ABERDEEN HARBOUR
EXPANSION PROJECT
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*Volume 3:*
*Technical*
*Appendices*

# APPENDIX 14-A MARINE ORNITHOLOGY VANTAGE POINT SURVEY REPORT

# Aberdeen Harbour Extension Project, Nigg Bay

# Data recorded on Seabirds and Marine Mammals, June 2014 to May 2015

**Mark Lewis**

**Common eider in Aberdeen harbour**

**This Project has received funding from the European Union:** The content of the document does not necessarily reflect the views or opinions of the EU Commission, and the Commission is not responsible for any use made by any party of the information contained within it.

## Executive summary

Data have been collected between June 2014 and May 2015 to inform the Environmental Impact Assessment for Aberdeen Harbour Board's proposed Nigg Bay development.

132 hours of vantage point survey data (11 hours each month) were collected from 4 vantage points situated around Nigg Bay.

Data were collected for target species of birds (all seaduck, divers and grebes) and all marine mammals. Data on wading birds were collected during walk-over surveys conducted when the observer was in transit between vantage point survey locations.

These standardised surveys are supplemented with 163 *ad hoc* counts of target species, and wading birds. This, in combination with the standardised survey data ensured that data was collected on the site on 184 days – the equivalent of data from every second day of the year.

This review summarises data collected for eight target bird species, waders, and four species of marine mammals, and presents summaries of effort and environmental conditions.

# Contents

## 1. Introduction

Aberdeen Harbour Board have proposed the design and construction of a new harbour facility at Nigg Bay, immediately south of the existing harbour. The purpose of the new facility is to complement and expand the capabilities of the existing harbour, accommodate larger vessels, retain existing custom, and attract increased numbers of vessels and vessel types to Aberdeen.

The new harbour development shall include but is not limited to:

- Dredging the existing bay to accommodate vessels up to 9m draft with additional dredge depth of 10.5m to the east quay and entrance channel;
- Construction of new North and South breakwaters to form the harbour;
- Provision of approximately 1500m of new quays and associated support infrastructure. The quay will be constructed with solid quay wall construction and suspended decks over open revetment;
- Construction of areas for development by others to facilitate the provision of fuel, bulk commodities and potable water;
- Land reclamation principally through using materials recovered from dredging operations and local sources, where possible;
- Provision of ancillary accommodation for the facility;
- Off-site highway works to the extent necessary to access the facility and to satisfy statutory obligations;
- Diversions and enabling works necessary to permit the development.

This report summarises the survey work carried out to support the proposed Aberdeen Harbour Board development within Nigg Bay. The aim of these surveys is to characterise the presence, abundance, seasonality and behaviour of birds and marine mammals within the proposed development area. This report summarises the survey protocols, methods utilised, the survey effort undertaken to date (from June 2014 to May 2015), the vantage point survey results, wader walk-over counts, and the *ad hoc* counts of target species and waders.

Once complete, the data collected will be used to inform the Environmental Impact Assessment, alongside other already existing datasets.

Methodologies and survey protocols have been adapted from Scottish Natural Heritage (SNH) guidance on standard Vantage point survey methods, and have been reviewed and agreed by SNH.

The fieldwork and reporting are commissioned by Aberdeen Harbour Board, managed by Fugro EMU Limited, and completed by the author.

## 2. Survey methods

All surveys have been carried out by the author; a Joint Nature Conservation Committee (JNCC) accredited European Seabirds at Sea (ESAS) trainer with 1,900 hours of boat based seabird survey experience. The author is also an experienced, JNCC accredited Marine Mammal Observer (MMO), with good local knowledge of the site, and spent approximately 600 hours observing birds and marine mammals recreationally at the site in 2013, a similar number in 2014, and approximately 300 hours to date in 2015.

## 2.1 Vantage point surveys

Vantage point (VP) surveys (in line with standard methodologies described in SNH, 2014) were carried out from four VPs distributed to the north and south of Nigg Bay. They allowed full coverage of the bay itself, directly offshore from the bay and offshore areas to the north and south. The viewsheds for each of these VPs are illustrated in Figures 1 – 4, with the total area covered illustrated in Figure 5. The locations of the 4 VPs are shown in Table 1.

| Site | Grid reference | Easting (OSBG) | Northing (OSGB) |
|---|---|---|---|
| Vantage point 1 | NJ 97234 05297 | 397234 | 805297 |
| Vantage point 2 | NJ 96961 04303 | 396961 | 804303 |
| Vantage point 3 | NJ 97153 05439 | 397153 | 805439 |
| Vantage point 4 | NJ 97091 04218 | 397091 | 804218 |

**Table 1**. Location of Vantage points used for VP surveys.

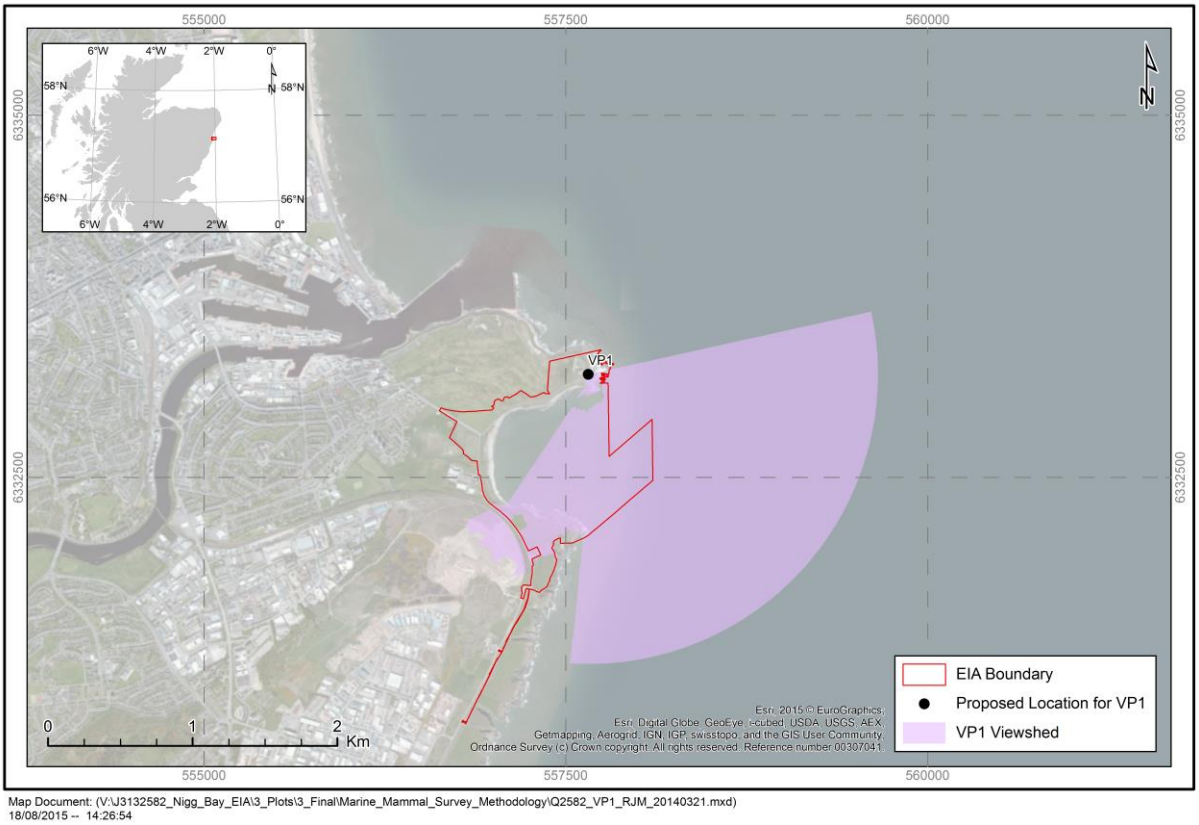


**Figure 1**. Viewshed and VP location for VP1


**Figure 2**. Viewshed and VP location for VP2

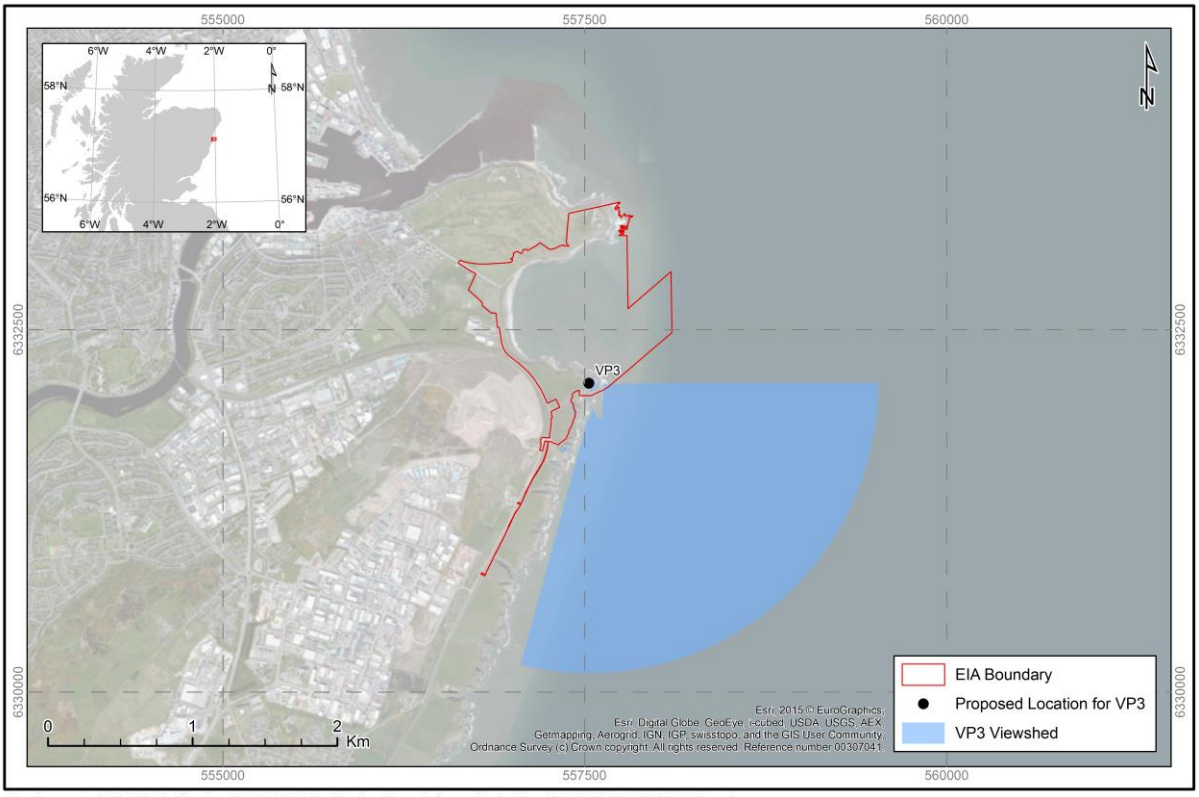


**Figure 3**. Viewshed and VP location for VP3

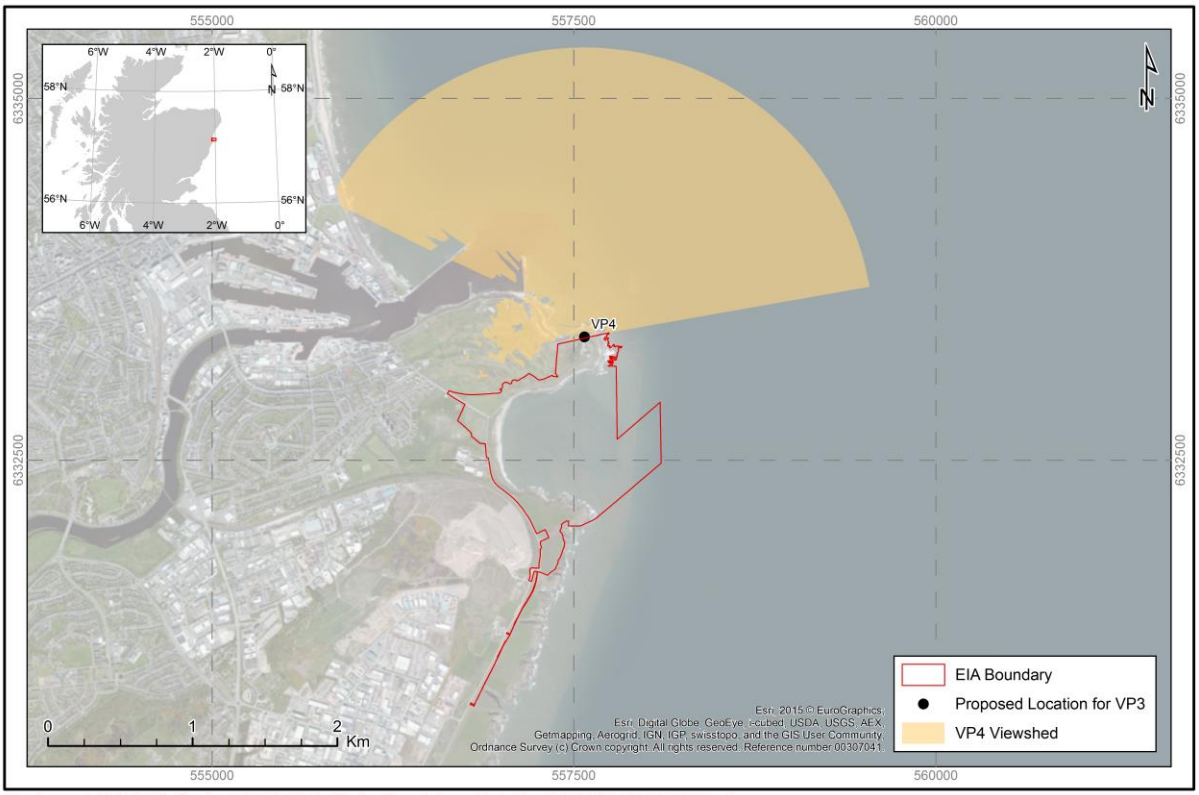


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**Figure 4**. Viewshed and VP location for VP4

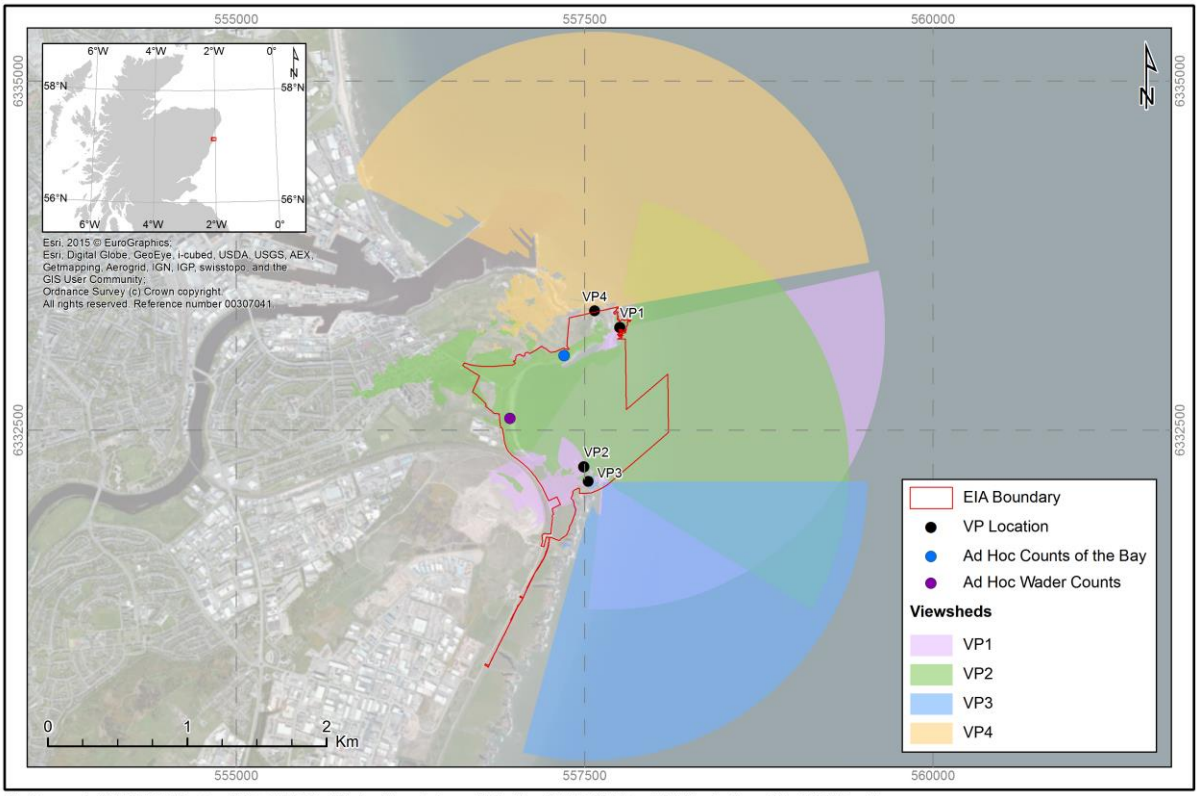


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**Figure 5**. Viewsheds from VPs 1 – 4 overlain, to show the total surveyed area. *Ad Hoc* count locations have also been added.

In each month, surveys were conducted over one three hour period at VP 1, two three hour periods at VP2, and one hour periods at VPs 3 and 4. VPs 1 and 2 were the main vantage points, affording the best views into the bay. Of these, VP2 was selected to receive the greatest survey effort, as it offers the best viewing in terms of coverage of the bay, and light conditions.

