded 12,494 AONs and at least 2100 non-breeding individuals. This represents an increase of nearly 13% in AONs since the last count in 2012 and an increase of 59% since 2009.

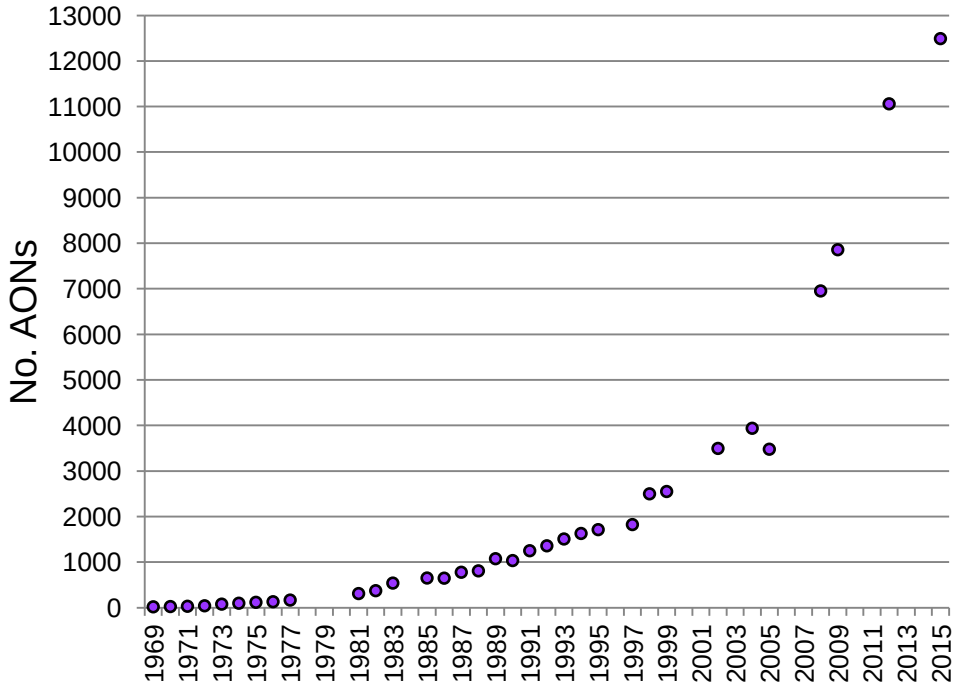


Fig. 13: Northern Gannet breeding population at Flamborough and Filey Coast pSPA (1969-2015).

Filey Black-legged Kittiwake colony count

The Filey Kittiwake colony count recorded 6546 apparently occupied nests; confirming no significant decline since the 2012 and 2013 counts (see Figure 14).

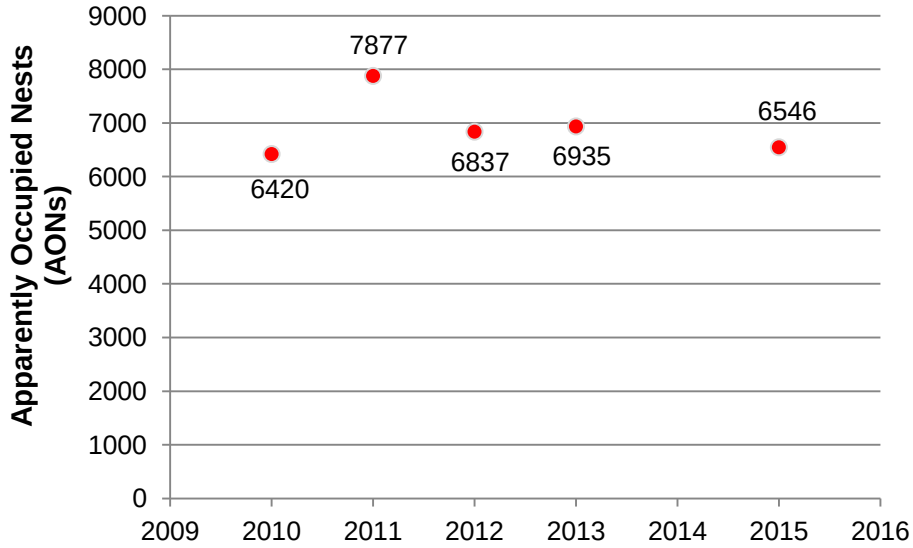


Fig. 14: Black-legged Kittiwake apparently occupied nests Filey Brigg to Cayton Bay (2010 - 2015).

European Shag nest count and roost counts

Although Shag nests along the full length of the colony were not counted this year, some effort went into checking Shag nests in the margins of other work and from the seabird cruises organised by the RSPB. 18 Shag nest sites were counted between Swineshaw Hole, Flamborough Head and Staple Newk, RSPB Bempton Cliffs and it is likely that there was at least one more (a family party seen regularly at the end of the season but not traceable to a nest) on this stretch of cliffs as well as possible nests North of Staple Newk. This represents a welcome uplift from the 16 nests counted in the whole colony in 2014.

As expected, Shag roost numbers fell back over the summer period although use of the new vantage point at Carter Lane (see Methods section) did increase the numbers (Fig. 15). It has been a challenge to fit these dusk counts in during the height of the monitoring season but it is hoped to continue them over the winter 2015-16. If 2015-16 counts numbers continue to fall well short of the original FBO seawatch counts (Aitken et al, 2014(a), p.16) the continuation of the roost counts may be reconsidered.

