



AP7/1/2018

Hook Head Shellfish Ltd

Site Ref: T3/87A

Appeal

NOTICE OF APPEAL UNDER SECTION 40(1) OF FISHERIES (AMENDMENT) ACT 1997 (NO. 23)

Hook Head Shellfish Ltd
Ramstown
Fethard on Sea
New Ross
Co Wexford
Y34 XF20

Telephone:
E-mail address: info@hookheadoysters.ie



Subject matter of the appeal:

Decision to refuse licence for cultivation of oysters using bags and trestles on the foreshore in Bannow Bay, Co Wexford

Site Reference Number:

T03/87A

Appellant's particular interest in the outcome of the appeal:

Hook Head Shellfish Ltd are the applicants of this licence, we have been farming oysters in Bannow Bay for thirty years and hope to develop our business further which would be beneficial to our rural area in terms of production, exports and employment.

on additional page(s) give full grounds of the appeal and the reasons, considerations and arguments on which they are based):

We respectfully wish to appeal the decision to refuse on the following basis:

1. The Appropriate Assessment findings cited in the rationale for refusal are not applicable to the area which are the subject of the current license application (T03/87A) Species of shorebirds which have been shown to *potentially* be negatively affected by aquaculture, namely, Grey Plover, Dunlin and Knot do not occur in the area under application. The risk of deterioration does not therefore exist, and thus therefore neither does the potential for adverse effects on European Site integrity. Please see supporting documentation "Winter Bird Survey 2017/2018" commissioned jointly by Marine Institute and Hook Head Shellfish Ltd.

2. With respect to mitigation measures, we note that mitigation measures are available and currently being investigated at the nearby Dungarvan Harbour

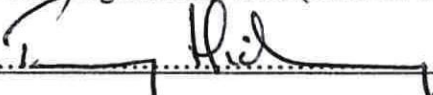
SPA. These could be applied to the areas in this application at minimum until such time as their efficacy is proven or disproved in terms of avoiding adverse effects on site integrity.

3. We note that the Appropriate Assessment cited in terms of Bannow Bay, is based on a trestle study which was targeted at determining overall patterns of association across multiple European sites - and not at producing reliable data for individual sites. We respectfully submit that aquaculture activities should continue to be licensed until such time as this is available.

4. There is no examination or analysis in the AA determination that the Department is using to stop our license applications. This is illegal (Eammon Kelly vs An Bord Pleanala, 2014 Case). Please ask the department to show the Examination and Analysis of data used in the AA and how it is linked to the potential negative impacts on the Special Conservation Interests of the SPA - this is our right as Irish citizens. Any findings must be complete, precise and definitive before the Competent Authority can issue a determination, such as the one stopping our licenses.

Fee enclosed: **€380.92**

(payable to the Aquaculture Licences Appeals Board in accordance with the Aquaculture Licensing Appeals (Fees) Regulations, 1998 (S.I. No. 449 of 1998))(See Note 2)

Signed by appellant:  Date: 01/08/18

Note 1: This notice should be completed under each heading and duly signed by the appellant and be accompanied by such documents, particulars or information relating to the appeal as the appellant considers necessary or appropriate and specifies in the Notice.

Note 2: The fees payable are as follows:

Appeal by licence applicant **€380.92**

Appeal by any other individual or organisation €152.37

Request for an Oral Hearing (fee payable in addition to appeal fee) €76.18

In the event that the Board decides not to hold an Oral Hearing the fee will not be refunded.

Winter Waterbird Survey 2017/18

Bannow Bay SPA, County Wexford



May 2018

Inis

Inis Environmental Consultants Ltd
Planning and Environmental Consultants

INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties,
Information Age Park, Ennis, County Clare, Ireland.
T : +353 (0) 65 6892441, M : +353 (0) 87 2831725

f. www.facebook.com/inis.en

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Notice

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1.0 INTRODUCTION

1.1 Introduction and scope of works

Inis Environmental was contracted to co-ordinate a series of waterbird surveys at Bannow Bay, Co. Wexford during the 2017/18 winter season. Following standard methodology used for surveying wintering waterbirds at low tide (Lewis & Tierney, 2014), the 2017/18 surveys included four low tide surveys and a single high tide survey, although the latter was repeated due to poor and deteriorating weather conditions on the scheduled date.