A single observer, made observations for both birds and marine mammals, by scanning the viewshed with 10x42 binoculars and a 30 – 70 magnification telescope. Recording at VPs 1 and 2 was broken down into a series of 20 minute periods, with periods focussing on birds and marine mammals using the bay, and then birds and marine mammals passing further offshore, in turn. Recording for the one hour sessions at VPs 3 and 4 was focussed on recording marine mammals, with VP4 also focusing on vessel traffic and any interactions between boats and marine mammals. Table 2 shows how the survey work was composed each month.

| **Month** | **Site visit number** | **Survey time** | | | |
|---|---|---|---|---|---|
| | | **VP1** | **VP2** | **VP3** | **VP4** |
| 1 | 1 | Dusk(3 hours) | Dawn (3 hours) | | |
| | 2 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |
| 2 | 3 | | Morning (3 hours) | 1 hour (Afternoon/Dusk) | 1 hour (Afternoon/Dusk) |
| | 4 | Dawn (3 hours) | Dusk (3 hours) | | |
| 3 | 5 | Afternoon (3 hours) | Dawn (3 hours) | | |
| | 6 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |
| 4 | 7 | | Morning (3 hours) | 1 hour (Afternoon/Dusk) | 1 hour (Afternoon/Dusk) |
| | 8 | Morning (3 hours) | Dusk (3 hours) | | |
| 5 | 9 | Dusk (3 hours) | Dawn (3 hours) | | |
| | 10 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |
| 6 | 11 | | Morning (3 hours) | 1 hour (Afternoon/Dusk) | 1 hour (Afternoon/Dusk) |
| | 12 | Dawn (3 hours) | Dusk (3 hours) | | |
| 7 | 13 | Afternoon (3 hours) | Dawn (3 hours) | | |
| | 14 | | Afternoon (3 hours) | 1 hour(Dawn/Morning) | 1 hour (Dawn/Morning) |

| Month | Site visit number | Survey time | | | |
|---|---|---|---|---|---|
| | | VP1 | VP2 | VP3 | VP4 |
| 8 | 15 | | Morning (3 hours) | 1 hour(Afternoon/ Dusk) | 1 hour(Afternoon/ Dusk) |
| | 16 | Morning (3 hours) | Dusk (3 hours) | | |
| 9 | 17 | Dusk (3 hours) | Dawn (3 hours) | | |
| | 18 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour(Dawn/Morning) |
| 10 | 19 | Dusk (3 hours) | Dawn (3 hours) | | |
| | 20 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |
| 11 | 21 | Dusk (3 hours) | Dawn (3 hours) | | |
| | 22 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |
| 12 | 23 | Dusk (3 hours) | Dawn (3 hours) | | |
| | 24 | | Afternoon (3 hours) | 1 hour (Dawn/Morning) | 1 hour (Dawn/Morning) |

**Table 2**. Composition of monthly VP effort.

Target species for VP surveys comprised all seaducks, divers and grebes, and all marine mammals, selected as targets as they are species that were known to regularly use the bay, and show sensitivity to disturbance from vessels and development. Any notable occurrences of other species were also recorded.

For each observation, details on the species, number and behaviour were noted, and where possible, the age and sex were recorded (although age and sex have not been analysed within this report). Where birds or marine mammals were observed passing offshore, the direction of travel was noted. For all observations, the location was marked on a map, and the angle of inclination was recorded, which was then used to calculate a distance from the observer. A bearing (or range of bearings for larger flocks of birds) was also taken, which when coupled with the calculated distances, was used to accurately record locations of observations.

However, the use of the inclinometer readings to calculate distances has the potential to return unreliable measurements. The device only records angles of inclination in whole degrees, which when coupled with the rather restricted visual range the observations were made in, leads to ‘clumping’ of observations into one of five or six distances. When these distances were compared with known distances (for example the distance between VPs 1 and 2, as calculated using an online mapping tool) they were found to be incorrect. With the accuracy and precision of the calculated distances in question, it was decided to add an estimated distance for each observation, informed by known distances to C-PODS (passive acoustic monitoring devices detecting vocalisations from dolphins and porpoises that are positioned around the mouth of the bay) and distances across the bay at various points. The

addition of these estimated distances has been endorsed by SNH after a review in October 2014. SNH also recommended that distance estimates were banded (i.e. estimates would be made in increments of 100 m for observations within 1 km, and increments of 500 m for estimates beyond this distance). This is to avoid false precision within the distance estimates.

### 2.2 *Ad hoc* counts

Additional counts for VP target species, as well as any waders using the bay, were carried out on an *ad hoc* basis throughout the 12 month period. Unstandardised counts of waterfowl were carried out from VP1, and on the north side of the bay from NJ 968051. Wader counts were carried out on the shore of the bay itself, at NJ 965046 (Figure 5). Approximately 10 minutes was spent at both count points for each *ad hoc* count. These *ad hoc* counts can add context to the VP and wader walk over survey data. Where populations fluctuate, and surveys are carried out over a narrow time window, the *ad hoc* data can inform how representative the survey data are.

### 2.3 Wader walkovers

When in transit to a VP, the observer recorded waders using the shore of Nigg Bay. Most walkover counts were carried out from NJ 965046 in an attempt to reduce disturbance on roosting and feeding birds. All wader walkover data (effort and counts) are presented in Appendix 3.

## 3. Effort

### 3.1 Vantage point surveys

Eleven hours of vantage point survey effort were completed every month, comprising six hours at VP2, three hours at VP1, and one hour at VPs 3 and 4. The dates, times and durations of VP surveys are presented in Table 3. Almost all VPs have been surveyed for the required duration at the first attempt. VPs 1 and 2 were surveyed primarily for birds and marine mammals using the bay, and as such were given greater coverage than VPs 3 and 4, that focused on the use of areas to the north and the south of the site by marine mammals. VP2 was selected to receive the most coverage, as being north facing there would be a greatly reduced chance of glare, compared to the south facing VP1.

VP locations were selected on the basis of offering unobstructed views of the area to be surveyed, with easy and safe access.

Environmental variables such as failing light, and extremely heavy rain compromising observing conditions, have necessitated returning to complete a VP on only three occasions.

| | Date | Time | Duration |
|---|---|---|---|
| **VP1** | 21/06/2014 | 04:20 | 3 hours |
| **VP2** | 21/06/2014 | 18:50 | 3 hours |
| **VP2** | 22/06/2014 | 15:05 | 2 hours 20 minutes |
| **VP2** | 25/06/2014 | 17:10 | 40 minutes |
| **VP3** | 25/06/2014 | 17:55 | 1 hour |

| | Date | Time | Duration |
|---|---|---|---|
| **VP4** | 22/06/2014 | 09:50 | 1 hour |
| **VP3** | 17/07/2014 | 14:50 | 1 hour |
| **VP4** | 17/07/2014 | 16:25 | 1 hour |
| **VP2** | 17/07/2014 | 17:35 | 1 hour |
| **VP1** | 18/07/2014 | 05:00 | 3 hours |
| **VP2** | 21/07/2014 | 19:15 | 1 hour |
| **VP2** | 26/07/2014 | 08:50 | 3 hours |
| **VP2** | 26/07/2014 | 19:00 | 1 hour |
| **VP2** | 20/08/2014 | 06:00 | 3 hours |
| **VP1** | 20/08/2014 | 13:00 | 3 hours |
| **VP3** | 20/08/2014 | 16:30 | 1 hour |
| **VP2** | 27/08/2014 | 17:05 | 2 hours |
| **VP4** | 30/08/2014 | 08:30 | 1 hour |
| **VP2** | 30/08/2014 | 17:20 | 1 hour |
| **VP1** | 06/09/2014 | 06:00 | 3 hours |
| **VP2** | 24/09/2014 | 06:30 | 3 hours |
| **VP2** | 25/09/2014 | 16:30 | 3 hours |
| **VP3** | 06/09/2014 | 16:45 | 1 hour |
| **VP4** | 07/09/2014 | 07:20 | 1 hour |
| **VP2** | 18/10/2014 | 08:00 | 3 hours |
| **VP1** | 18/10/2014 | 14:30 | 3 hours |
| **VP4** | 19/10/2014 | 08:00 | 1 hour |
| **VP3** | 19/10/2014 | 11:00 | 1 hour |
| **VP2** | 19/10/2014 | 14:30 | 3 hours |
| **VP2** | 24/11/2014 | 08:30 | 3 hours |
| **VP1** | 24/11/2014 | 12:30 | 3 hours |
| **VP4** | 25/11/2014 | 08:30 | 1 hour |
| **VP3** | 25/11/2014 | 10:30 | 1 hour |
| **VP2** | 25/11/2014 | 12:30 | 3 hours |
| **VP2** | 16/12/2014 | 08:30 | 3 hours |
| **VP1** | 16/12/2014 | 12:30 | 3 hours |
| **VP4** | 17/12/2014 | 09:00 | 1 hour |
| **VP3** | 17/12/2014 | 10:30 | 1 hour |
| **VP2** | 17/12/2014 | 12:15 | 3 hours |
| **VP2** | 24/01/2015 | 08:30 | 3 hours |
| **VP1** | 24/01/2015 | 12:50 | 3 hours |
| **VP4** | 25/01/2015 | 09:00 | 1 hour |
| **VP3** | 25/01/2015 | 10:30 | 1 hour |

| | Date | Time | Duration |
|---|---|---|---|
| **VP2** | 25/01/2015 | 12:15 | 3 hours |
| **VP2** | 18/02/2015 | 08:20 | 3 hours |
| **VP1** | 18/02/2015 | 12:15 | 3 hours |
| **VP4** | 19/02/2015 | 09:00 | 1 hour |
| **VP3** | 19/02/2015 | 10:30 | 1 hour |
| **VP2** | 19/02/2015 | 12:15 | 3 hours |
| **VP2** | 15/03/2015 | 08:00 | 3 hours |
| **VP1** | 15/03/2015 | 13:00 | 3 hours |
| **VP4** | 22/03/2015 | 08:00 | 1 hour |
| **VP3** | 22/03/2015 | 10:30 | 1 hour |
| **VP2** | 22/03/2015 | 13:30 | 3 hours |
| **VP2** | 25/04/2015 | 07:00 | 3 hours |
| **VP1** | 25/04/2015 | 16:00 | 3 hours |
| **VP4** | 26/04/2015 | 08:00 | 1 hour |
| **VP3** | 26/04/2015 | 10:30 | 1 hour |
| **VP2** | 26/04/2015 | 14:00 | 3 hours |
| **VP2** | 16/05/2015 | 06:00 | 3 hours |
| **VP1** | 16/05/2015 | 15:00 | 3 hours |
| **VP4** | 17/05/2015 | 11:00 | 1 hour |
| **VP3** | 17/05/2015 | 13:00 | 1 hour |
| **VP2** | 17/05/2015 | 15:00 | 3 hours |

**Table 3**. Dates, start times and durations of all VP surveys.

### 3.2 *Ad hoc* Counts

A total of 163 *ad hoc* counts were carried out over the 12 month period, with each count taking approximately 20 minutes. *Ad hoc* counts were opportunistic counts that add context to the data collected during the VP surveys. A summary of the number of counts carried out in each month is presented in Table 4. A full table of the dates and times of *ad hoc* counts is presented in Appendix 1.

| Month | Number of *ad hoc* counts | Total time for *ad hoc* counts |
|---|---|---|
| June 2014 | 20 | 6h 40 mins |
| July 2014 | 10 | 3h 20 mins |
| August 2014 | 17 | 5h 40 mins |
| September 2014 | 5 | 1h 40 mins |
| October 2014 | 9 | 3h |
| November 2014 | 9 | 3h |
| December 2014 | 7 | 2h 20 mins |
| January 2015 | 12 | 4h |

| Month | Number of *ad hoc* counts | Total time for *ad hoc* counts |
|---|---|---|
| February 2015 | 14 | 4h 40 mins |
| March 2015 | 26 | 8h 40 mins |
| April 2015 | 14 | 4h 40 mins |
| May 2015 | 20 | 6h 40 mins |
| **Total *ad hoc* effort** | **163** | **54 h 20 mins** |

**Table 4.** Number of *ad hoc* counts carried out in each month.

### 3.3 Wader walkovers

A total of 45 wader walkovers were carried out over the 12 month period. A summary of the dates and times of all wader walkovers is presented in Table 5.

| Date | Time |
|---|---|
| 21/06/2014 | 08:00 |
| 21/06/2014 | 18:20 |
| 22/06/2014 | 09:25 |
| 22/06/2014 | 14:40 |
| 25/06/2014 | 16:55 |
| 17/07/2014 | 14:30 |
| 17/07/2014 | 17:55 |
| 18/07/2014 | 08:25 |
| 21/07/2014 | 19:00 |
| 26/07/2014 | 08:20 |
| 26/07/2014 | 18:25 |
| 20/08/2014 | 05:45 |
| 27/08/2014 | 16:40 |
| 30/08/2014 | 17:00 |
| 06/09/2014 | 09:20 |
| 06/09/2014 | 16:15 |
| 07/09/2014 | 08:40 |
| 24/09/2014 | 09:40 |
| 25/09/2014 | 16:15 |
| 18/10/2014 | 07:45 |
| 18/10/2014 | 14:00 |
| 19/10/2014 | 07:45 |
| 19/10/2014 | 10:30 |
| 19/10/2014 | 14:10 |

| Date | Time |
|---|---|
| 24/11/2014 | 11:45 |
| 25/11/2014 | 09:35 |
| 25/11/2014 | 11:45 |
| 16/12/2014 | 11:45 |
| 17/12/2014 | 10:15 |
| 17/12/2014 | 12:00 |
| 24/01/2015 | 11:50 |
| 25/01/2015 | 10:20 |
| 25/01/2015 | 11:50 |
| 18/02/2015 | 11:40 |
| 19/02/2015 | 10:30 |
| 19/02/2015 | 12:00 |
| 15/03/2015 | 11:00 |
| 22/03/2015 | 09:30 |
| 22/03/2015 | 13:00 |
| 25/04/2015 | 10:20 |
| 26/04/2015 | 09:30 |
| 26/04/2015 | 13:40 |
| 16/05/2015 | 05:45 |
| 17/05/2015 | 10:30 |
| 17/05/2015 | 14:20 |

**Table 5**. Dates and times of all wader walkovers.

## 4. Environmental conditions

The observer recorded the following environmental data for each 20 minute observation period: Wind speed and direction, sea state, visibility and cloud cover. The time of each 20 minute recording period was noted, and related to the time and height of the nearest high tide, and the recorded tidal state. Sea state, visibility and cloud cover were recorded as they potentially impact detectability. Wind speed and direction were recorded as they have the potential to influence the distribution and behaviour of birds on the site.

Wind speed was recorded using the Beaufort scale, and sea state was recorded using the standard scale used for at-sea seabird and cetacean surveys – see http://www.metoffice.gov.uk/guide/weather/marine/beaufort-scale for further details. Visibility was based on the estimated maximum visible distance, and cloud cover was recorded in oktas, reflecting the proportion of the sky that was cloudy.

It is recommended that cetacean surveys be carried out in sea states of three or less (SNH, 2014), as higher sea states compromise detection of smaller cetaceans. All observations were carried out in sea states of three or less, in conditions of ‘good’ or ‘excellent’ visibility.

A full summary of the environmental conditions for each observation period can be found in Appendix 2.

## 5. Species accounts: Birds

### 5.1 Key species

The following species accounts contain raw counts for key target species recorded. No extrapolation of counts was needed as the survey area was adequately covered from the vantage points.

For each species, data on populations and trends is presented, along with information regarding relevant Special Protection Areas (SPAs), i.e. those likely to show connectivity with the birds using Nigg Bay.

A brief summary of the numbers of birds observed on VP surveys and *ad hoc* counts is presented below. The maximum counts were then used to put the numbers occurring at Nigg Bay into a biogeographic, national, and SPA suite context.

#### 5.1.1 Common eider *Somateria mollissima*

The common eider is resident in the UK, with local birds making some relatively small scale seasonal and post breeding movements. Its population trend in the UK is unknown.

SPA designation reference population (non-breeding) – 20,000 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 27,000 | 63,000 | AMBER | LC | ROMS |

**Table 6**. Conservation status of common eider. Population estimates are taken from Musgrove *et al.* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed on Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

#### SPA connectivity

There are no SPAs for breeding common eider in the UK.

There are eight SPAs for non-breeding populations, two in Northern Ireland, two in England, and four on the east coast of Scotland. Of these, the Firth of Forth SPA, Firth of Tay and Eden Estuary SPA, Montrose Basin SPA and Ythan Estuary, Sands of Forvie and Meikle Loch SPA are considered to show potential connectivity with the Nigg Bay population. The locations of these SPAs are shown in Figure 6.

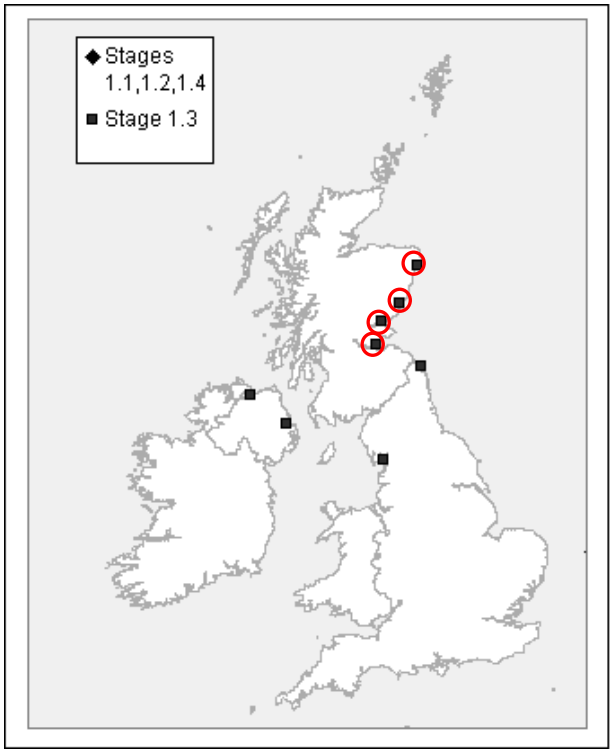


**Figure 6**. Map of SPAs for non-breeding common eider taken from Stroud *et al* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population.

Common eider breed at the Ythan estuary, and birds ringed as pulli (very young chicks) here, are regularly seen at the Nigg Bay site (per observations) (although none have been noted during the 12 month period covered in this report). Some of these birds disperse to Aberdeen Bay (including Nigg Bay) after breeding. The east coast population is reasonably sedentary, and in winter aggregate in the Firths of Forth and Tay (Wernham *et al.*, 2002). As such is it extremely likely that the survey site contains birds that breed locally, and winter in one of the non-breeding SPAs.

### Counts

Monthly maximum counts of common eider from each VP, and *ad hoc* maxima are presented in Table 7.

| Eider | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 529 | 749 | na | na | 843 |
| July | 420 | 595 | na | na | 903 |
| August | 547 | 669 | na | na | 655 |
| September | 141 | 122 | na | na | 175 |
| October | 64 | 97 | na | na | 67 |
| November | 82 | 85 | na | na | 101 |
| December | 76 | 89 | na | na | 80 |
| January | 74 | 90 | na | na | 98 |
| February | 112 | 94 | na | na | 109 |
| March | 61 | 75 | na | na | 88 |

| Eider | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| April | 35 | 44 | na | na | 47 |
| May | 101 | 102 | na | na | 107 |

**Table 7**. Monthly maxima of common eider from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

Comparison of the data from *ad hoc* counts and that collected on VP surveys shows that the VP data accurately reflect the use of the site by common eider (see Figure 7).