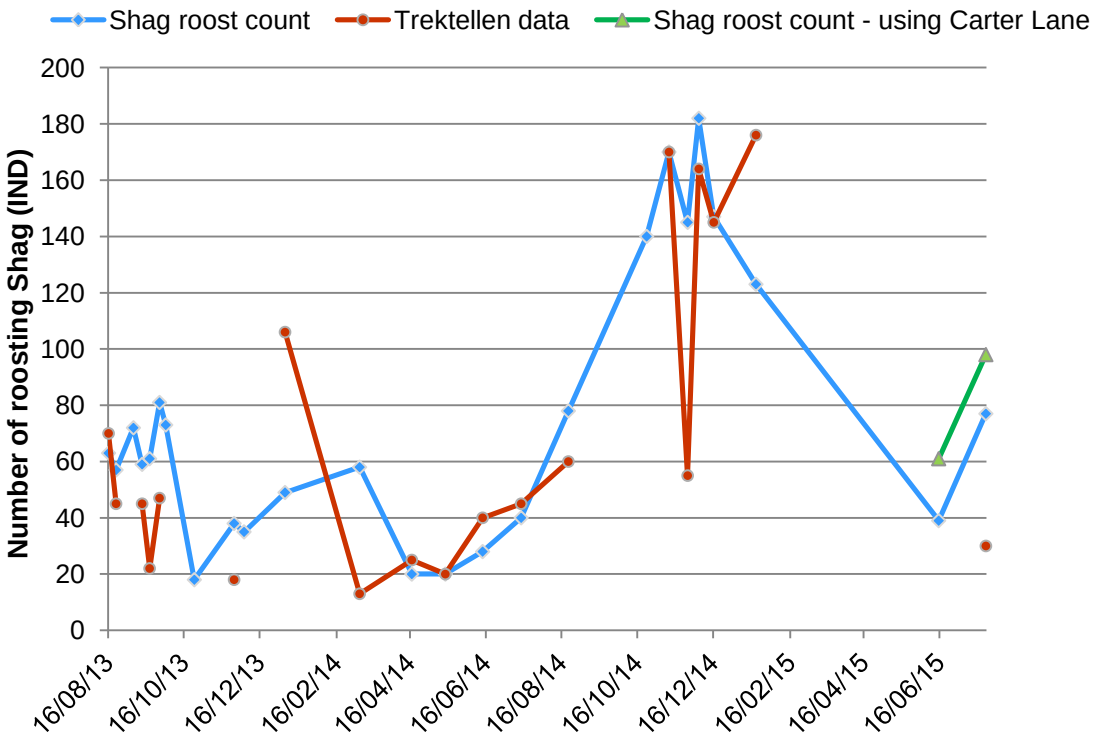
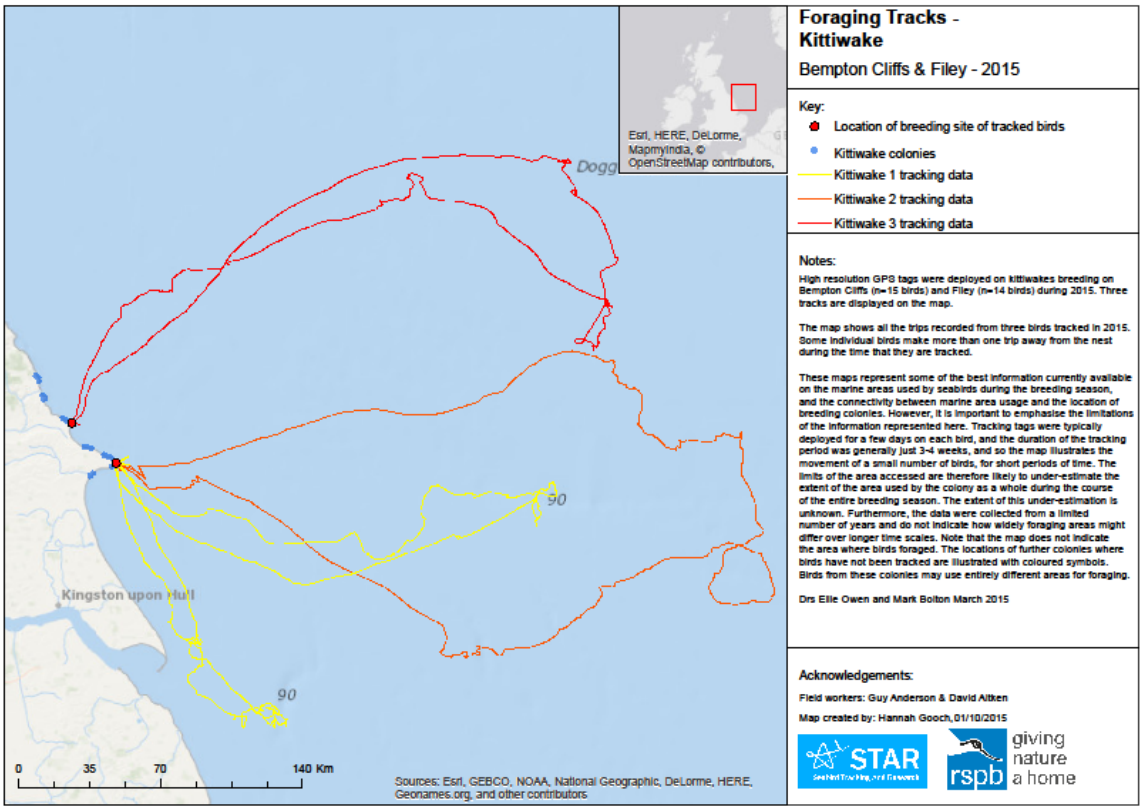


Fig. 15: Shag roost count (blue) and Trektellen (red) data for Flamborough. The green line shows Shag roost counts using the new watch point at Carter Lane.