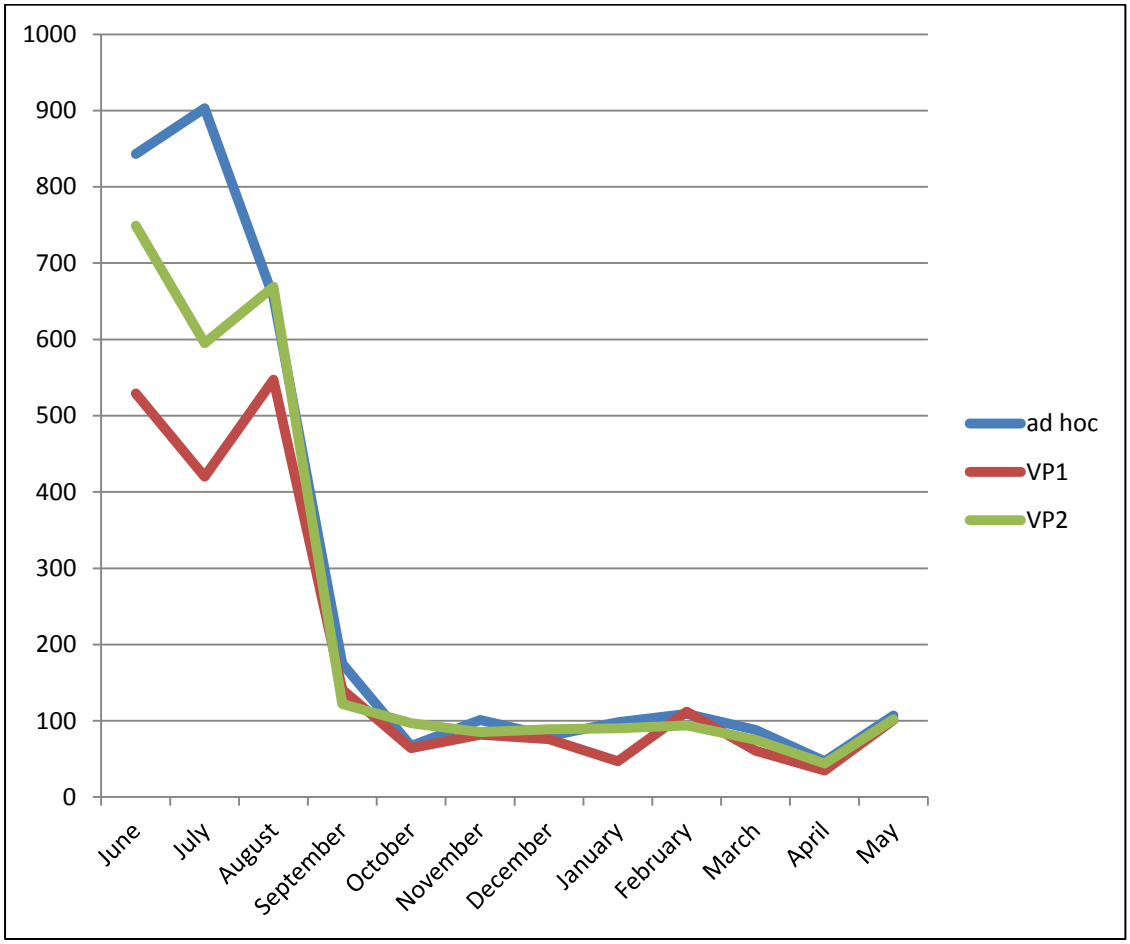


**Figure 7**. Comparison of maxima from VPs and *ad hoc* counts for common eider.

**Summary**

The largest number of common eider are found around Nigg Bay in summer, peaking with counts of 749 birds from the VP surveys and 903 birds from the *ad hoc* counts. Numbers decreased rapidly through the autumn to an early winter population of around 100 birds, and the population remained at this level through to February. After decreasing further through March and April, numbers began to increase in May with the arrival of males from local breeding areas. The birds that pass through the site can be linked to some degree with non-breeding SPAs for common eider, as patterns of occurrence are consistent with the rest of the east coast of Scotland population, which largely winters in the Firths of Forth and Tay. In total, the suite of non-breeding SPAs comprise 22,223 birds, with January maxima totalling 9,023 birds, equalling 0.5% of the biogeographic population, and 11.5% of the UK population. The four east coast Scotland SPAs hold 13,475 birds (Stroud *et al.,* 2001). The

maximum counts of birds using the survey site are expressed as percentages of the relevant thresholds, national populations and SPA populations in Table 8.

| | | Biogeographic SPA threshold | UK breeding population | UK winter population | Ythan SPA | Montrose Basin SPA | Firth of Forth SPA | Firth of Tay SPA | East coast SPAs Total |
|---|---|---|---|---|---|---|---|---|---|
| | | **20,000** | **27,000** | **63,000** | **1,778** | **1,794** | **7,887** | **2,061** | **13,520** |
| **VP max** | **749** | 3.75 | 2.77 | 1.19 | 42.13 | 41.75 | 9.50 | 36.34 | 5.54 |
| **Ad hoc max** | **903** | 4.52 | 3.34 | 1.43 | 50.79 | 50.33 | 11.45 | 43.81 | 6.68 |

**Table 8**. Maximum counts of common eider expressed as percentages of the relevant thresholds, national populations and SPA populations.

While there is known connectivity between east coast breeding common eider and the non-breeding SPAs, linking the Nigg Bay birds to a specific SPA population is not possible. As such, it would be precautionary to use the east coast Scotland SPA total as well as the individual site totals when assessing any potential impacts the proposed development might have.

Common eider use Nigg Bay and the wider area for feeding and roosting. The largest roost flocks are generally found on the water, but some birds roost on the rocky shores on the north and south sides of Nigg Bay. Occasionally, relatively large numbers are seen roosting on the beach – these roosts tend to be seen in early mornings, and it is likely that beach roosting birds are frequently disturbed by dog walkers, bait diggers, etc.

Spatial use of the site is weather dependent to some degree, with birds moving between Nigg Bay, Greyhope Bay, and frequently Aberdeen Harbour itself, depending on the strength and direction of the wind (note that this is anecdotal, rather than being based upon any evidence collected during the surveys).

### 5.1.2 Common scoter *Melanitta nigra*

The common scoter is a rare breeding bird in the UK, with all birds breeding in Scotland (Balmer *et al.,* 2013). It is more common in the winter, with influx of birds from Icelandic and Scandinavian populations (Wernham *et al.*, 2002). There are also summer aggregations of moulting birds, including one to the north of the survey area in Aberdeen Bay (Forrester *et al.*, 2007). Its population trend in the UK is unknown.

SPA designation reference population (breeding) – 5,300 (biogeographic)
SPA designation reference population (non-breeding) – 16,000 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 52 | 100,000 | RED | LC | ROMS |

**Table 9**. Conservation status of common scoter. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed in Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

**SPA Connectivity**

There are two breeding SPAs for common scoter in the UK, the Rinns of Islay SPA and the Caithness and Sutherland Peatlands SPA (Figure 8). Of these, the Caithness and Sutherland Peatlands SPA is considered to show potential connectivity with the Nigg Bay population.

There are six non-breeding SPAs for common scoter in the UK (Figure 9). Three are on English coasts and are not considered to show potential connectivity. Three are on the east coast of Scotland, and it is considered that these SPAs do show potential connectivity with the Nigg Bay population. These sites are the Firth of Forth SPA, Firth of Tay and Eden Estuary SPA, and the Moray and Nairn Coast SPA.


**Figure 8**. Map of SPAs for breeding common scoter taken from Stroud *et al.,* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population.

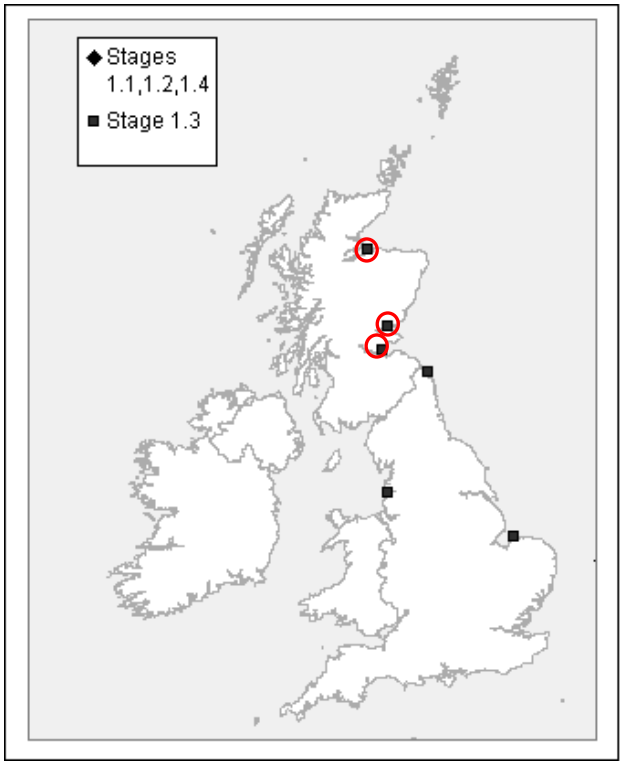


**Figure 9**. Map of SPAs for non-breeding common scoter taken from Stroud *et al.,* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population.

The moulting flock of common scoter in Aberdeen Bay can number as many as 4,750 birds (Forrester *et al.*, 2007) and as such must contain birds that do not originate from UK breeding areas – i.e. those originating in European breeding areas. However, despite the fact that little is known about the movements of UK breeding birds, it is assumed that they use the same UK wintering and moult flocks as the European birds. With moult flocks also present on the west coast of Scotland, it is likely that the birds breeding at eastern SPAs use the east coast moult flocks, and those breeding at the west coast SPA use west coast moult aggregations.

Entirely marine SPAs in Carmarthen Bay and Liverpool Bay also list common scoter as interest features. It is not thought that there is potential for connectivity between these sites and those on the east coast of Scotland.

**Counts**

Monthly maximum counts of common scoter from each VP, and *ad hoc* maxima are presented in Table 10.

| Common scoter | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 84 | 21 | na | na | 800 |
| July | 45 | 0 | na | na | 99 |
| August | 0 | 2 | na | na | 2 |
| September | 13 | 0 | na | na | 0 |
| October | 0 | 0 | na | na | 2 |
| November | 0 | 0 | na | na | 3 |

| Common scoter | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| December | 0 | 0 | na | na | 0 |
| January | 0 | 0 | na | na | 0 |
| February | 0 | 6 | na | na | 4 |
| March | 0 | 0 | na | na | 0 |
| April | 0 | 0 | na | na | 9 |
| May | 12 | 0 | na | na | 23 |

**Table 10**. Monthly maxima of common scoter from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

Comparison of the data from *ad hoc* counts and that collected on VP surveys shows that the VP data reflect the use of the site by common scoter. See Figure 10. While *ad hoc* counts recorded much higher totals than the VP surveys, the pattern of occurrence remains consistent, with larger numbers being recorded in the summer, and very few birds after July. The large flock of 800 common scoter recorded on the *ad hoc* counts in June was unprecedented (previous high counts from the site numbering 300 birds). The presence of an aberrant individual frequently seen off Blackdog (the usual location of the large moult aggregation – *pers obs*.), and the presence of boats close inshore in the Blackdog area at the same time suggest that the birds lingering off Girdle Ness were part of the displaced Aberdeen Bay moult flock.

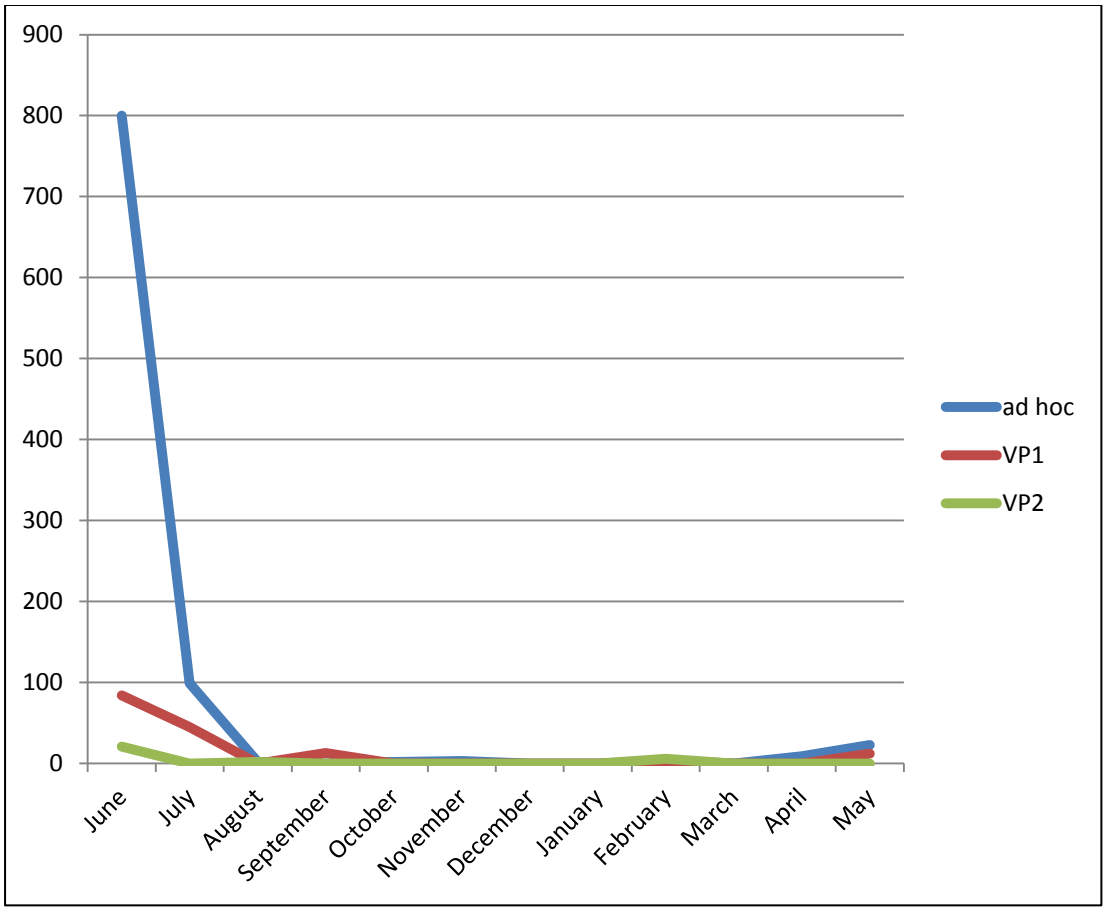


**Figure 10**. Comparison of maxima from VPs and *ad hoc* counts for common scoter.

**Summary**

There is a distinct peak in numbers of common scoter using Nigg Bay in summer, coinciding with the annual build up of birds aggregating to moult in Aberdeen Bay. Dispersal of some of these moulting birds (possibly a result of boats being present in the area) resulted in an unprecedented flock of 800 birds using the site for six days, in late June and early July. It is likely that the birds that aggregate in moult flocks to the north of the site contain a small number of UK bred birds, and that these moult flocks comprise some proportion of the populations designated as wintering SPAs for this species. Of the six UK wintering SPAs, the Firth of Forth SPA, the Firth of Tay and Eden Estuary SPA, and the Moray and Nairn Coast SPA are considered to have potential connectivity with birds using the survey site. In total, the suite of non-breeding SPAs comprise 8,793 birds, with January maxima totalling 3,422 birds, equalling 0.2% of the biogeographic population, and 12.4% of the UK population. The three relevant east coast Scottish SPAs comprise a total population of 4,628 birds (Stroud *et al.,* 2001). The maximum counts of birds using the survey site are expressed as percentages of the relevant thresholds, national populations and SPA populations in Table 11.

| | | Biogeographic SPA threshold br | Biogeographic SPA threshold non br | UK breeding population | UK winter population | Moray and Nairn Coast | Firth of Forth SPA | Firth of Tay SPA | East coast SPAs Total |
|---|---|---|---|---|---|---|---|---|---|
| | | **5,300** | **16,000** | **52** | **100,000** | **531** | **2,653** | **1,444** | **4,628** |
| **VP max** | **84** | 1.58 | 0.53 | 161.54 | 0.08 | 15.82 | 3.17 | 5.82 | 1.82 |
| **Ad hoc max** | **800** | 15.09 | 5.00 | 1538.4 | 0.80 | 150.66 | 30.15 | 55.40 | 17.29 |

**Table 11.** Maximum counts of common scoter expressed as percentages of the relevant thresholds, national populations and SPA populations.

As the behaviour of UK breeding common scoter is poorly known, linking the Nigg Bay birds to a specific wintering SPA population is not possible. As such, it would be precautionary to use the east coast Scotland SPAs total as well as the individual site totals when assessing any potential impacts the proposed development might have on non-breeding birds. Potential impacts on UK breeding populations should be assessed against the population breeding within the Caithness and Sutherland Peatlands SPA.

The majority of common scoter records from the site are of birds passing the headland, or of small groups of birds associating with flocks of common eider. As such the distribution of the eider flocks they associate with largely drives the distribution of common scoter actively using the site.

Common scoter will occasionally roost with flocks of common eider using Nigg Bay, but have never been observed to roost out of the water.

### 5.1.3 Long-tailed duck *Clangula hyemalis*

The long-tailed duck is a regular non-breeding visitor to UK waters, with most UK birds wintering on northern and eastern Scottish coasts (Balmer *et al.*, 2013). Some wintering birds linger into spring. In Nigg Bay, counts of long-tailed duck are highest in spring, with displaying birds sometimes present to late May. Its population trend in the UK is unknown.

SPA designation reference population (non-breeding) – 1,500 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 0 | 11,000 | GREEN | Vulnerable | ROMS |

**Table 12**. Conservation status of long-tailed duck. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed in Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

### SPA Connectivity

There are three SPAs designated for aggregations of non-breeding long-tailed duck in UK waters; the Firth of Forth SPA, Firth of Tay and Eden Estuary SPA, and the Moray and Nairn Coast SPA (Figure 11). Long-tailed duck winter aggregations are generally very site faithful (possibly due to specific habitat requirements) (Forrester *et al.,* 2007), accounting for the very low numbers encountered during winter months. However, the birds comprising the spring aggregations must come from one of the non-breeding SPAs in the UK. As there is no knowledge of where these spring birds come from, it is precautionary to assume that there is connectivity with all three SPAs.