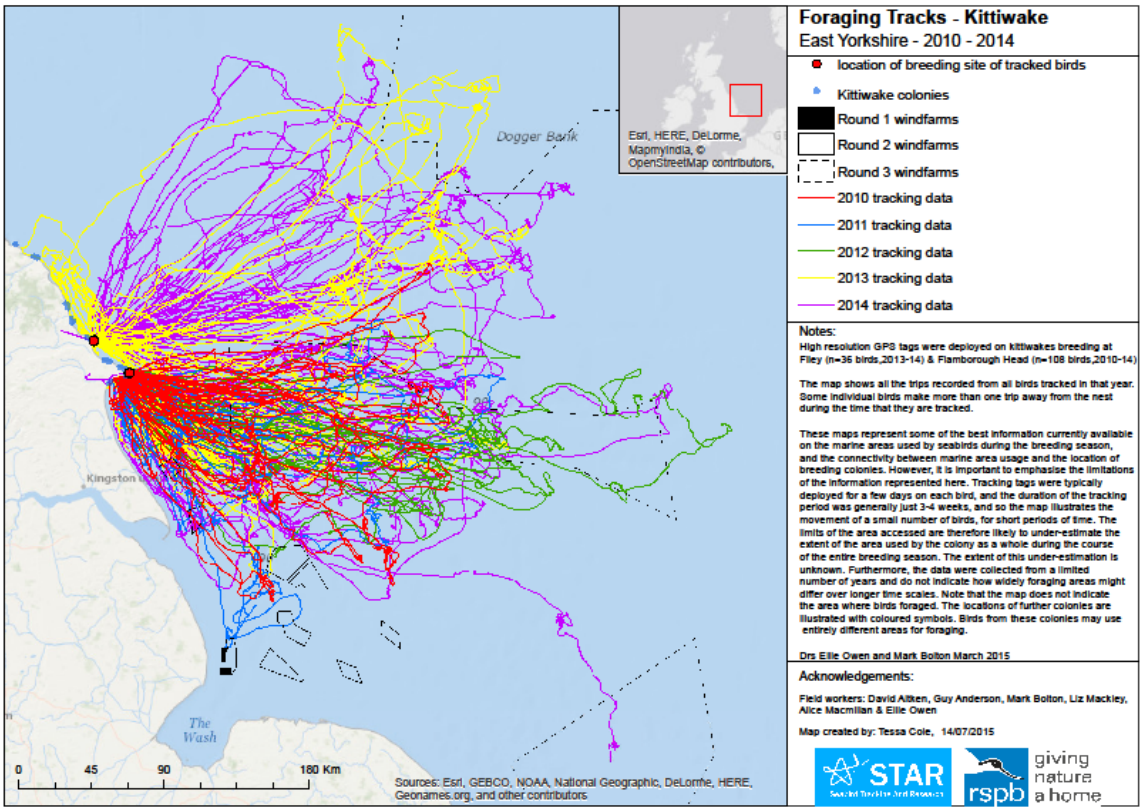
Black-legged Kittiwake tracking

Twenty-five GPS tags were deployed at Flamborough of which 15 were recovered; 24 tags were deployed at Filey of which 14 were recovered. The overall recovery rate of 59% was slightly less than some previous years, reflecting the fact that tagging in 2015 was specifically targeted at birds which had been tagged in previous years (which tend to be more wary of the tagging team). It is hoped that repeat tagging of the same birds will inform studies of foraging site fidelity in Black-legged Kittiwake. The data from 2015 is subject to ongoing analysis from the RSPB conservation science team.

Map 2: Kittiwake foraging tracks from Flamborough (orange and yellow) and Filey (red) in 2015



Map 3: Kittiwake foraging tracks from Flamborough and Filey 2010-2014



Auk tracking

Despite the very limited time available, tracks or partial tracks were recovered from two Razorbills and one Guillemot. At the time of writing this tracking data is still being analysed by RSPB conservation scientists. The sample size it is too small to permit any meaningful statistical analysis, but the results will feed into the RSPB's nationwide seabird tracking data set.

Recreational disturbance

Recreational disturbance continues to be a threat to the breeding success of the colony. The Flamborough Head and Bempton Cliffs SPA European Marine Site partnership study of disturbance incidents across the SPA identified incidents involving anglers, motorized watercraft including jet skis, paragliders, civil aircraft and kayakers in 2015.

A voluntary code of conduct for Bempton and Speeton Cliffs incorporating a closed season for cliff-top angling from 1 March to 30 September, developed with local angling groups and supported by review meetings, was considered a success.

Last year two jet ski incidents, involving disturbing/hitting seabirds in the inshore extension of the pSPA, were witnessed. As a result of both incidents Natural England issued written warning letters which were ignored. As a result they then issued a 'STOP NOTICE'. This is a piece of legislation not often used which stops people carrying out an activity that is deemed damaging to the environment. This order was upheld by the judge following an appeal by the jet ski operators. A workshop will be held in 2016 with responsible jet ski operators with a view to develop a voluntary code of conduct to avoid similar disturbance incidents in the future.

Meetings were held with the George Cayley Sailwing Club following a disturbance incident involving paragliders at Speeton and Buckton Cliffs. It is hoped that a voluntary code of conduct can be agreed in time for the 2016 breeding season.

DISCUSSION

The Flamborough Head and Bempton Cliffs SPA, now Flamborough and Filey Coast pSPA, supports the largest mainland seabird colony in England, one of the largest Kittiwake colonies in the UK and the only Gannet colony in England. It is also the most southerly large cliff-nesting seabird colony on the North Sea coast.

A Seabird Monitoring Programme has been operating for the last seven years, since 2009, providing a real insight into trends in breeding seabird productivity and populations.

The general picture is one of a successful seabird colony. In common with most Gannet colonies, the 2015 whole colony Gannet count revealed a spectacular increase in the breeding population, which now supports 12,494 pairs plus over 2100 non-breeding birds on potential nest sites. Remarkably, the 317% increase since 2004 is identical to the scale of increases on the only other mainland UK Gannet colony at Troup Head (Murray et al 2015). Razorbill and Guillemot study plot counts also suggest a significant increase in breeding numbers in the same period.