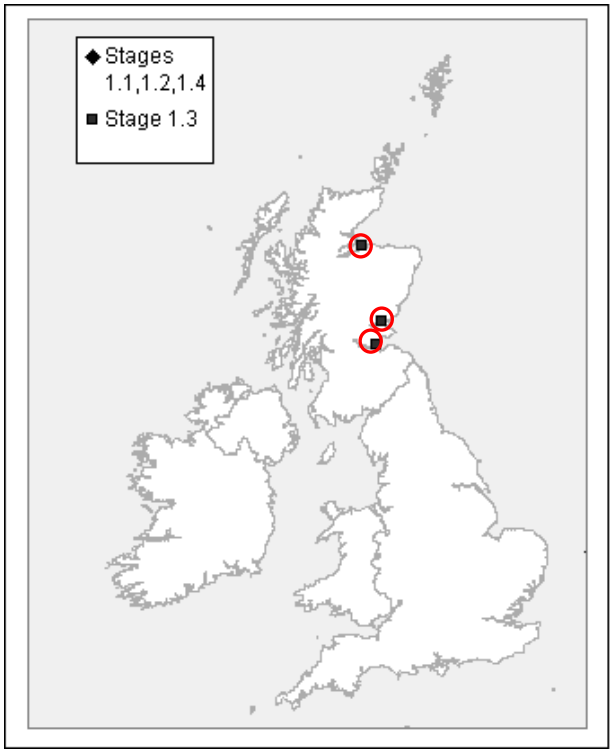


**Figure 11**. Map of SPAs for non-breeding long-tailed duck taken from Stroud *et al.,* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population.

### Counts

Monthly maximum counts of long-tailed duck from each VP, and ad hoc maxima are presented in Table 13.

| Long-tailed duck | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 0 | 0 | na | na | 0 |
| July | 0 | 0 | na | na | 0 |
| August | 0 | 0 | na | na | 0 |
| September | 0 | 0 | na | na | 0 |
| October | 0 | 3 | na | na | 2 |
| November | 1 | 1 | na | na | 2 |
| December | 0 | 3 | na | na | 1 |
| January | 2 | 3 | na | na | 2 |
| February | 1 | 0 | na | na | 1 |
| March | 2 | 2 | na | na | 6 |
| April | 23 | 25 | na | na | 27 |
| May | 2 | 2 | na | na | 4 |

**Table 13**. Monthly maxima of long-tailed duck from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

Comparison of the data from *ad hoc* counts and that collected on VP surveys shows that the VP data reflect the use of the site by long-tailed ducks, with no birds being recorded in summer and then small numbers occurring in autumn and winter, coinciding with the period that non-breeding birds arrive in Scottish waters (Forrester *et al.*, 2007) (see Figure 12).

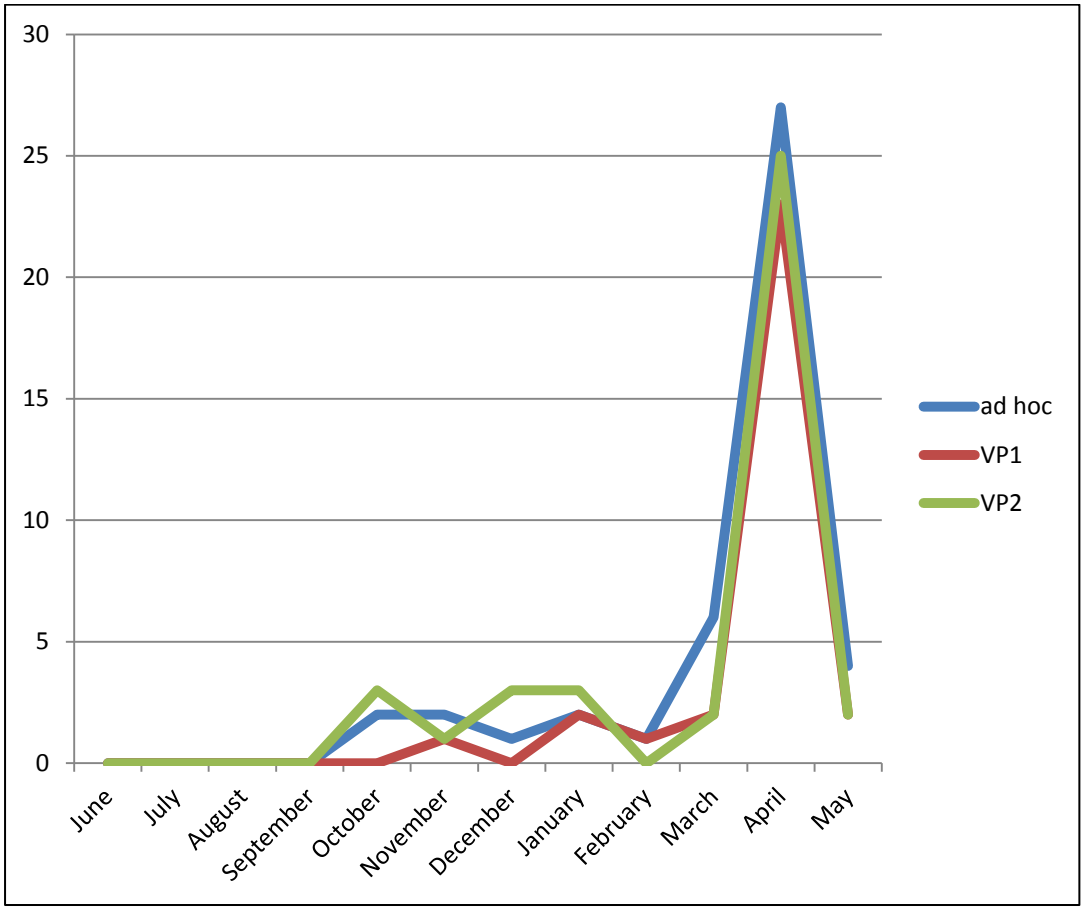


**Figure 12**. Comparison of maxima from VPs and *ad hoc* counts for long-tailed duck.

**Summary**

Very small numbers of long-tailed duck were noted during the 12 month period, with the small autumn increase in sightings reflecting a) the arrival of non-breeding birds from northern Fennoscandinavia and north west Russia (Wernham *et al.*, 2002) and b) the largely site-faithful nature of this species on its UK wintering sites. A small aggregation occurred in April (as with other years, *pers obs*) before returning to low numbers in May.

Of the UK wintering population, the Firth of Forth SPA, the Firth of Tay and Eden Estuary SPA, and the Moray and Nairn Coast SPA are considered to have potential connectivity with birds using the survey site. These three SPAs hold a total population of 1,553 birds, with a January maximum of 796. These totals comprise less than 0.1% of the biogeographic population and 3.5% of the UK wintering population. The maximum counts of birds using the survey site are expressed as percentages of the relevant thresholds, national populations and SPA populations in Table 14.

| | | Biogeographic SPA threshold | UK winter population | Montrose Basin SPA | Firth of Forth SPA | Firth of Tay and Eden Estuary SPA | East coast SPAs Total |
|---|---|---|---|---|---|---|---|
| | | 1,500 | 11,000 | 277 | 716 | 560 | 1,553 |
| VP max | 25 | 1.67 | 0.23 | 9.03 | 3.49 | 4.46 | 1.61 |
| Ad hoc max | 27 | 1.80 | 0.25 | 9.75 | 3.77 | 4.82 | 1.74 |

**Table 14.** Maximum counts of long-tailed duck expressed as percentages of the relevant thresholds, national populations and SPA populations.

The majority of long-tailed duck records from the site are of birds passing the headland, or of small groups of birds associating with flocks of common eider. As such the distribution of the eider flocks they associate with largely drives the distribution of long-tailed duck actively using the site.

### 5.1.4 Red-throated diver *Gavia stellata*

The red-throated diver is a rare breeding bird in the UK, but is reasonably common winter visitor around UK coasts, especially in the east. Winter aggregations of red-throated divers are thought to comprise some UK breeders as well as birds originating in Greenland, Iceland and Scandinavia. The breeding population fluctuates but has shown no long-term change between 1980 and 2005 (Mavor *et al.*, 2008).

SPA designation reference population (breeding) – 71 (biogeographic)
SPA designation reference population (non-breeding) – 750 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 1,300 | 17,000 | AMBER | LC | Annex 1 |

**Table 15**. Conservation status of red-throated diver. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed in Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

## SPA connectivity

There are 10 SPAs for breeding red-throated diver in the UK (Figures 13 and 14). Three of these are situated in the Western Isles, and are considered to have little potential connectivity with the birds occurring at Nigg Bay. The seven eastern sites are considered very likely to show connectivity with Nigg Bay. There are well-documented spring and autumn passages of red-throated diver along the east coast of Scotland (Forrester *et al.*, 2007), and although these movements almost certainly contain birds that have bred further north than the UK, it is assumed that UK breeders are involved as well. The relevant breeding SPAs are; Caithness and Sutherland Peatlands SPA, Fouls SPA, Hermaness, Saxa Vord and Valla Field SPA, Hoy SPA, Orkney Mainland Moors SPA, Otterswick and Graveland SPA, and Ronas Hill – North Roe and Tingon SPA.

There are three SPAs designated for non-breeding aggregations of red-throated diver. The Firth of Forth SPA is considered to show connectivity with Nigg Bay. Liverpool Bay SPA and the Outer Thames Estuary SPA, both recently designated marine SPAs, list red-throated diver as an interest feature. Of these, the Outer Thames Estuary SPA is considered likely to show connectivity with Nigg Bay as birds migrate down the east coast of the UK. There is considered to be no connectivity with Liverpool Bay SPA.

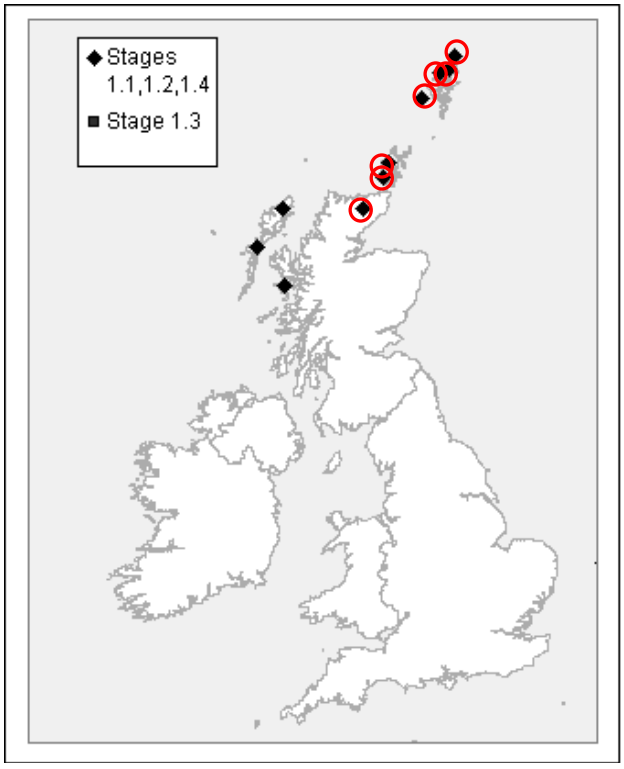


**Figure 13**. Map of SPAs for breeding red-throated diver taken from Stroud *et al.,* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population.

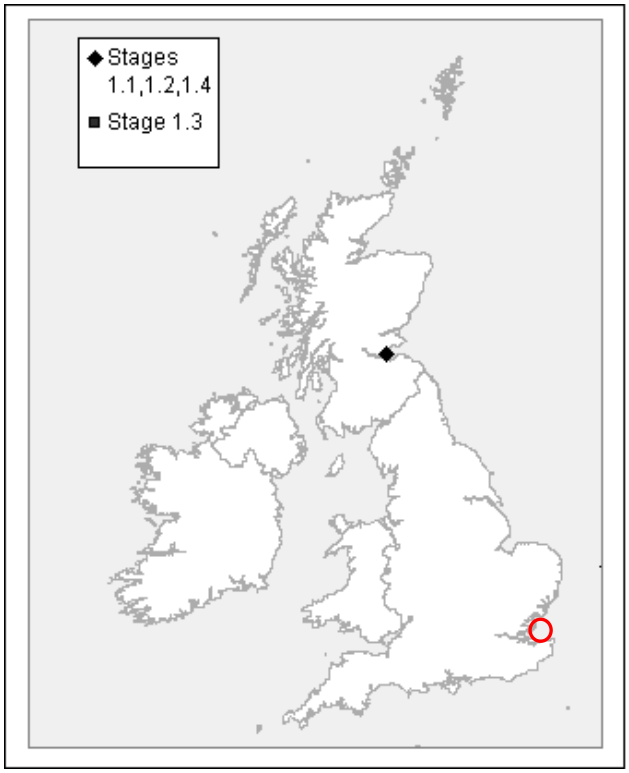


**Figure 14**. Map of SPAs for non-breeding red-throated diver taken from Stroud *et al.,* 2001. SPAs circled in red are those that are considered to show potential connectivity with the Nigg Bay population Note that marine sites Liverpool Bay SPA and the Outer Thames Estuary SPA are not noted on this map, but the rough location of the Outer Thames SPA is indicated with a red circle.

### Counts

Monthly maximum counts of red-throated diver from each VP, and *ad hoc* maxima are presented in Table 16.

| Red-throated diver | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 5 | 1 | na | na | 1 |
| July | 2 | 1 | na | na | 1 |
| August | 0 | 1 | na | na | 1 |
| September | 3 | 2 | na | na | 1 |
| October | 4 | 5 | na | na | 3 |
| November | 1 | 1 | na | na | 2 |
| December | 2 | 2 | na | na | 2 |
| January | 2 | 1 | na | na | 3 |
| February | 2 | 3 | na | na | 3 |
| March | 2 | 4 | na | na | 6 |
| April | 5 | 9 | na | na | 8 |
| May | 4 | 4 | na | na | 34 |

**Table 16**. Monthly maxima of red-throated diver from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

Comparison of the data from *ad hoc* counts and that collected on VP surveys (Figure 15) shows that the VP data reflect the use of the site by red-throated divers, with low counts during the summer, increasing numbers through September and October (reflecting peak time for southerly passage of this species) and then a decrease from late autumn to winter as the passage stops. A count of five birds from VP1 in June is not unusual, as birds can still be migrating north at this time of year.

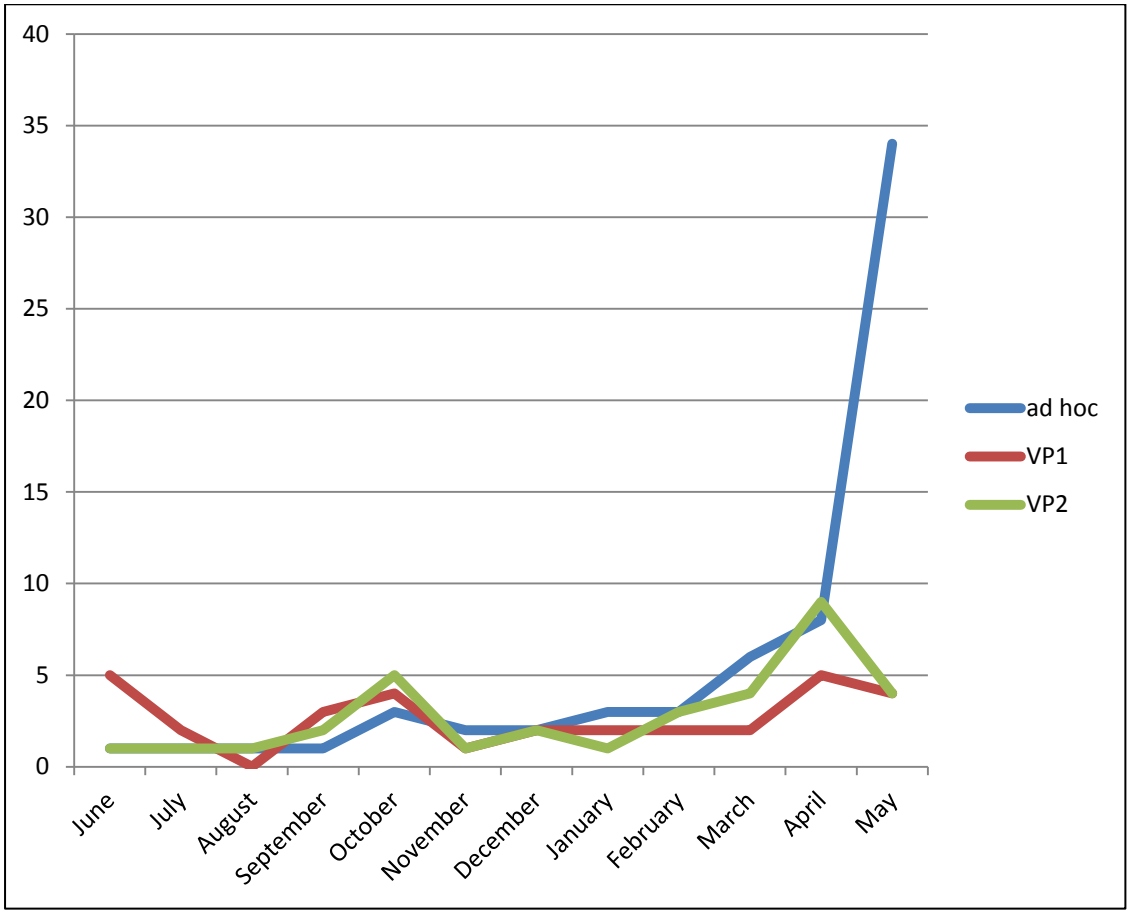


**Figure 15**. Comparison of maxima from VPs and *ad hoc* counts for red-throated diver.

**Summary**

Small numbers of red-throated diver were noted at the site throughout the nine month period, with peak counts during the spring and autumn coinciding with the species main migration periods. The birds comprising these peak counts are considered to be both UK breeders and those that breed at more northerly latitudes. The largest counts coincided with the peak period of spring passage, in April and May.

Of the 13 UK SPAs that list red-throated divers as an interest feature, seven terrestrial SPAs, two wholly marine SPAs, and one SPA with a marine component are considered to be likely to show connectivity with Nigg Bay. The seven terrestrial sites are designated for breeding populations, and the three others for wintering aggregations. The maximum counts of birds using the survey site are expressed as percentages of the relevant thresholds, national populations and SPA populations for wintering SPAs in Table 17 and for breeding SPAs in Table 18.

| | | Biogeographic SPA threshold | UK breeding population | UK winter population | Firth of Forth SPA | Liverpool Bay SPA | Outer Thames Estuary SPA |
|---|---|---|---|---|---|---|---|
| | | 750 | 1,300 | 17,000 | 88 | 922 | 6,466 |
| VP max | 9 | 1.20 | 0.69 | 0.05 | 10.23 | 0.98 | 0.14 |
| Ad hoc max | 34 | 4.53 | 2.62 | 0.20 | 38.64 | 3.69 | 0.53 |

**Table 17.** Maximum counts of red-throated diver expressed as percentages of the relevant thresholds, national populations and non-breeding SPA populations.

| | | Caithness and Sutherland Peatlands SPA | Foula SPA | Hermaness, Saxa Vord and Valla Field SPA | Hoy SPA | Orkney Mainland Moors SPA | Otterswick and Graveland SPA | Ronas Hill SPA | East coast SPAs Total |
|---|---|---|---|---|---|---|---|---|---|
| | | 89 | 11 | 28 | 56 | 15 | 27 | 50 | 276 |
| VP max | 9 | 10.11 | 81.82 | 32.14 | 16.07 | 60.00 | 33.33 | 18.00 | 3.26 |
| Ad hoc max | 34 | 38.20 | 309.09 | 121.43 | 60.71 | 226.67 | 125.93 | 68.00 | 12.32 |

**Table 18.** Maximum counts of red-throated diver, expressed as percentages of the populations of breeding SPA populations.

The majority of red-throated diver records from the site are of birds passing the headland, or of small groups of birds associating with flocks of common eider. As such the distribution of the eider flocks they associate with largely drives the distribution of red-throated diver actively using the site. In spring, and less frequently autumn, small flocks use Nigg Bay for resting and feeding.

### 5.2 Other species

The following species accounts cover target species that were observed irregularly and in small numbers.

They contain raw counts for key target species recorded. No extrapolation of counts was needed as the survey area was adequately covered from the vantage points.

For each species, data on populations and trends is presented, along with a brief summary of the numbers of birds observed on VP surveys and *ad hoc* counts.

#### 5.2.1 Goldeneye *Bucephala clanga*

SPA designation reference population (non-breeding) – 3,000 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 200 | 27,000 | AMBER | LC | ROMS |

**Table 19**. Conservation status of goldeneye. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed in Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

Monthly maximum counts of goldeneye from each VP, and *ad hoc* maxima are presented in Table 20.

| Goldeneye | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 8 | 0 | Na | na | 0 |
| July | 0 | 0 | Na | na | 0 |
| August | 0 | 0 | Na | na | 0 |
| September | 0 | 0 | Na | na | 0 |
| October | 1 | 0 | Na | na | 11 |
| November | 0 | 5 | Na | na | 4 |
| December | 0 | 0 | Na | na | 0 |
| January | 0 | 0 | Na | na | 0 |
| February | 0 | 0 | Na | na | 0 |
| March | 0 | 0 | Na | na | 0 |
| April | 0 | 0 | Na | na | 0 |
| May | 0 | 0 | Na | na | 0 |

**Table 20**. Monthly maxima of goldeneye from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

### 5.2.2 Velvet scoter *Melanitta fusca*

SPA designation reference population (non-breeding) – 50 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 0 | 2,500 | AMBER | LC | ROMS |

**Table 21**. Conservation status of velvet scoter Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the bird's status on the Birds Directive. ROMS are not listed on annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

Monthly maximum counts of velvet scoter from *ad hoc* counts are presented in Table 22. No velvet scoters were recorded during VP surveys.

| Velvet scoter | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 0 | 0 | Na | na | 5 |
| July | 0 | 0 | Na | na | 1 |
| August | 0 | 0 | na | na | 0 |
| September | 0 | 0 | na | na | 0 |
| October | 0 | 0 | na | na | 0 |
| November | 0 | 0 | na | na | 0 |
| December | 0 | 0 | na | na | 0 |
| January | 0 | 0 | na | na | 0 |
| February | 0 | 0 | na | na | 0 |
| March | 0 | 0 | na | na | 0 |
| April | 0 | 0 | na | na | 0 |
| May | 0 | 0 | na | na | 5 |

**Table 22**. Maximum *ad hoc* counts by month for Velvet scoter. See Table 4 for a summary of *ad hoc* effort for each month.

### 5.2.3 Goosander *Mergus merganser*

SPA designation reference population (non-breeding) – 2,000 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 3,500 | 12,000 | GREEN | LC | ROMS |

**Table 23**. Conservation status of goosander. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the bird's status on the Birds Directive. ROMS are not listed in Annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

| Goosander | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 0 | 0 | Na | na | 0 |
| July | 0 | 0 | Na | na | 0 |
| August | 0 | 3 | Na | na | 0 |
| September | 0 | 0 | na | na | 0 |
| October | 0 | 0 | na | na | 0 |
| November | 0 | 0 | na | na | 0 |
| December | 0 | 0 | na | na | 0 |
| January | 0 | 0 | na | na | 0 |
| February | 0 | 0 | na | na | 0 |
| March | 0 | 0 | na | na | 0 |
| April | 0 | 0 | na | na | 1 |
| May | 0 | 0 | na | na | 0 |

**Table 24**. Monthly maxima of goosander from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

Monthly maximum counts of goosander from each VP, and *ad hoc* maxima are presented in Table 24.

### 5.2.4 Red-breasted merganser *Merganser serrator*

SPA designation reference population (non-breeding) – 1.250 (biogeographic)

| UK breeding pop | UK winter pop | BOCC status* | IUCN status** | Annex 1 |
|---|---|---|---|---|
| 2,400 | 9,000 | GREEN | LC | ROMS |

**Table 25**. Conservation status of red-breasted merganser. Population estimates are taken from Musgrove *et al.,* 2013. Annex 1 refers to the birds status on the Birds Directive. ROMS are not listed on annex 1, but are regularly occurring migratory species for which SPAs can be designated. Breeding populations are given in pairs, wintering populations in individuals.
*Birds of Conservation concern (BOCC), **International Union for Conservation of Nature (IUCN).

Monthly maximum counts of red-breasted merganser from each VP are presented in Table 26. No red-breasted mergansers were recorded on *ad hoc* counts.

| Red-breasted merganser | VP1 | VP2 | VP3 | VP4 | Ad hoc |
|---|---|---|---|---|---|
| June | 1 | 0 | na | na | 0 |
| July | 0 | 0 | na | na | 0 |
| August | 0 | 0 | na | na | 0 |
| September | 0 | 1 | na | na | 0 |
| October | 0 | 0 | na | na | 0 |
| November | 0 | 0 | na | na | 0 |
| December | 0 | 0 | na | na | 0 |
| January | 0 | 0 | na | na | 0 |
| February | 0 | 0 | na | na | 0 |
| March | 0 | 0 | na | na | 0 |
| April | 0 | 0 | na | na | 0 |
| May | 0 | 0 | na | na | 0 |

**Table 26**. Monthly maxima of red-breasted merganser from each VP. See Table 4 for a summary of *ad hoc* effort for each month.

## 5.3 Waders

Waders were counted during walk-over surveys, conducted when the observer was in transit between VPs. In total, 36 walk-over counts were carried out, comprising six hours of effort. To supplement the data collected during the wader walk-over surveys, a total of 163 *ad hoc* counts of waders were conducted during the 12 month period, comprising approximately 54 hours and 40 minutes of additional effort.

Table 27 shows that no waders were recorded in significant numbers on the walk-over surveys. Here, the populations recorded are expressed as percentages of the 1% population thresholds used in non-breeding SPA selection. The non-breeding thresholds are used as no

waders breed at the site, apart from very small numbers of ringed plovers (i.e. 1 pair or fewer, annually). The full dataset collected during wader walk-overs is shown in appendix two.

| Month | Oystercatcher | Ringed plover | Curlew | Turnstone | Whimbrel | Redshank | Sanderling |
|---|---|---|---|---|---|---|---|
| June | 24 | 2 | 2 | 0 | 0 | 0 | 0 |
| July | 27 | 3 | 5 | 1 | **2** | **6** | 0 |
| August | 19 | 4 | 9 | 1 | 1 | 2 | **1** |
| September | **67** | **6** | 9 | 0 | 0 | 4 | 0 |
| October | 47 | 0 | 7 | **3** | 0 | 6 | 0 |
| November | 22 | 0 | 3 | **3** | 0 | 5 | 0 |
| December | 19 | 0 | 2 | 1 | 0 | 1 | 0 |
| January | 13 | 0 | 7 | 1 | 0 | 3 | 0 |
| February | 15 | 1 | **14** | 2 | 0 | 1 | 0 |
| March | 15 | 2 | 4 | 1 | 0 | 1 | 0 |
| April | 11 | 2 | 1 | **6** | 0 | **8** | 0 |
| May | 15 | 2 | 1 | 0 | 0 | 0 | 0 |
| SPA threshold | **3600** | **290** | **1200** | **640** | **5000** | **1200** | **230** |
| max %age of threshold | **1.86** | **2.1** | **1.17** | **0.9** | **0.04** | **0.6** | **0.4** |

**Table 27**. Maximum numbers of waders recorded during walk-over surveys, related to the non-breeding SPA thresholds.

| Month | Oystercatcher | Ringed plover | Sanderling | Purple sandpiper | Dunlin | Turnstone | Whimbrel | Curlew | Redshank | Greenshank | lapwing | golden plover | Common sandpiper |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| June | 42 | **6** | 0 | 0 | 0 | 2 | 0 | 2 | 2 | **1** | 0 | **2** | 0 |
| July | 38 | **6** | 0 | 0 | 1 | 1 | **2** | 4 | 3 | 0 | **1** | 0 | 0 |
| August | 49 | 3 | **1** | 1 | **2** | 1 | 0 | 12 | 4 | 0 | 0 | 0 | 1 |
| September | 65 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 7 | 0 | 0 | 0 | 0 |
| October | **68** | 2 | 0 | 21 | 0 | 12 | 0 | 6 | 7 | 0 | 0 | 0 | 0 |
| November | 22 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 2 | 0 | 0 | 0 | 0 |
| December | 23 | 2 | 0 | 0 | 0 | 1 | 0 | 3 | 3 | 0 | 0 | 0 | 0 |
| January | 28 | 0 | 0 | 0 | 0 | 3 | 0 | 18 | 3 | 0 | 0 | 0 | 0 |
| February | 28 | 2 | 0 | 0 | 0 | 0 | 0 | **19** | 3 | 0 | 0 | 0 | 0 |

| Month | Oystercatcher | Ringed plover | Sanderling | Purple sandpiper | Dunlin | Turnstone | Whimbrel | Curlew | Redshank | Greenshank | lapwing | golden plover | Common sandpiper |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| March | 28 | **6** | 0 | 0 | 0 | 6 | 0 | 11 | 12 | 0 | 0 | 0 | 0 |
| April | 46 | 3 | 0 | **88** | 0 | **26** | 0 | 5 | **15** | 0 | 0 | 0 | 1 |
| May | 27 | 3 | 0 | 8 | **2** | 4 | 1 | 11 | 0 | 0 | 0 | 0 | 2 |
| SPA threshold | **3600** | **290** | **230** | **210** | **5300** | **640** | **5000** | **1200** | **1200** | **na** | **20000** | **2500** | **na** |
| max %age of threshold | **1.89** | **2.1** | **0.4** | **41.9** | **0.02** | **4.1** | **0.04** | **1.6** | **1.3** | **na** | **0.005** | **0.08** | **na** |

**Table 28**. Maximum numbers of waders recorded during *ad hoc* surveys, related to the non-breeding SPA thresholds.

The diversity of species, and the maxima recorded during the *ad hoc* counts are generally larger than those recorded on the walk-over surveys, which would be expected given the level of effort involved with each, and the wider temporal spread of the *ad hoc* counts over each month. However, for the key species of wader (Table 28), the *ad hoc* counts support the trends demonstrated by the walk-over data, and the fact that the populations recorded are not significant. Figures 16 – 20 show how the *ad hoc* data back up the counts conducted on the walk-over surveys.