A whole colony count of the Filey colony revealed that the Kittiwake breeding population has remained fairly stable through the last five years despite poor breeding productivity (see below).

It is hoped to carry out whole colony counts of Kittiwake, Guillemot, Razorbill and Puffin in 2016. Boat and land-based observer counts will be compared with drone, boat and land-based digital photography counts.

Gannet, Razorbill and Guillemot breeding success has been relatively high, fairly consistent and slightly higher than national averages throughout this period suggesting food availability is not limiting.

Remarkably, the study of auk diet (Jeavons 2015) during the nestling period highlighted that Clupeids, probably Sprats *Sprattus sprattus*, formed 95.1% of the Guillemot chick diet whilst, in contrast, 89.7% of Razorbills chick diet were Sandeels, probably Lesser Sandeel *Ammodytes marinus*. There have been few studies of Razorbill diet but interestingly, Sprats appear to be the main food in both the Irish Sea (Ashcroft 1976) and Baltic Sea (Andersson et al 1974). Previous diet studies at the Flamborough Head and Bempton Cliffs SPA have focused on Guillemot and highlighted the bias towards Sprats. This is typical of Guillemot nestling diet on the North Sea where the proportion of Sandeels in the diet appears to have declined in the last 30 years (Anderson et al 2013). It has previously been suggested that this decline is in response to rising surface sea temperatures and over-fishing. However, the high proportion of Sandeels taken by Razorbills and fed to their chicks suggests that Guillemots may be selecting Sprats in preference to Sandeels. This study highlights the importance of repeating this auk diet work in future years.

Fulmar productivity is also higher than the national average and, at 0.55 fledged young per pair, is sufficient to maintain the current population.

In contrast, whilst Kittiwake productivity at Flamborough and Bempton Cliffs is also higher than the national average the current average productivity of 0.73 fledged young per pair is not sustainable. Kittiwake breeding productivity in the Filey colony fell below the national average in the last four years. Furthermore, some study plots suffered almost complete breeding failure mainly due to

predation of eggs and chicks by Carrion Crow *Corvus corone*. Consideration should be given to assessing whether there is a case for the control of cliff-nesting Carrion Crow which are known to predate breeding seabirds.

We can predict that unless there is an upturn in fortunes or an influx of breeding birds from other colonies the cliff-nesting colony of Kittiwake will continue to decline in the next 25 years.

This situation is further exacerbated by the findings from the Kittiwake tagging study which once again highlighted the overlap between core Kittiwake foraging areas, when feeding nestlings, and the proposed Hornsea and Dogger Bank offshore wind array footprints. There is a concern that Kittiwakes will either be displaced from core feeding areas and /or face a collision risk. Evidence is growing highlighting the importance of the SPA for wintering Common Guillemot and European Shag. Anecdotal data gathered from the Seabird Centre, in the winter of 2014/15, suggested that Guillemots were present on the cliffs and inshore waters for at least 50% of the period from mid-November-March. Observation suggests that these were local breeding birds, occupying and defending nesting sites. Large numbers of immature birds were also present suggesting that on many days up to 100,000 birds may be present in the SPA. It is proposed to carry out daily checks throughout the winter of 2015/16 to determine the scale of use in more detail.

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The National Lottery through the Heritage Lottery Fund (HLF) enabled us to secure a three year seasonal Seabird Research Assistant, helping to deliver monitoring and research projects across the SPA.

Invaluable commitment and flexibility from Chris Place and Filey Sailing Club allowed us to complete the annual boat-based whole-colony counts.

The RSPB East Yorkshire Local Group and Flamborough Bird Observatory for their continued financial support and tireless fundraising efforts that help deliver seabird monitoring and research and members of Filey Bird Observatory & Group, for their continued commitment to monitoring Black-legged Kittiwake at Filey Cliffs.

Natural England for vital funding support and for granting the necessary permissions to carry out projects across the SPA.

The Yorkshire Wildlife Trust who provide access to the fabulous Flamborough Cliffs reserve and their ongoing support of the monitoring programme.

Initial LEADER funding for optics, waterproofs and other monitoring equipment that continue to provide essential tools for our volunteer team.

East Riding of Yorkshire Council for providing access and granting permissions to satellite tag seabirds at Flamborough Head.