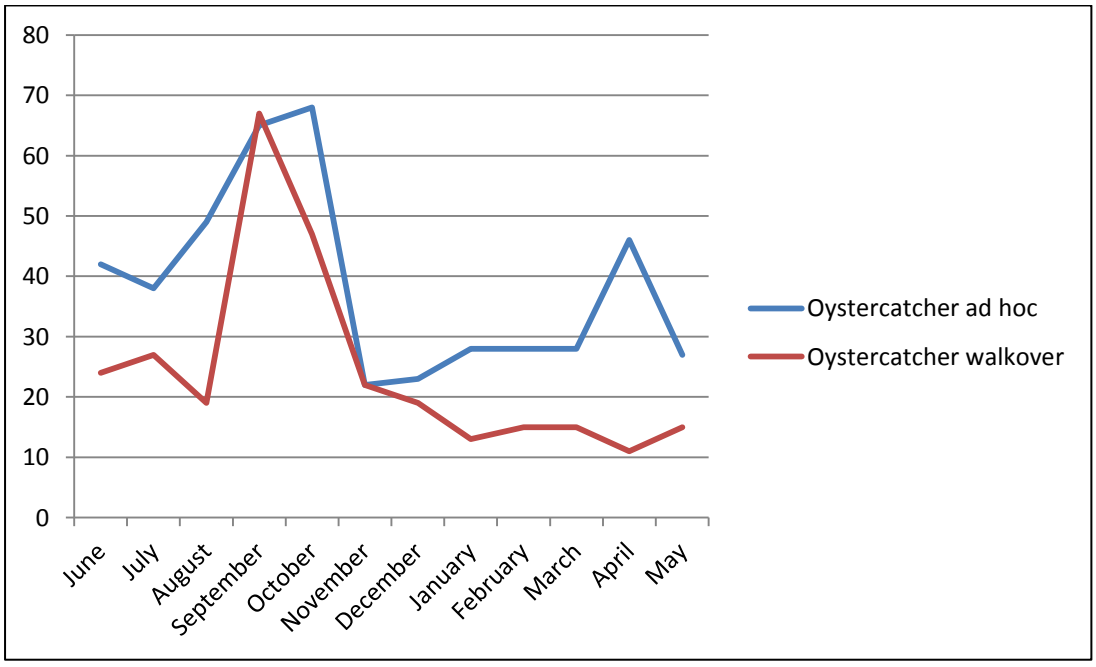


**Figure 16**. Counts of oystercatcher from walk-over and *ad hoc* surveys.

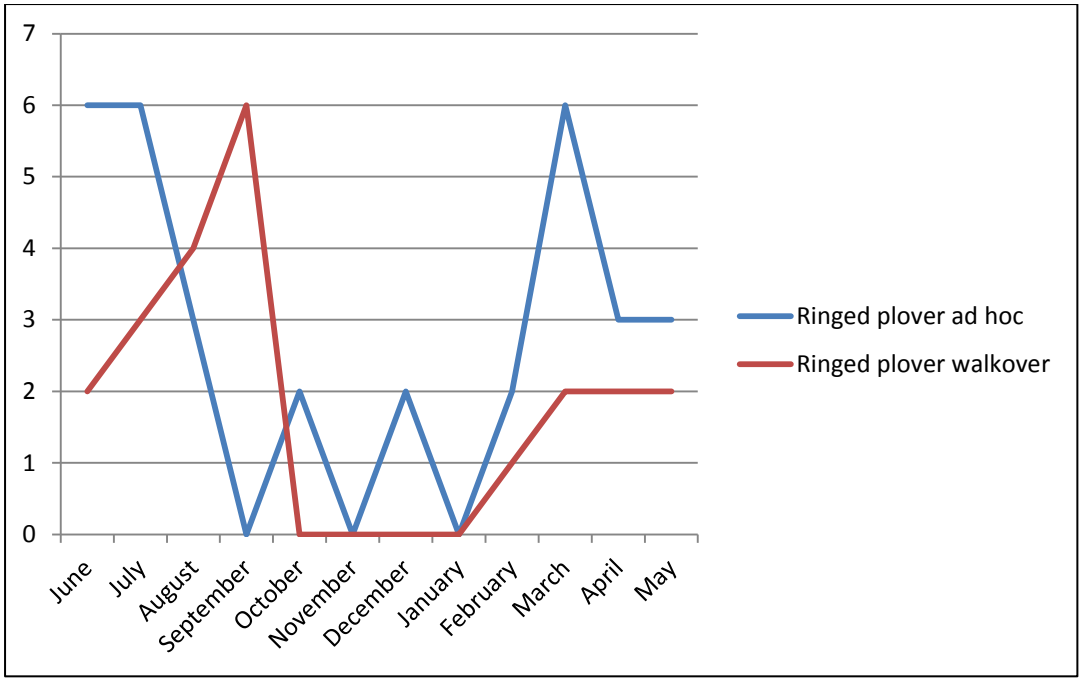


**Figure 17**. Counts of ringed plover from walk-over and *ad hoc* surveys.

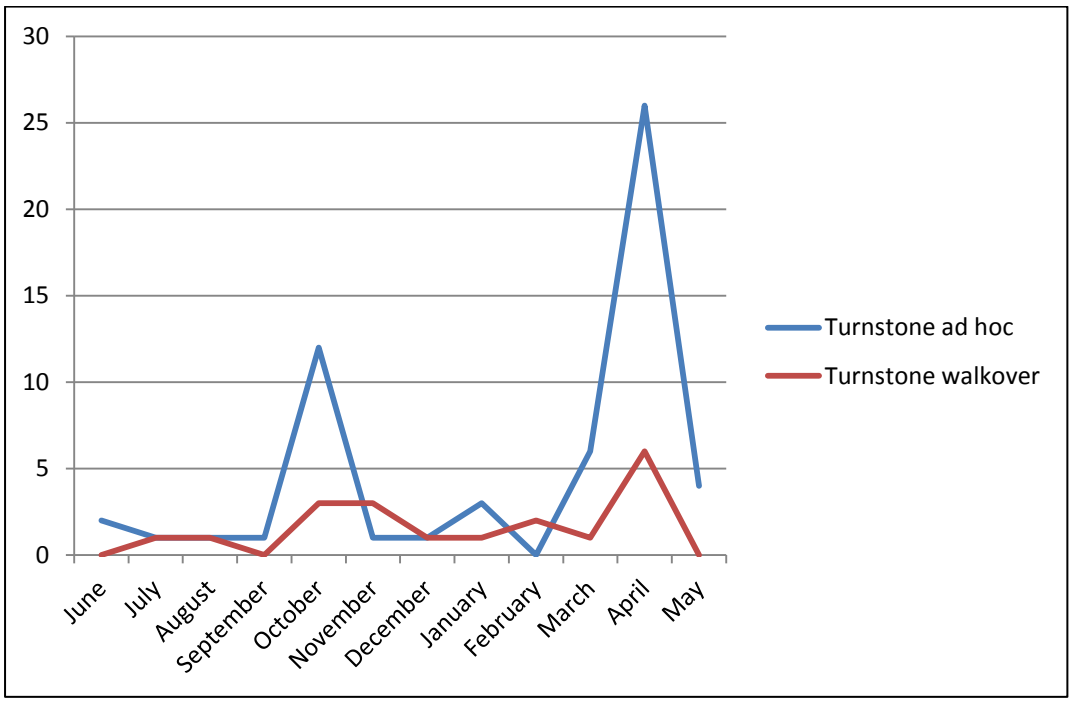


**Figure 18**. Counts of turnstone from walk-over and *ad hoc* surveys.

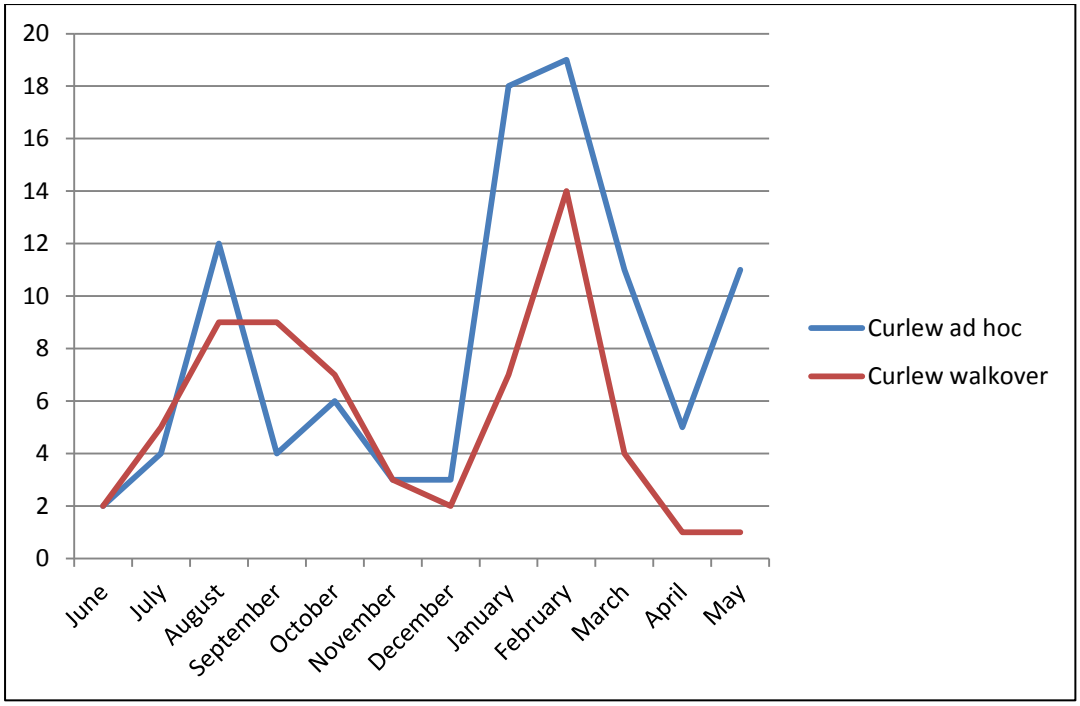


**Figure 19**. Counts of curlew from walk-over and *ad hoc* surveys.

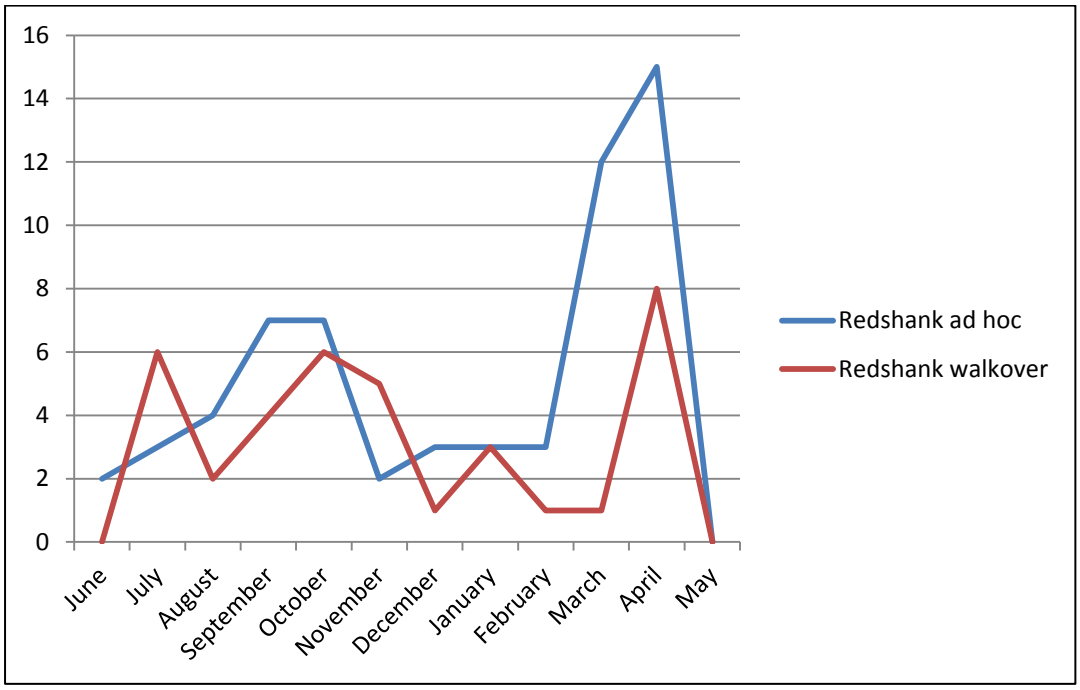


**Figure 20**. Counts of redshank from walk-over and *ad hoc* surveys.

## 6. Marine Mammals

The following species accounts contain raw counts for marine mammal species recorded. No extrapolation of counts was needed as the survey area was adequately covered from the vantage points. All data refer to VP surveys, as no *ad hoc* data was collected for marine mammals.

## 6.1 Grey Seal *Halichoerus grypus*

Monthly maxima of grey seal from each VP are presented in Table 29.

| Grey seal | VP1 | VP2 | VP3 | VP4 |
|---|---|---|---|---|
| June | 0 | 1 | 1 | 1 |
| July | 1 | 2 | 0 | 1 |
| August | 1 | 1 | 0 | 0 |
| September | 1 | 1 | 0 | 0 |
| October | 2 | 2 | 0 | 0 |
| November | 1 | 1 | 0 | 0 |
| December | 1 | 1 | 0 | 0 |
| January | 2 | 2 | 0 | 0 |
| February | 1 | 2 | 0 | 0 |
| March | 1 | 1 | 0 | 0 |
| April | 1 | 2 | 0 | 0 |
| May | 1 | 1 | 0 | 1 |

**Table 29.** Monthly maxima of grey seal from each VP.

### Summary

Small numbers of grey seals appear to regularly use Nigg Bay, with only VP1 in June returning no sightings. Figures 21 and 22 show colony locations and preferred marine areas for grey seals, and show that they broadly overlap geographically. The figures also show that there are no grey seal colonies in the vicinity of the proposed development and that the areas offshore from the site are not hotspots for this species.

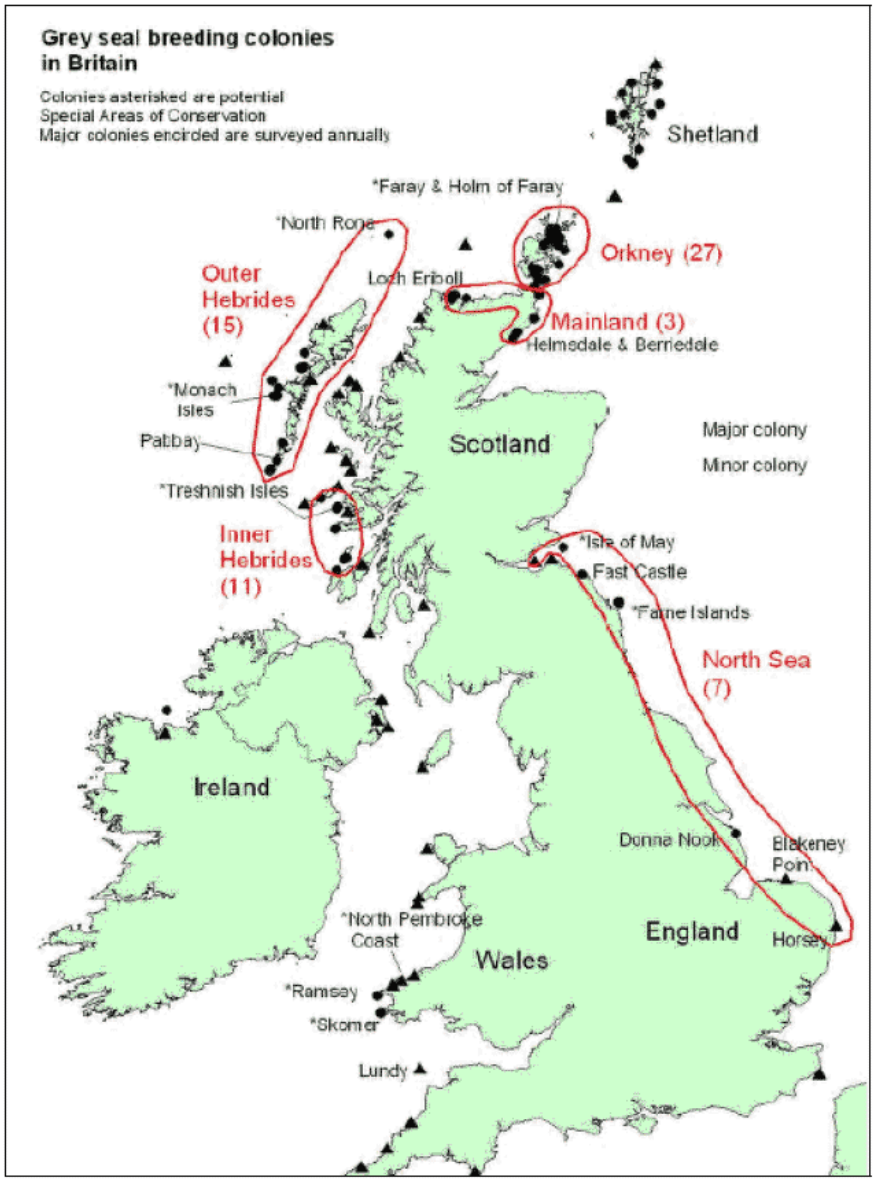


**Figure 21**. Map of British Isles grey seal colonies.
Taken from Appendix E. Marine Mammal and Otter Baseline Review for the Draft **OWE** Plan **HRA - http://www.scotland.gov.uk/Publications/2011/03/04165857/72**

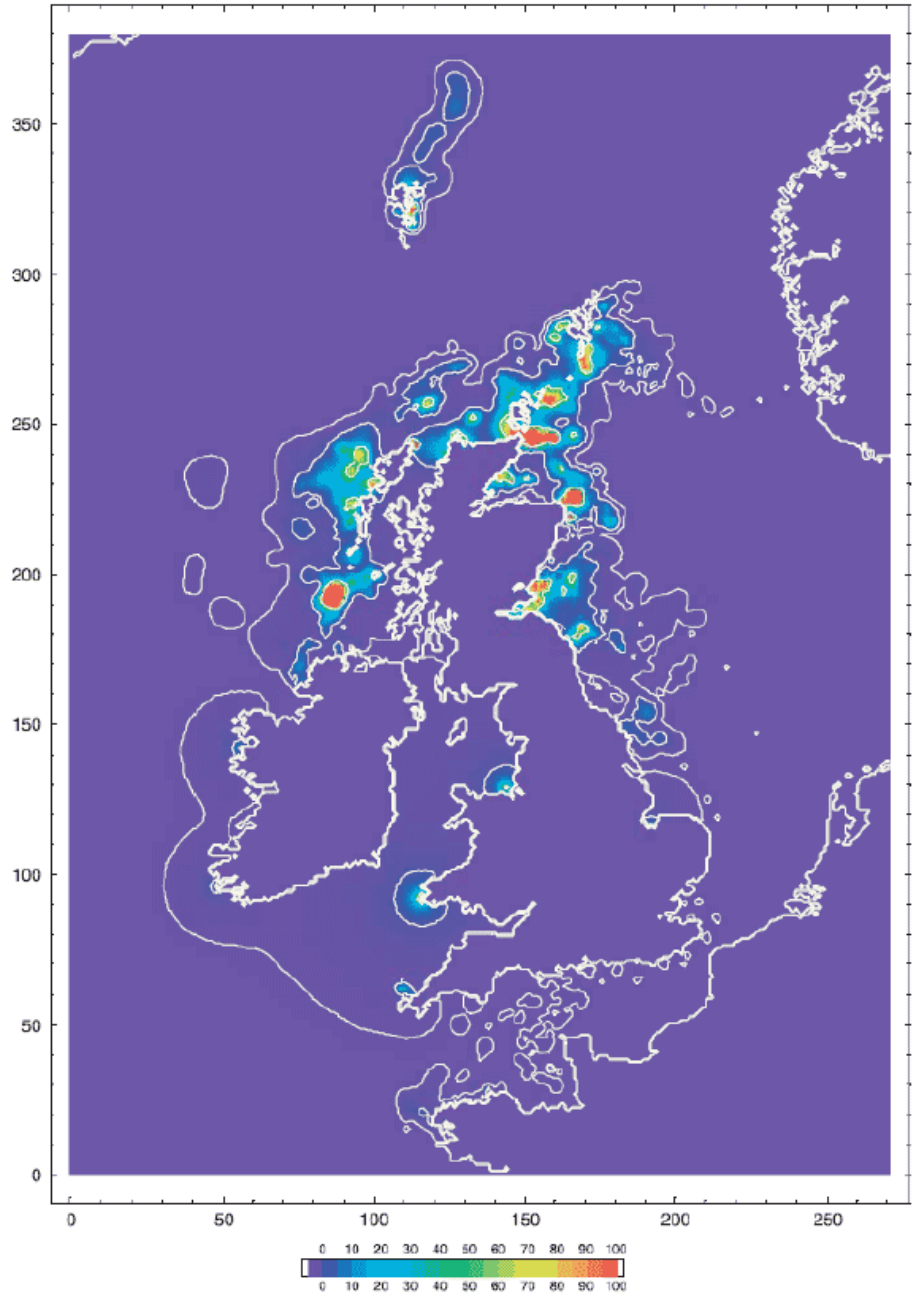


**Figure 22**. Modelled use of the marine environment by grey seals.
Taken from Appendix E. Marine Mammal and Otter Baseline Review for the Draft **OWE** Plan **HRA -** **http://www.scotland.gov.uk/Publications/2011/03/04165857/72**

## 6.2 Harbour Porpoise *Phocoena phocoena*

Monthly maxima of harbour porpoise from each VP are presented in Table 30.

| Harbour porpoise | VP1 | VP2 | VP3 | VP4 |
|---|---|---|---|---|
| June | 0 | 5 | 6 | 1 |
| July | 2 | 2 | 2 | 0 |
| August | 0 | 2 | 0 | 2 |

| Harbour porpoise | VP1 | VP2 | VP3 | VP4 |
|---|---|---|---|---|
| September | 2 | 2 | 1 | 2 |
| October | 0 | 1 | 1 | 0 |
| November | 0 | 0 | 0 | 0 |
| December | 0 | 0 | 0 | 0 |
| January | 1 | 0 | 6 | 0 |
| February | 0 | 1 | 0 | 0 |
| March | 0 | 0 | 0 | 0 |
| April | 3 | 2 | 2 | 4 |
| May | 2 | 1 | 2 | 0 |

**Table 30.** Monthly maxima of harbour porpoise from each VP.

**Summary**

Harbour porpoise were recorded throughout the 12 month period, apart from during November, December and March, when there were no records at all. Anderwald and Evans (2010) show that this species is regularly recorded from land-based watches in north east Scotland, including the vicinity of the proposed development.

Anderwald and Evans (2010) also show that numbers and sightings of harbour porpoise peak in late summer in the region, and decrease through the autumn to lowest numbers in winter. While the summer peaks and lack of November and December records broadly reflects this pattern, the peak from the VP surveys was recorded in June.

### 6.3 Bottlenose dolphin *Tursiops truncatus*

Monthly maxima of bottlenose dolphin from each VP are presented in Table 31.

| Bottlenose dolphin | VP1 | VP2 | VP3 | VP4 |
|---|---|---|---|---|
| June | 0 | 18 | 10 | 8 |
| July | 0 | 0 | 0 | 0 |
| August | 0 | 0 | 0 | 0 |
| September | 6 | 0 | 9 | 3 |
| October | 0 | 4 | 4 | 0 |
| November | 0 | 0 | 0 | 0 |
| December | 0 | 0 | 7 | 0 |
| January | 0 | 4 | 0 | 0 |
| February | 5 | 0 | 0 | 10 |
| March | 8 | 13 | 8 | 0 |
| April | 1 | 6 | 0 | 10 |
| May | 10 | 6 | 4 | 0 |

**Table 31.** Monthly maxima of bottlenose dolphin from each VP.

**Summary**

Bottlenose dolphin are regularly recorded in the area, with animals frequenting the mouth of Aberdeen harbour (per obs). Anderwald and Evans (2010) show that the largest numbers and highest frequency of records in the area come from between the Ythan Estuary and Montrose. There is a mid-summer peak in the numbers recorded in the region.

### 6.4 White-beaked dolphin *Lagenorhynchus albirostris*

Monthly maxima of white-beaked dolphin from each VP are presented in Table 32.

| White-beaked dolphin | VP1 | VP2 | VP3 | VP4 |
|---|---|---|---|---|
| June | 0 | 0 | 0 | 0 |
| July | 0 | 3 | 0 | 0 |
| August | 0 | 0 | 0 | 0 |
| September | 0 | 0 | 0 | 0 |
| October | 0 | 0 | 0 | 0 |
| November | 0 | 0 | 0 | 0 |
| December | 0 | 0 | 0 | 0 |
| January | 0 | 0 | 0 | 0 |
| February | 0 | 0 | 0 | 0 |
| March | 0 | 0 | 0 | 0 |
| April | 0 | 0 | 0 | 0 |
| May | 0 | 0 | 0 | 0 |

**Table 32.** Monthly maxima of white-beaked dolphin from each VP.

**Summary**

In north east Scotland, records of white-beaked dolphin tend to be concentrated on the east coast, between Peterhead and Montrose. There is a distinct summer peak, with the largest numbers and highest frequency of records coming from July and August. The VP records fit well within this pattern.

## References


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## Appendices

## Appendix 1: Dates, times and time of nearest high tide for all ad hoc counts.

| Date | Time of count | Time of nearest high tide |
|---|---|---|
| 01/06/2014 | 06:50 | 04:11 |
| 03/06/2014 | 07:00 | 05:27 |
| 04/06/2014 | 06:50 | 06:12 |
| 05/06/2014 | 07:00 | 07:04 |
| 08/06/2014 | 06:50 | 10:07 |
| 09/06/2014 | 07:30 | 11:09 |
| 10/06/2014 | 06:30 | 12:03 |
| 11/06/2014 | 06:45 | 12:52 |
| 12/06/2014 | 17:20 | 13:37 |
| 13/06/2014 | 17:00 | 14:22 |
| 15/06/2014 | 10:20 | 15:57 |
| 16/06/2014 | 06:40 | 04:06 |
| 17/06/2014 | 06:50 | 04:54 |
| 18/06/2014 | 16:50 | 18:39 |
| 19/06/2014 | 07:10 | 06:46 |
| 26/06/2014 | 17:10 | 13:50 |
| 27/06/2014 | 17:15 | 14:30 |
| 28/06/2014 | 09:00 | 15:08 |
| 29/06/2014 | 07:00 | 03:16 |
| 01/07/2014 | 17:00 | 16:57 |
| 02/07/2014 | 06:30 | 05:00 |
| 03/07/2014 | 06:40 | 05:39 |
| 09/07/2014 | 17:20 | 11:29 |
| 11/07/2014 | 06:45 | 00:50 |
| 14/07/2014 | 16:45 | 15:45 |
| 22/07/2014 | 17:10 | 10:57 |
| 23/07/2014 | 17:00 | 12:02 |
| 24/07/2014 | 06:40 | 00:27 |
| 27/07/2014 | 17:30 | 14:50 |
| 28/07/2014 | 17:15 | 15:22 |
| 31/07/2014 | 14:00 | 17:01 |
| 01/08/2014 | 06:30 | 05:07 |
| 07/08/2014 | 06:45 | 11:03 |
| 08/08/2014 | 17:00 | 12:11 |

| Date | Time of count | Time of nearest high tide |
|---|---|---|
| 09/08/2014 | 14:00 | 13:06 |
| 10/08/2014 | 16:30 | 13:55 |
| 11/08/2014 | 06:30 | 02:04 |
| 12/08/2014 | 06:30 | 02:48 |
| 13/08/2014 | 17:30 | 16:12 |
| 14/08/2014 | 16:45 | 16:58 |
| 15/08/2014 | 17:00 | 17:47 |
| 16/08/2014 | 17:00 | 18:39 |
| 17/08/2014 | 07:45 | 06:55 |
| 18/08/2014 | 17:00 | 20:40 |
| 19/08/2014 | 06:30 | 09:13 |
| 26/08/2014 | 08:00 | 14:56 |
| 28/08/2014 | 06:45 | 03:34 |
| 29/08/2014 | 08:00 | 04:05 |
| 02/09/2014 | 17:20 | 19:30 |
| 03/09/2014 | 17:20 | 20:42 |
| 04/09/2014 | 17:40 | 21:57 |
| 22/09/2014 | 07:30 | 13:27 |
| 24/09/2014 | 07:15 | 02:06 |
| 06/10/2014 | 17:10 | 12:33 |
| 07/10/2014 | 17:00 | 13:19 |
| 08/10/2014 | 16:45 | 14:00 |
| 10/10/2014 | 17:10 | 15:21 |
| 20/10/2014 | 16:50 | 12:18 |
| 23/10/2014 | 16:50 | 13:57 |
| 26/10/2014 | 09:00 | 02:18 |
| 28/10/2014 | 17:00 | 15:53 |
| 30/10/2014 | 16:30 | 17:41 |
| 02/11/2014 | 11:20 | 09:11 |
| 07/11/2014 | 09:45 | 13:19 |
| 08/11/2014 | 10:00 | 13:58 |
| 09/11/2014 | 13:45 | 14:37 |
| 15/11/2014 | 09:45 | 07:24 |
| 16/11/2014 | 14:15 | 08:31 |
| 22/11/2014 | 11:00 | 13:02 |
| 29/11/2014 | 10:40 | 06:23 |
| 30/11/2014 | 13:15 | 07:32 |

| Date | Time of count | Time of nearest high tide |
|---|---|---|
| 06/12/2014 | 09:20 | 13:02 |
| 07/12/2014 | 11:45 | 13:41 |
| 13/12/2014 | 09:50 | 05:38 |
| 14/12/2014 | 14:15 | 18:40 |
| 20/12/2014 | 12:00 | 12:00 |
| 21/12/2014 | 10:40 | 12:39 |
| 22/12/2014 | 13:10 | 13:19 |
| 02/01/2015 | 09:20 | 11:23 |
| 03/01/2015 | 14:10 | 12:10 |
| 04/01/2015 | 13:30 | 12:50 |
| 06/01/2015 | 12:45 | 14:03 |
| 07/01/2015 | 12:40 | 14:37 |
| 08/01/2015 | 12:45 | 15:11 |
| 10/01/2015 | 10:00 | 04:17 |
| 11/01/2015 | 13:45 | 17:01 |
| 18/01/2015 | 09:45 | 11:33 |
| 21/01/2015 | 13:00 | 13:44 |
| 23/01/2015 | 12:30 | 15:11 |
| 26/01/2015 | 12:45 | 17:45 |
| 15/02/2015 | 14:20 | 10:06 |
| 16/02/2015 | 13:00 | 11:08 |
| 20/02/2015 | 13:00 | 14:09 |
| 21/02/2015 | 10:00 | 14:53 |
| 23/02/2015 | 12:40 | 16:28 |
| 24/02/2015 | 13:00 | 17:22 |
| 25/02/2015 | 13:00 | 18:24 |
| 26/02/2015 | 12:50 | 07:03 |
| 27/02/2015 | 13:00 | 08:16 |
| 28/02/2015 | 09:40 | 09:37 |
| 02/03/2015 | 16:50 | 11:38 |
| 03/03/2015 | 17:00 | 12:18 |
| 04/03/2015 | 12:45 | 12:53 |
| 05/03/2015 | 17:30 | 13:25 |
| 06/03/2015 | 12:30 | 13:55 |
| 07/03/2015 | 09:00 | 14:24 |
| 08/03/2015 | 10:30 | 14:54 |
| 09/03/2015 | 17:00 | 15:26 |

| Date | Time of count | Time of nearest high tide |
|---|---|---|
| 10/03/2015 | 12:45 | 16:00 |
| 11/03/2015 | 12:45 | 16:39 |
| 12/03/2015 | 16:55 | 17:26 |
| 13/03/2015 | 17:00 | 18:20 |
| 16/03/2015 | 16:45 | 22:24 |
| 18/03/2015 | 12:45 | 11:36 |
| 19/03/2015 | 17:30 | 12:22 |
| 20/03/2015 | 17:30 | 13:06 |
| 21/03/2015 | 08:30 | 01:40 |
| 23/03/2015 | 17:00 | 15:20 |
| 24/03/2015 | 16:45 | 16:09 |
| 25/03/2015 | 17:00 | 17:02 |
| 26/03/2015 | 16:45 | 18:03 |
| 27/03/2015 | 12:45 | 19:10 |
| 28/03/2015 | 09:00 | 07:38 |
| 29/03/2015 | 10:15 | 09:57 |
| 30/03/2015 | 16:50 | 11:13 |
| 31/03/2015 | 17:00 | 12:08 |
| 01/04/2015 | 12:30 | 12:51 |
| 02/04/2015 | 12:30 | 13:26 |
| 14/04/2015 | 08:00 | 10:03 |
| 15/04/2015 | 13:00 | 11:14 |
| 16/04/2015 | 07:30 | 12:11 |
| 17/04/2015 | 12:45 | 13:01 |
| 18/04/2015 | 09:00 | 13:46 |
| 19/04/2015 | 10:15 | 14:31 |
| 20/04/2015 | 12:15 | 15:16 |
| 21/04/2015 | 12:30 | 16:03 |
| 22/04/2015 | 17:30 | 16:52 |
| 23/04/2015 | 07:45 | 05:10 |
| 24/04/2015 | 07:30 | 06:00 |
| 27/04/2015 | 07:00 | 09:08 |
| 02/05/2015 | 06:30 | 01:15 |
| 04/05/2015 | 17:20 | 14:35 |
| 06/05/2015 | 07:00 | 03:23 |
| 07/05/2015 | 07:00 | 03:57 |
| 08/05/2015 | 12:40 | 17:08 |

| Date | Time of count | Time of nearest high tide |
|---|---|---|
| 09/05/2015 | 06:50 | 05:18 |
| 10/05/2015 | 06:45 | 06:09 |
| 11/05/2015 | 07:10 | 07:12 |
| 12/05/2015 | 07:00 | 08:24 |
| 13/05/2015 | 06:50 | 09:36 |
| 14/05/2015 | 07:00 | 10:46 |
| 15/05/2015 | 12:55 | 11:48 |
| 18/05/2015 | 07:00 | 01:58 |
| 19/05/2015 | 13:00 | 15:02 |
| 20/05/2015 | 07:05 | 03:22 |
| 21/05/2015 | 07:20 | 04:04 |
| 22/05/2015 | 12:45 | 17:24 |
| 25/05/2015 | 17:00 | 20:03 |
| 27/05/2015 | 07:00 | 09:21 |
| 28/05/2015 | 06:40 | 10:28 |

## Appendix 2: Environmental conditions for each observation period.

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 1 | 2 | 3 | NW | Exc | 8 |
| 2 | 2 | 3 | NW | Exc | 8 |
| 3 | 2 | 3 | NW | Exc | 8 |
| 4 | 2 | 2 | NW | Exc | 8 |
| 5 | 2 | 2 | NW | Exc | 8 |
| 6 | 2 | 2 | NW | Exc | 8 |
| 7 | 2 | 2 | NW | Exc | 8 |
| 8 | 2 | 2 | NW | Exc | 8 |
| 9 | 2 | 2 | NW | Exc | 7 |
| 10 | 2 | 3 | NW | Exc | 7 |
| 11 | 2 | 3 | NW | Exc | 7 |
| 12 | 2 | 3 | NW | Exc | 7 |
| 13 | 2 | 3 | NW | Exc | 7 |
| 14 | 2 | 3 | NW | Exc | 7 |
| 15 | 2 | 3 | NW | Exc | 7 |
| 16 | 2 | 3 | NW | Exc | 6 |
| 17 | 2 | 3 | NW | Exc | 6 |
| 18 | 2 | 3 | NW | Exc | 6 |
| 19 | 2 | 2 | W | Exc | 7 |
| 20 | 2 | 2 | W | Exc | 6 |
| 21 | 2 | 2 | W | Exc | 6 |
| 22 | 2 | 2 | W | Exc | 6 |
| 23 | 2 | 2 | W | Exc | 6 |
| 24 | 2 | 2 | W | Exc | 6 |
| 25 | 2 | 2 | W | Exc | 6 |
| 26 | 2 | 2 | W | Exc | 6 |
| 27 | 1 | 1 | E | exc | 5 |
| 28 | 1 | 1 | E | exc | 5 |
| 29 | 1 | 1 | E | exc | 6 |
| 30 | 2 | 2 | SW | Exc | 6 |
| 31 | 2 | 2 | SW | Exc | 7 |
| 32 | 2 | 2 | SW | Exc | 7 |
| 33 | 2 | 3 | SW | Exc | 7 |
| 34 | 3 | 3 | SW | Exc | 7 |
| 35 | 2 | 2 | S | Exc | 2 |
| 36 | 2 | 2 | S | Exc | 2 |
| 37 | 2 | 1 | S | Exc | 3 |
| 38 | 2 | 1 | S | Exc | 3 |
| 39 | 2 | 2 | SE | Exc | 4 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 40 | 2 | 2 | SE | Good | 4 |
| 41 | 2 | 2 | SE | Good | 6 |
| 42 | 2 | 2 | SE | Good | 5 |
| 43 | 2 | 2 | SE | Good | 6 |
| 44 | 2 | 2 | N | Exc | 6 |
| 45 | 3 | 3 | N | Exc | 6 |
| 46 | 3 | 3 | N | Exc | 7 |
| 47 | 2 | 2 | S | Good | 2 |
| 48 | 2 | 2 | S | Good | 2 |
| 49 | 2 | 2 | S | Good | 3 |
| 50 | 2 | 3 | SW | Exc | 3 |
| 51 | 2 | 3 | S | Exc | 3 |
| 52 | 2 | 3 | S | Exc | 3 |
| 53 | 3 | 3 | S | Exc | 3 |
| 54 | 3 | 3 | S | Exc | 3 |
| 55 | 2 | 3 | S | Exc | 4 |
| 56 | 2 | 3 | S | Exc | 6 |
| 57 | 2 | 3 | S | Exc | 6 |
| 58 | 2 | 3 | S | Exc | 6 |
| 59 | 3 | 3 | NW | Good | 4 |
| 60 | 3 | 3 | NW | Good | 5 |
| 61 | 2 | 3 | NW | Good | 5 |
| 62 | 2 | 3 | NW | Good | 6 |
| 63 | 3 | 3 | NW | Good | 6 |
| 64 | 3 | 3 | NW | Good | 6 |
| 65 | 3 | 3 | NW | Good | 5 |
| 66 | 3 | 3 | NW | Good | 4 |
| 67 | 3 | 3 | NW | Good | 4 |
| 68 | 2 | 2 | NW | Exc | 7 |
| 69 | 2 | 2 | NW | Exc | 7 |
| 70 | 2 | 3 | NW | Exc | 7 |
| 71 | 2 | 3 | NW | Exc | 7 |
| 72 | 2 | 3 | NW | Exc | 7 |
| 73 | 2 | 3 | NW | Exc | 7 |
| 74 | 2 | 3 | NW | Exc | 6 |
| 75 | 2 | 3 | NW | Exc | 6 |
| 76 | 2 | 3 | NW | Exc | 5 |
| 77 | 2 | 3 | NW | Exc | 5 |
| 78 | 3 | 3 | SE | Exc | 3 |
| 79 | 3 | 3 | SE | Exc | 3 |
| 80 | 3 | 3 | SE | Exc | 3 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 81 | 3 | 3 | SE | Exc | 3 |
| 82 | 3 | 3 | SE | Exc | 3 |
| 83 | 3 | 3 | SE | Exc | 3 |
| 84 | 3 | 3 | SW | Good | 6 |
| 85 | 3 | 3 | SW | Good | 7 |
| 86 | 3 | 3 | SW | Good | 7 |
| 87 | 3 | 3 | SW | Good | 7 |
| 88 | 1 | 2 | SW | Exc | 4 |
| 89 | 1 | 2 | SW | Exc | 4 |
| 90 | 1 | 2 | SW | Exc | 4 |
| 91 | 1 | 2 | SW | Exc | 4 |
| 92 | 1 | 2 | SW | Exc | 4 |
| 93 | 1 | 2 | SW | Exc | 4 |
| 94 | 1 | 2 | SW | Exc | 4 |
| 95 | 1 | 2 | SW | Exc | 4 |
| 96 | 1 | 2 | SW | Exc | 6 |
| 97 | 2 | 2 | NW | Exc | 6 |
| 98 | 2 | 2 | NW | Exc | 5 |
| 99 | 2 | 2 | W | Exc | 5 |
| 100 | 2 | 2 | W | Exc | 5 |
| 101 | 2 | 2 | W | Exc | 5 |
| 102 | 2 | 2 | W | Exc | 5 |
| 103 | 2 | 2 | W | Exc | 5 |
| 104 | 2 | 2 | W | Exc | 5 |
| 105 | 2 | 2 | W | Exc | 5 |
| 106 | 2 | 2 | W | Exc | 5 |
| 107 | 2 | 2 | W | Exc | 5 |
| 108 | 2 | 2 | NW | Exc | 8 |
| 109 | 2 | 3 | NW | Exc | 8 |
| 110 | 2 | 3 | NW | Exc | 8 |
| 111 | 2 | 3 | NW | Exc | 8 |
| 112 | 2 | 3 | NW | Exc | 8 |
| 113 | 2 | 3 | NW | Exc | 8 |
| 114 | 2 | 3 | NW | exc | 8 |
| 115 | 2 | 3 | NW | exc | 8 |
| 116 | 2 | 3 | NW | exc | 8 |
| 117 | 3 | 3 | W | Exc | 7 |
| 118 | 3 | 3 | W | Exc | 7 |
| 119 | 3 | 3 | W | Exc | 7 |
| 120 | 3 | 3 | W | Exc | 7 |
| 121 | 3 | 3 | W | Exc | 7 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 122 | 3 | 3 | W | Exc | 7 |
| 123 | 3 | 3 | W | Exc | 7 |
| 124 | 3 | 3 | W | Exc | 7 |
| 125 | 3 | 3 | W | Exc | 7 |
| 126 | 3 | 3 | W | Exc | 7 |
| 127 | 3 | 3 | W | Exc | 6 |
| 128 | 3 | 3 | W | Exc | 6 |
| 129 | 3 | 3 | W | Exc | 6 |
| 130 | 3 | 3 | W | Exc | 6 |
| 131 | 3 | 3 | W | Exc | 6 |
| 132 | 3 | 3 | W | Exc | 6 |
| 133 | 3 | 3 | W | Exc | 6 |
| 134 | 3 | 3 | W | Exc | 6 |
| 135 | 2 | 2 | SW | Exc | 8 |
| 136 | 2 | 2 | SW | Exc | 8 |
| 137 | 2 | 2 | SW | Exc | 8 |
| 138 | 2 | 2 | SW | Exc | 8 |
| 139 | 2 | 2 | SW | Exc | 8 |
| 140 | 2 | 2 | SW | Exc | 8 |
| 141 | 2 | 2 | SW | Exc | 8 |
| 142 | 2 | 2 | SW | Exc | 8 |
| 143 | 2 | 2 | SW | Exc | 8 |
| 144 | 2 | 2 | SW | Exc | 8 |
| 145 | 2 | 2 | SW | Exc | 8 |
| 146 | 2 | 2 | S | Good | 8 |
| 147 | 2 | 2 | S | Good | 8 |
| 148 | 2 | 2 | S | Good | 8 |
| 149 | 2 | 2 | S | Good | 8 |
| 150 | 2 | 2 | S | Good | 8 |
| 151 | 2 | 2 | S | Good | 8 |
| 152 | 2 | 2 | S | Good | 8 |
| 153 | 2 | 2 | S | Good | 8 |
| 154 | 2 | 2 | S | Good | 8 |
| 155 | 1 | 2 | S | Good | 8 |
| 156 | 1 | 2 | S | Good | 8 |
| 157 | 1 | 2 | S | Good | 8 |
| 158 | 1 | 2 | S | Good | 8 |
| 159 | 1 | 2 | S | Good | 8 |
| 160 | 1 | 2 | S | Good | 8 |
| 161 | 1 | 2 | S | Good | 8 |
| 162 | 1 | 2 | S | Good | 8 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 163 | 1 | 2 | S | Good | 8 |
| 164 | 1 | 2 | SW | Good | 8 |
| 165 | 1 | 2 | SW | Good | 8 |
| 166 | 1 | 1 | SW | Good | 8 |
| 167 | 1 | 1 | SW | Good | 8 |
| 168 | 1 | 1 | SW | Good | 8 |
| 169 | 1 | 1 | SW | Good | 8 |
| 170 | 1 | 1 | SW | Good | 8 |
| 171 | 1 | 1 | SW | Good | 8 |
| 172 | 1 | 1 | SW | Good | 8 |
| 173 | 1 | 1 | SW | Good | 8 |
| 174 | 1 | 1 | SW | Good | 8 |
| 175 | 2 | 2 | SW | Exc | 6 |
| 176 | 2 | 2 | SW | Exc | 6 |
| 177 | 2 | 2 | SW | Exc | 6 |
| 178 | 2 | 2 | SW | Exc | 6 |
| 179 | 2 | 2 | SW | Exc | 6 |
| 180 | 2 | 2 | SW | Exc | 6 |
| 181 | 2 | 2 | SW | Exc | 6 |
| 182 | 2 | 2 | SW | Exc | 6 |
| 183 | 2 | 2 | SW | Exc | 6 |
| 184 | 2 | 2 | SW | Exc | 6 |
| 185 | 2 | 2 | SW | Exc | 6 |
| 186 | 2 | 2 | SW | Exc | 6 |
| 187 | 2 | 2 | SW | Exc | 6 |
| 188 | 2 | 2 | SW | Exc | 6 |
| 189 | 2 | 2 | SW | Exc | 6 |
| 190 | 2 | 2 | SW | Exc | 6 |
| 191 | 2 | 2 | SW | Exc | 6 |
| 192 | 2 | 2 | SW | Exc | 6 |
| 193 | 3 | 3 | SW | Exc | 3 |
| 194 | 3 | 3 | SW | Exc | 3 |
| 195 | 3 | 3 | SW | Exc | 3 |
| 196 | 3 | 3 | SW | Exc | 3 |
| 197 | 3 | 3 | SW | Exc | 3 |
| 198 | 3 | 3 | SW | Exc | 3 |
| 199 | 3 | 3 | SW | Exc | 3 |
| 200 | 3 | 3 | SW | Exc | 3 |
| 201 | 3 | 3 | SW | Exc | 3 |
| 202 | 3 | 3 | SW | Exc | 3 |
| 203 | 3 | 3 | SW | Exc | 3 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 204 | 3 | 3 | W | Exc | 6 |
| 205 | 3 | 3 | W | Exc | 6 |
| 206 | 3 | 3 | W | Exc | 6 |
| 207 | 3 | 3 | W | Exc | 6 |
| 208 | 3 | 3 | W | Exc | 6 |
| 209 | 3 | 3 | W | Exc | 6 |
| 210 | 3 | 3 | W | Exc | 6 |
| 211 | 3 | 3 | W | Exc | 6 |
| 212 | 3 | 3 | W | Exc | 6 |
| 213 | 3 | 3 | W | Exc | 6 |
| 214 | 3 | 3 | W | Exc | 6 |
| 215 | 3 | 3 | W | Exc | 6 |
| 216 | 3 | 3 | W | Exc | 6 |
| 217 | 3 | 3 | W | Exc | 6 |
| 218 | 3 | 3 | W | Exc | 6 |
| 219 | 3 | 3 | W | Exc | 6 |
| 220 | 3 | 3 | W | Exc | 6 |
| 221 | 3 | 3 | W | Exc | 6 |
| 222 | 3 | 3 | SW | Exc | 7 |
| 223 | 3 | 3 | SW | Exc | 7 |
| 224 | 3 | 3 | SW | Exc | 7 |
| 225 | 3 | 3 | SW | Exc | 7 |
| 226 | 3 | 3 | SW | Exc | 7 |
| 227 | 3 | 3 | SW | Exc | 7 |
| 228 | 3 | 3 | SW | Exc | 7 |
| 229 | 3 | 3 | SW | Exc | 7 |
| 230 | 3 | 3 | SW | Exc | 7 |
| 231 | 3 | 3 | SW | Exc | 7 |
| 232 | 3 | 3 | SW | Exc | 7 |
| 233 | 3 | 3 | W | Exc | 4 |
| 234 | 3 | 3 | W | Exc | 4 |
| 235 | 3 | 3 | W | Exc | 4 |
| 236 | 3 | 3 | W | Exc | 4 |
| 237 | 3 | 3 | W | Exc | 4 |
| 238 | 3 | 3 | W | Exc | 4 |
| 239 | 3 | 3 | W | Exc | 4 |
| 240 | 3 | 3 | W | Exc | 4 |
| 241 | 3 | 3 | W | Exc | 4 |
| 242 | 3 | 3 | W | Exc | 4 |
| 243 | 3 | 3 | W | Exc | 4 |
| 244 | 3 | 3 | W | Exc | 4 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 245 | 3 | 3 | W | Exc | 4 |
| 246 | 3 | 3 | W | Exc | 4 |
| 247 | 3 | 3 | W | Exc | 4 |
| 248 | 3 | 3 | W | Exc | 4 |
| 249 | 3 | 3 | W | Exc | 4 |
| 250 | 3 | 3 | W | Exc | 4 |
| 251 | 3 | 3 | SW | Good | 7 |
| 252 | 3 | 3 | SW | Good | 7 |
| 253 | 3 | 3 | SW | Good | 7 |
| 254 | 3 | 3 | SW | Good | 7 |
| 255 | 3 | 3 | SW | Good | 7 |
| 256 | 3 | 3 | SW | Good | 7 |
| 257 | 3 | 3 | SW | Good | 7 |
| 258 | 3 | 3 | SW | Good | 7 |
| 259 | 3 | 3 | SW | Good | 7 |
| 260 | 3 | 3 | SW | Good | 7 |
| 261 | 3 | 3 | SW | Good | 7 |
| 262 | 2 | 2 | SW | Exc | 6 |
| 263 | 2 | 2 | SW | Exc | 6 |
| 264 | 2 | 2 | SW | Exc | 6 |
| 265 | 2 | 2 | SW | Exc | 6 |
| 266 | 2 | 2 | SW | Exc | 6 |
| 267 | 2 | 2 | SW | Exc | 6 |
| 268 | 2 | 2 | SW | Exc | 6 |
| 269 | 2 | 2 | SW | Exc | 6 |
| 270 | 2 | 2 | SW | Exc | 6 |
| 271 | 2 | 2 | SW | Exc | 6 |
| 272 | 2 | 2 | SW | Exc | 6 |
| 273 | 2 | 2 | SW | Exc | 6 |
| 274 | 2 | 2 | SW | Exc | 6 |
| 275 | 2 | 2 | SW | Exc | 6 |
| 276 | 2 | 2 | SW | Exc | 6 |
| 277 | 2 | 2 | SW | Exc | 6 |
| 278 | 2 | 2 | SW | Exc | 6 |
| 279 | 2 | 2 | SW | Exc | 6 |
| 280 | 3 | 3 | SW | Exc | 7 |
| 281 | 3 | 3 | SW | Exc | 7 |
| 282 | 3 | 3 | SW | Exc | 7 |
| 283 | 3 | 3 | SW | Exc | 7 |
| 284 | 3 | 3 | SW | Exc | 7 |
| 285 | 3 | 3 | SW | Exc | 7 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 286 | 3 | 3 | SW | Exc | 7 |
| 287 | 3 | 3 | SW | Exc | 7 |
| 288 | 3 | 3 | SW | Exc | 7 |
| 289 | 3 | 3 | SW | Exc | 7 |
| 290 | 3 | 3 | SW | Exc | 7 |
| 291 | 2 | 2 | SW | Exc | 4 |
| 292 | 2 | 2 | SW | Exc | 4 |
| 293 | 2 | 2 | SW | Exc | 3 |
| 294 | 2 | 2 | SW | Exc | 3 |
| 295 | 2 | 2 | SW | Exc | 3 |
| 296 | 2 | 2 | SW | Exc | 3 |
| 297 | 2 | 2 | SW | Exc | 3 |
| 298 | 2 | 3 | SW | Exc | 3 |
| 299 | 2 | 3 | SW | Exc | 2 |
| 300 | 2 | 3 | SW | Exc | 2 |
| 301 | 2 | 3 | SW | Exc | 2 |
| 302 | 2 | 2 | SW | Exc | 2 |
| 303 | 2 | 2 | SW | Exc | 2 |
| 304 | 2 | 2 | SW | Exc | 2 |
| 305 | 2 | 2 | SW | Exc | 2 |
| 306 | 2 | 2 | SW | Exc | 2 |
| 307 | 2 | 2 | SW | Exc | 2 |
| 308 | 2 | 2 | SW | Exc | 2 |
| 309 | 2 | 2 | SW | Exc | 4 |
| 310 | 2 | 2 | SW | Exc | 4 |
| 311 | 2 | 2 | SW | Exc | 4 |
| 312 | 2 | 2 | SW | Exc | 4 |
| 313 | 2 | 2 | SW | Exc | 4 |
| 314 | 2 | 2 | SW | Exc | 4 |
| 315 | 2 | 2 | SW | Exc | 4 |
| 316 | 2 | 2 | SW | Exc | 4 |
| 317 | 2 | 2 | SW | Exc | 4 |
| 318 | 2 | 2 | SW | Exc | 4 |
| 319 | 2 | 2 | SW | Exc | 4 |
| 320 | 3 | 3 | S | Exc | 5 |
| 321 | 3 | 3 | S | Exc | 5 |
| 322 | 3 | 3 | S | Exc | 5 |
| 323 | 3 | 3 | S | Exc | 5 |
| 324 | 3 | 3 | S | Exc | 5 |
| 325 | 3 | 3 | S | Exc | 5 |
| 326 | 3 | 3 | S | Exc | 5 |