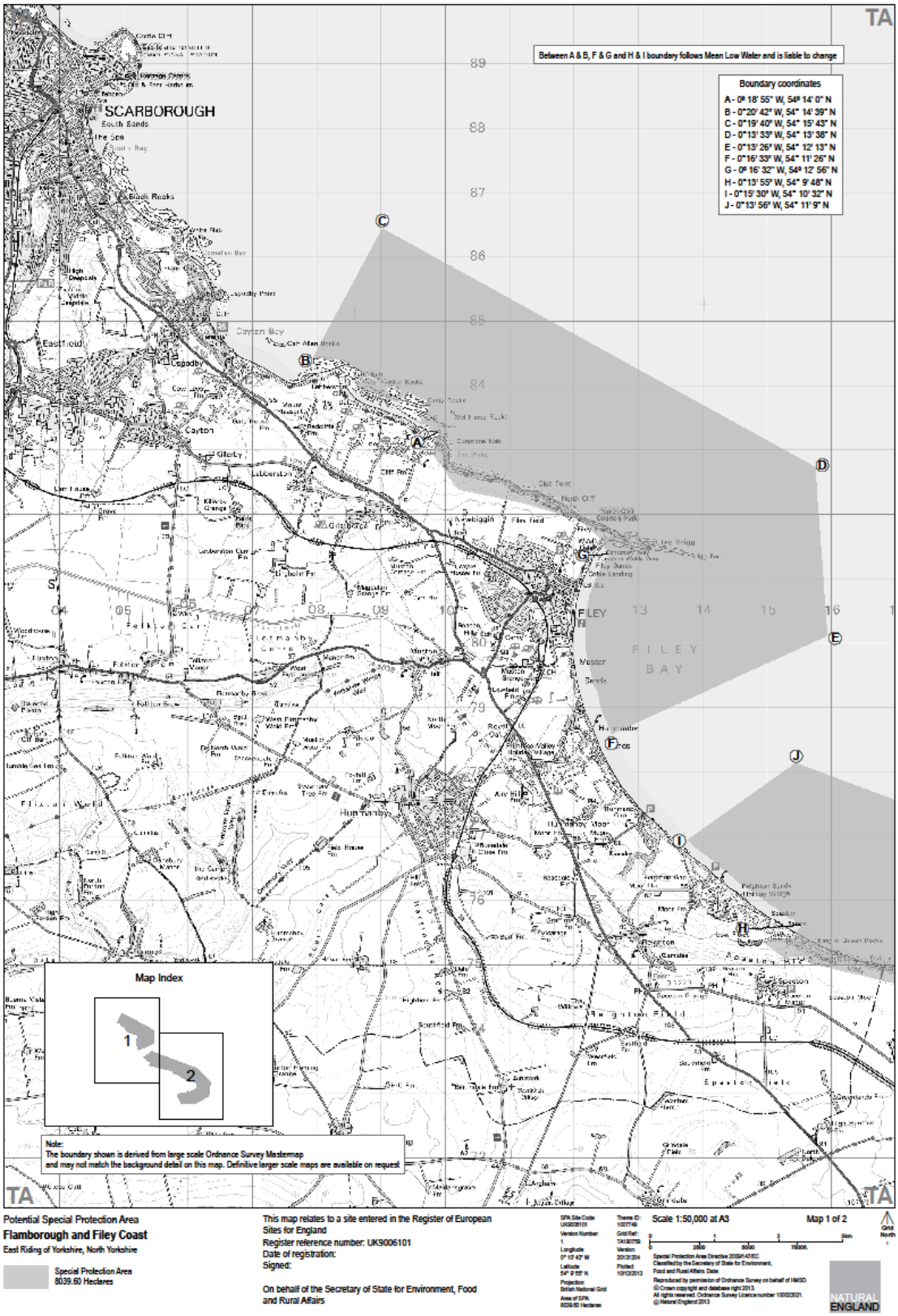
Access at Blue Dolphin Holiday Park at Filey allows us to reach important sections of the colony for essential monitoring works.

Last but not least, thanks to the owners and management at Caravel Bar and Thornwick & Sea Farm Caravan Park at Flamborough for providing parking permits for North Landing car park, which are invaluable.

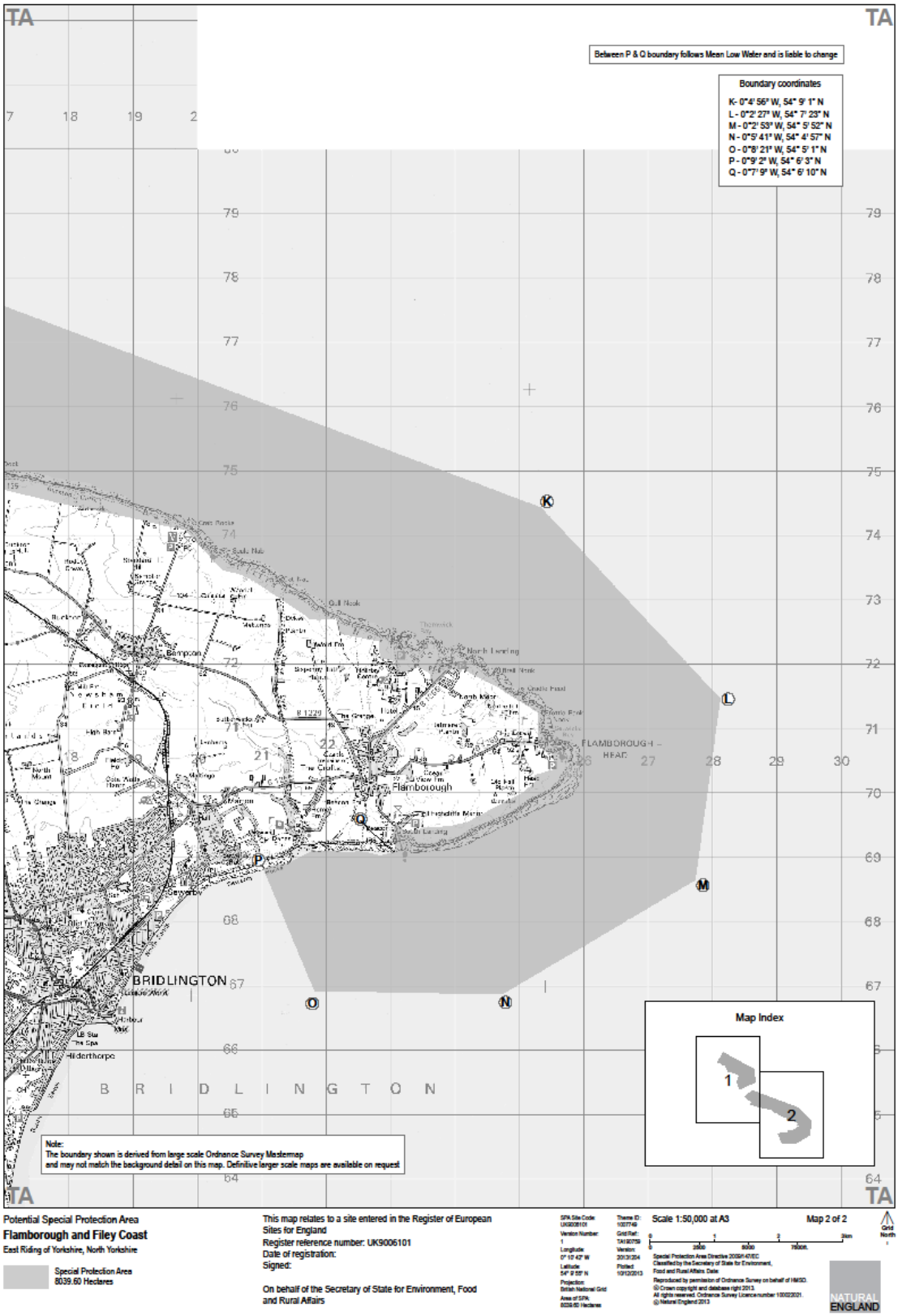
Without all of the aforementioned, the Flamborough and Filey Coast seabird monitoring programme would not be the success that it is.

Appendix 1: Flamborough and Filey Coast pSPA Maps

North



South


TA
TA
Between P & Q boundary follows Mean Low Water and is liable to change
Boundary coordinates
K- 0°4' 56" W, 54° 9' 1" N
L - 0°2' 27" W, 54° 7' 23" N
M - 0°2' 53" W, 54° 5' 52" N
N - 0°5' 41" W, 54° 4' 57" N
O - 0°8' 21" W, 54° 5' 1" N
P - 0°9' 2" W, 54° 6' 3" N
Q - 0°7' 9" W, 54° 6' 10" N
K
L
M
N
O
P
Q
Flamborough
FLAMBOROUGH HEAD
BRIDLINGTON
B R I D L I N G T O N
Map Index
1
2
Note:
The boundary shown is derived from large scale Ordnance Survey Mastermap
and may not match the background detail on this map. Definitive larger scale maps are available on request
TA
TA
Potential Special Protection Area
Flamborough and Filey Coast
East Riding of Yorkshire, North Yorkshire
Special Protection Area
8039.60 Hectares
This map relates to a site entered in the Register of European Sites for England
Register reference number: UK9006101
Date of registration:
Signed:
On behalf of the Secretary of State for Environment, Food and Rural Affairs
Scale 1:50,000 at A3
Map 2 of 2
Special Protection Area Directive 2009/147/EC
Classified by the Secretary of State for Environment, Food and Rural Affairs Date:
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NATURAL ENGLAND

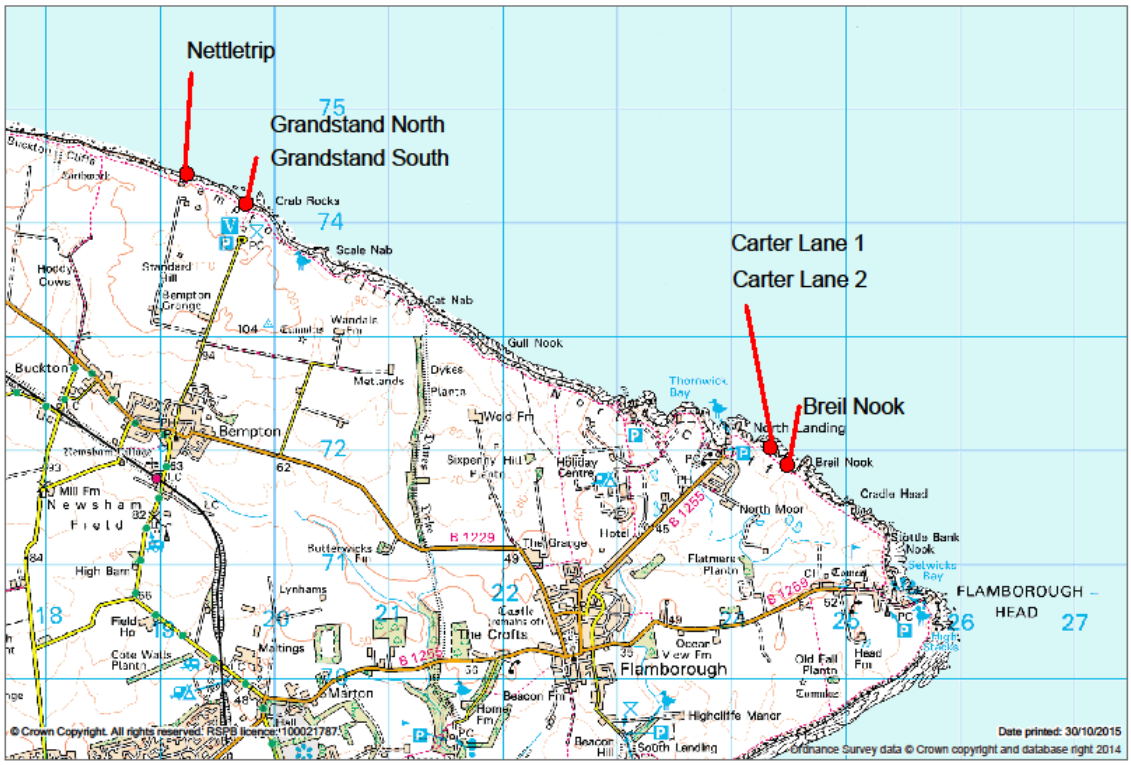
Appendix 2 - Productivity Plot Locations