| Survey ID | Sea State | Wind speed | Wind direction | Visibility | Cloud cover |
|---|---|---|---|---|---|
| 327 | 3 | 3 | S | Exc | 5 |
| 328 | 3 | 3 | S | Exc | 5 |
| 329 | 3 | 3 | S | Exc | 5 |
| 330 | 3 | 3 | S | Exc | 6 |
| 331 | 3 | 3 | S | Exc | 6 |
| 332 | 3 | 3 | S | Exc | 6 |
| 333 | 3 | 3 | S | Exc | 6 |
| 334 | 3 | 3 | S | Exc | 6 |
| 335 | 3 | 3 | S | Exc | 6 |
| 336 | 3 | 3 | S | Exc | 6 |
| 337 | 3 | 3 | S | Exc | 6 |
| 338 | 3 | 3 | SW | Exc | 3 |
| 339 | 3 | 3 | SW | Exc | 3 |
| 340 | 3 | 3 | SW | Exc | 3 |
| 341 | 3 | 3 | SW | Exc | 3 |
| 342 | 3 | 3 | SW | Exc | 3 |
| 343 | 3 | 3 | SW | Exc | 2 |
| 344 | 3 | 3 | SW | Exc | 2 |
| 345 | 3 | 3 | SW | Exc | 2 |
| 346 | 3 | 3 | SW | Exc | 2 |
| 347 | 3 | 3 | SW | Exc | 3 |
| 348 | 3 | 3 | SW | Exc | 3 |

## Appendix 3: Wader walkover data.

| Date | Time | Oystercatcher | Ringed plover | Curlew | Turnstone | Whimbrel | Redshank | Sanderling |
|---|---|---|---|---|---|---|---|---|
| 21/06/2014 | 08:00 | 24 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21/06/2014 | 18:20 | 5 | 1 | 0 | 0 | 0 | 0 | 0 |
| 22/06/2014 | 09:25 | 18 | 2 | 2 | 0 | 0 | 0 | 0 |
| 22/06/2014 | 14:40 | 18 | 1 | 2 | 0 | 0 | 0 | 0 |
| 25/06/2014 | 16:55 | 11 | 2 | 1 | 0 | 0 | 0 | 0 |
| 17/07/2014 | 14:30 | 11 | 2 | 4 | 0 | 0 | 0 | 0 |
| 17/07/2014 | 17:55 | 14 | 1 | 1 | 0 | 0 | 0 | 0 |
| 18/07/2014 | 08:25 | 27 | 2 | 2 | 0 | 0 | 1 | 0 |
| 21/07/2014 | 19:00 | 13 | 2 | 1 | 1 | 2 | 0 | 0 |
| 26/07/2014 | 08:20 | 25 | 3 | 0 | 0 | 0 | 3 | 0 |
| 26/07/2014 | 18:25 | 22 | 2 | 5 | 0 | 2 | 6 | 0 |
| 20/08/2014 | 05:45 | 14 | 2 | 6 | 1 | 0 | 2 | 0 |
| 27/08/2014 | 16:40 | 7 | 2 | 4 | 0 | 0 | 1 | 1 |
| 30/08/2014 | 17:00 | 19 | 4 | 9 | 0 | 1 | 0 | 0 |
| 06/09/2014 | 09:20 | 39 | 2 | 4 | 0 | 0 | 0 | 0 |
| 06/09/2014 | 16:15 | 12 | 1 | 5 | 0 | 0 | 1 | 0 |
| 07/09/2014 | 08:40 | 17 | 0 | 2 | 0 | 0 | 4 | 0 |
| 24/09/2014 | 09:40 | 67 | 0 | 8 | 0 | 0 | 2 | 0 |
| 25/09/2014 | 16:15 | 29 | 6 | 9 | 0 | 0 | 3 | 0 |
| 18/10/2014 | 07:45 | 33 | 0 | 4 | 2 | 0 | 6 | 0 |
| 18/10/2014 | 14:00 | 47 | 0 | 1 | 0 | 0 | 0 | 0 |
| 19/10/2014 | 07:45 | 21 | 0 | 3 | 1 | 0 | 3 | 0 |
| 19/10/2014 | 10:30 | 41 | 0 | 4 | 3 | 0 | 6 | 0 |
| 19/10/2014 | 14:10 | 32 | 0 | 7 | 0 | 0 | 5 | 0 |
| 24/11/2014 | 11:45 | 13 | 0 | 2 | 0 | 0 | 2 | 0 |
| 25/11/2014 | 09:35 | 22 | 0 | 3 | 3 | 0 | 2 | 0 |
| 25/11/2014 | 11:45 | 3 | 0 | 2 | 3 | 0 | 5 | 0 |
| 16/12/2014 | 11:45 | 16 | 0 | 0 | 1 | 0 | 1 | 0 |
| 17/12/2014 | 10:15 | 19 | 0 | 0 | 0 | 0 | 1 | 0 |
| 17/12/2014 | 12:00 | 19 | 0 | 2 | 0 | 0 | 1 | 0 |
| 24/01/2015 | 11:50 | 4 | 0 | 1 | 1 | 0 | 1 | 0 |
| 25/01/2015 | 10:20 | 11 | 0 | 1 | 0 | 0 | 3 | 0 |
| 25/01/2015 | 11:50 | 13 | 0 | 7 | 1 | 0 | 3 | 0 |
| 18/02/2015 | 11:40 | 12 | 0 | 6 | 0 | 0 | 1 | 0 |
| 19/02/2015 | 10:30 | 15 | 0 | 9 | 0 | 0 | 0 | 0 |

| Date | Time | Oystercatcher | Ringed plover | Curlew | Turnstone | Whimbrel | Redshank | Sanderling |
|---|---|---|---|---|---|---|---|---|
| 19/02/2015 | 12:00 | 3 | 1 | 14 | 2 | 0 | 1 | 0 |
| 15/03/2015 | 11:00 | 11 | 2 | 4 | 0 | 0 | 0 | 0 |
| 22/03/2015 | 09:30 | 15 | 2 | 2 | 1 | 0 | 0 | 0 |
| 22/03/2015 | 13:00 | 15 | 2 | 2 | 1 | 0 | 1 | 0 |
| 25/04/2015 | 10:20 | 11 | 1 | 1 | 6 | 0 | 8 | 0 |
| 26/04/2015 | 09:30 | 4 | 1 | 0 | 6 | 0 | 5 | 0 |
| 26/04/2015 | 13:40 | 9 | 2 | 0 | 5 | 0 | 7 | 0 |
| 16/05/2015 | 05:45 | 12 | 2 | 1 | 0 | 0 | 0 | 0 |
| 17/05/2015 | 10:30 | 14 | 1 | 0 | 0 | 0 | 0 | 0 |
| 17/05/2015 | 14:20 | 15 | 1 | 1 | 0 | 0 | 0 | 0 |

## Appendix 4: Other species recorded

The following list includes all other seabirds and waterfowl observed during VP surveys with notes on status and phenology.

**Whooper swan**

Winter visitor to the UK, occasionally recorded on autumn and spring passage. No use of the site recorded.

**Pink-footed goose**

Winter visitor to the UK, recorded on autumn and spring passage, occasionally in large numbers. Use of the site restricted to very occasional occurrences usually related to harsh weather.

**Wigeon**

Regular on spring and autumn passage.

**Teal**

Regular on spring and autumn passage.

**Fulmar**

Common offshore, especially in spring, summer and autumn. Small numbers breed on the cliffs to the south of the site. Regularly feeds in outer areas of Nigg Bay.

**Manx shearwater**

Regular offshore in spring, summer and autumn. Very occasionally feeds in outer areas of Nigg Bay.

**Sooty shearwater**

Uncommon offshore in autumn.

**Gannet**

Common offshore in spring, summer and autumn. Regularly feeds in outer areas of Nigg Bay.

**Cormorant**

Common all year round and frequently passes through Nigg Bay when transiting between night and day roost sites.

**Shag**

Common throughout the year. Regularly feeds in outer areas of Nigg Bay.

**Arctic skua**

Regular offshore during summer and autumn.

**Pomarine skua**

Uncommon offshore during autumn, and one March record.

**Great skua**

Regular offshore during summer and autumn.

**Black-headed gull**

Common during autumn, winter and spring, with a small northward passage in early spring.

**Common gull**

Common all year. Large roosts form in Nigg Bay (up to 2400 birds) during the winter and spring passage can be strong.

**Lesser black-backed gull**

Common in spring and summer.

**Herring gull**

Common throughout the year. Breeds on the roof of the water treatment works.

**Great black-backed gull**

Common throughout the year.

**Kittiwake**

Common in spring, summer and autumn, with small numbers present offshore during the winter. Large roosts (several thousand birds) form in Aberdeen harbour, using breakwaters. Breeds in small numbers on cliffs to the south of the site.

**Sandwich tern**

Common offshore in spring, summer and autumn, with birds from the Ythan Estuary SPA foraging in Nigg Bay. Roosts and crèches young on the rocky shore in Greyhope Bay. This species is a feature of the new dSPA in Aberdeen Bay

**Common tern**

Common offshore in spring, summer and autumn, with birds from the Ythan Estuary SPA foraging in Nigg Bay. Roosts and crèches young on the rocky shore in Greyhope Bay.

**Arctic tern**

Common offshore in spring, summer and autumn, with birds from the Ythan Estuary SPA foraging in Nigg Bay. Roosts and crèches young on the rocky shore in Greyhope Bay.

**Guillemot**

Common offshore throughout the year. In spring and summer birds forage in the outer areas of Nigg Bay. Breeds in small numbers on cliffs to the south of the site.

**Razorbill**

Common offshore throughout the year. In spring and summer birds forage in the outer areas of Nigg Bay. Breeds in small numbers on cliffs to the south of the site.

**Little auk**

Uncommon winter visitor.

**Black guillemot**

Very rare breeder on coasts to the south of the site. Occasionally recorded in summer and autumn.

**Puffin**

Regular offshore during the spring and summer.