Northern Fulmar Productivity Plots

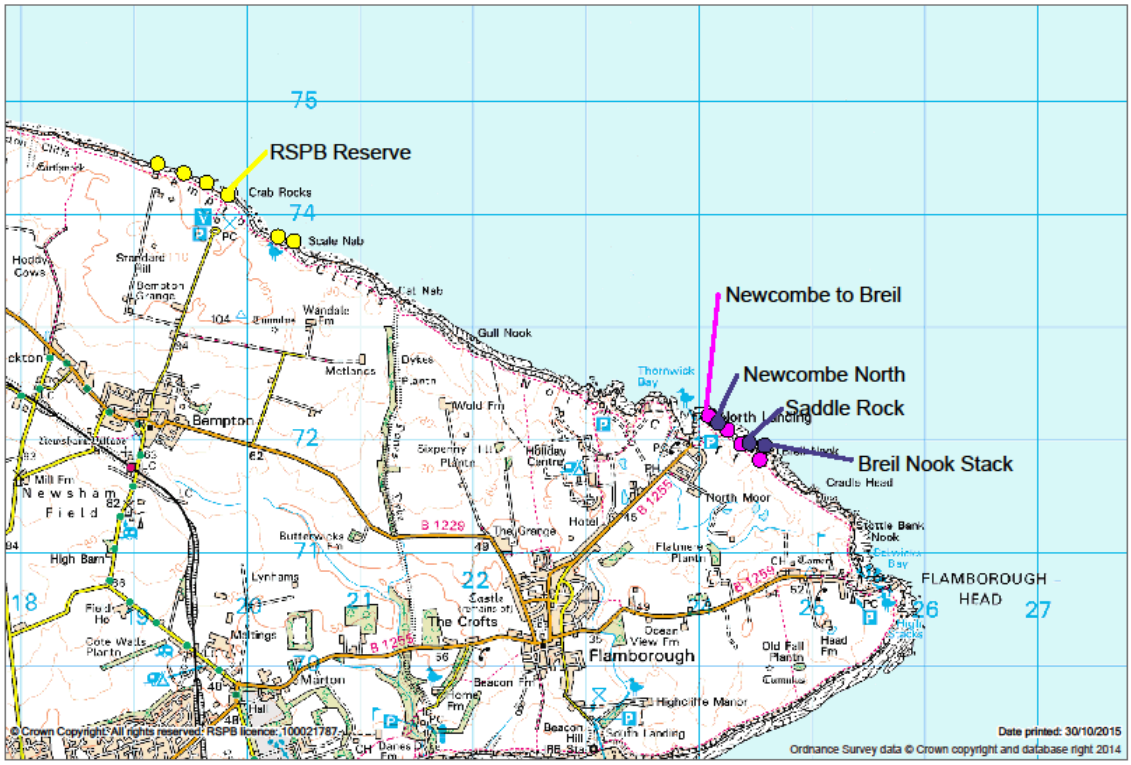
Northern Gannet Productivity Plots

Razorbill Productivity Plots

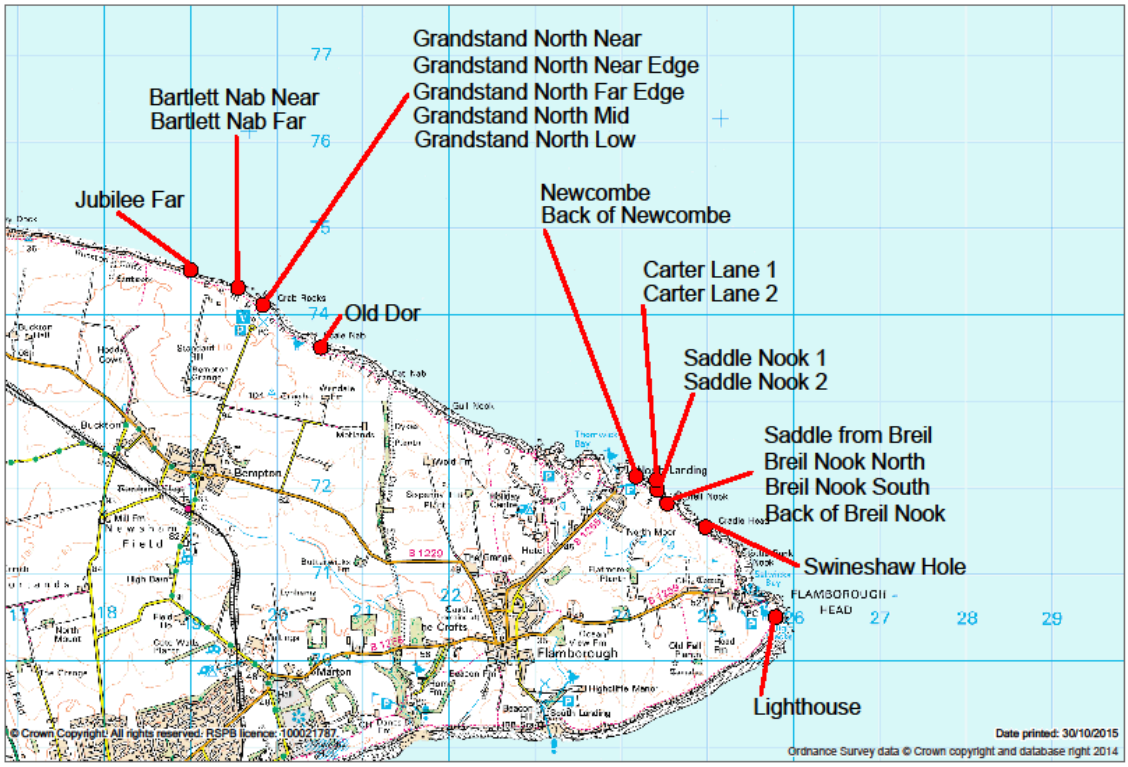
Common Guillemot Productivity Plots



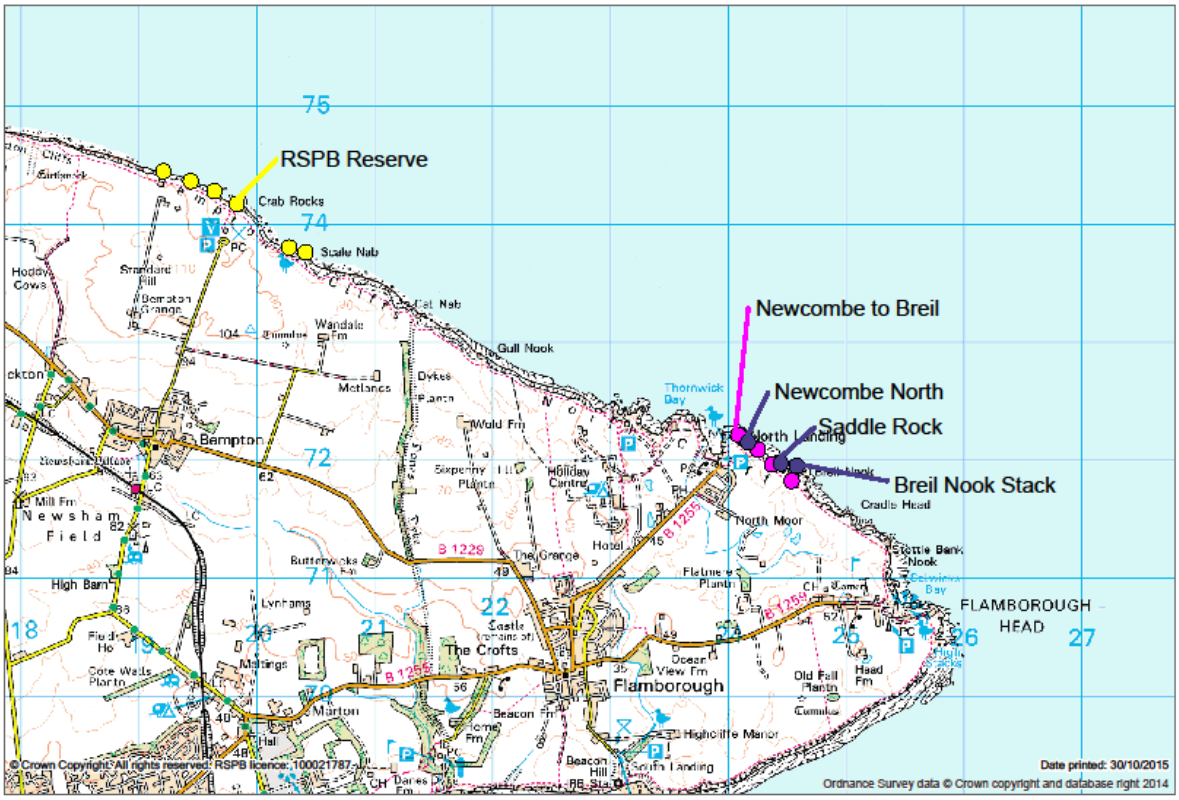
Black-legged Kittiwake Productivity Plots - Bempton/Flamborough



Black-legged Kittiwake Productivity Plots - Filey



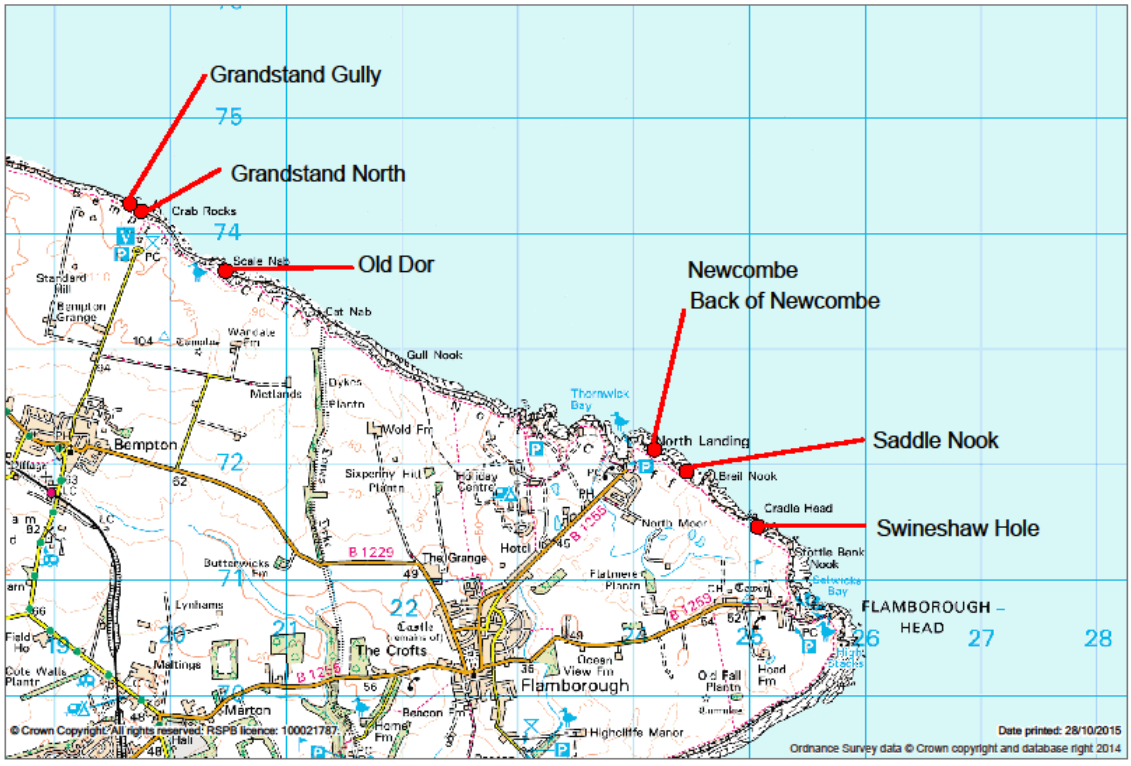
Herring Gull Productivity Plots



Appendix 3 - Study Plot Locations

Common Guillemot Study Plots

Razorbill Study Plots



Black-legged Kittiwake Study Plots