This report details the results of the 2017/18 waterbird survey programme. These results are examined and discussed in light of similar surveys undertaken during the three previous winter seasons (2016/17, 2015/16 and 2014/15) and the baseline low tide survey undertaken during 2009/10 as part of the National Parks & Wildlife Service (NPWS) Waterbird Survey Programme (NPWS, 2012).

1.2 Site background

Bannow Bay in County Wexford is a large and sheltered estuarine system located on the southeast coast of Ireland on the east side of the Hook Peninsula, seven miles northeast of Hook Head Lighthouse (Figure 1). The bay is approximately 14 km along its northeast/south-west axis and has an average width of about 2 km (NPWS, 2012). The bay is relatively isolated with the surrounding landscape dominated by agricultural land and the main nearby settlements are Wellingtonbridge, at the estuary head, and Saltmills to the south-west, both relatively small villages with populations of less than 250 (DoEHLG, 2009). Fethard-on-Sea lies at the south-eastern extremity of the bay and is a small fishing village and holiday resort (NPWS, 2012).



Figure 1. Location of Bannow Bay, Co. Wexford.

At low tide, extensive intertidal mud and sand flats are exposed. Saltmarsh is well-developed in the sheltered parts of the site while some freshwater habitats occur at the northern end of the site (mosaic of marsh, reedbed and willows). These collectively provide good habitats for wintering waterbirds and Bannow Bay is one of the most important sites for non-breeding (wintering) waterbirds in the south-east. Consequently the bay is designated as a Special Protection Area (SPA) under the EU Birds Directive (2009/147/EC)¹ and 13 waterbird species are listed as Special Conservation Interests (SCIs) for this site. Bannow Bay is also a designated Special Area of Conservation (Site Code 00697) under the EU Habitats Directive². The SPA and SAC site synopses are given in Appendix 1.

¹ Directive 2009/147/EC on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended).

² Council Directive 92/43/EEC on the conservation of natural habitats and wild flora and fauna, as amended by Council Directive 97/62/EC. The Directive was transposed into Irish law by the European Communities (Natural Habitats) Regulations, SI 94/1997 which were amended and later consolidated by the European Communities (Birds and Natural Habitats) Regulations 2011 – 2015 (S.I. 355/2015).

2.0 METHODOLOGY

2.1 Background to the low tide survey programme

The Irish Wetland Bird Survey (I-WeBS) is the primary method by which data are collected for wintering waterbird populations at Irish wetland sites. These data, largely collected by volunteer field surveyors since the winter season of 1995/96, have underpinned the designation of Special Protection Areas, and have enabled the production of waterbird population estimates and trends at national and at site level. I-WeBS surveys are undertaken primarily on a rising or high tide, when birds, are pushed closer to shore or are gathering at roost sites, and are easier to count.

While I-WeBS surveys are designed to obtain the most accurate peak counts of waterbirds at a site, they cannot provide information about waterbird abundance or distribution during the low tide period, when many waterbirds are feeding. This gap in knowledge was addressed somewhat in 2009/10, when the National Parks and Wildlife Service initiated a programme of low tide surveys which took place over the three winter seasons of 2009/10, 2010/11 and 2011/12 at 33 coastal SPAs (The NPWS Waterbird Survey Programme). Each SPA site was surveyed in a single winter season and Bannow Bay was surveyed in 2009/10. Standard methodology was designed to ensure consistency in data capture and recording at each site (Lewis & Tierney, 2014).

Waterbird surveys at Bannow Bay during the 2017/18 winter season therefore followed the standard methodology developed by the NPWS waterbird survey programme. Similar surveys were also undertaken during the 2014/15, 2015/16 and 2016/17 seasons (Limosa Environmental 2015, 2016, 2017) in addition to the baseline data collected by NPWS in 2009/10.

2.2 Survey design and count area

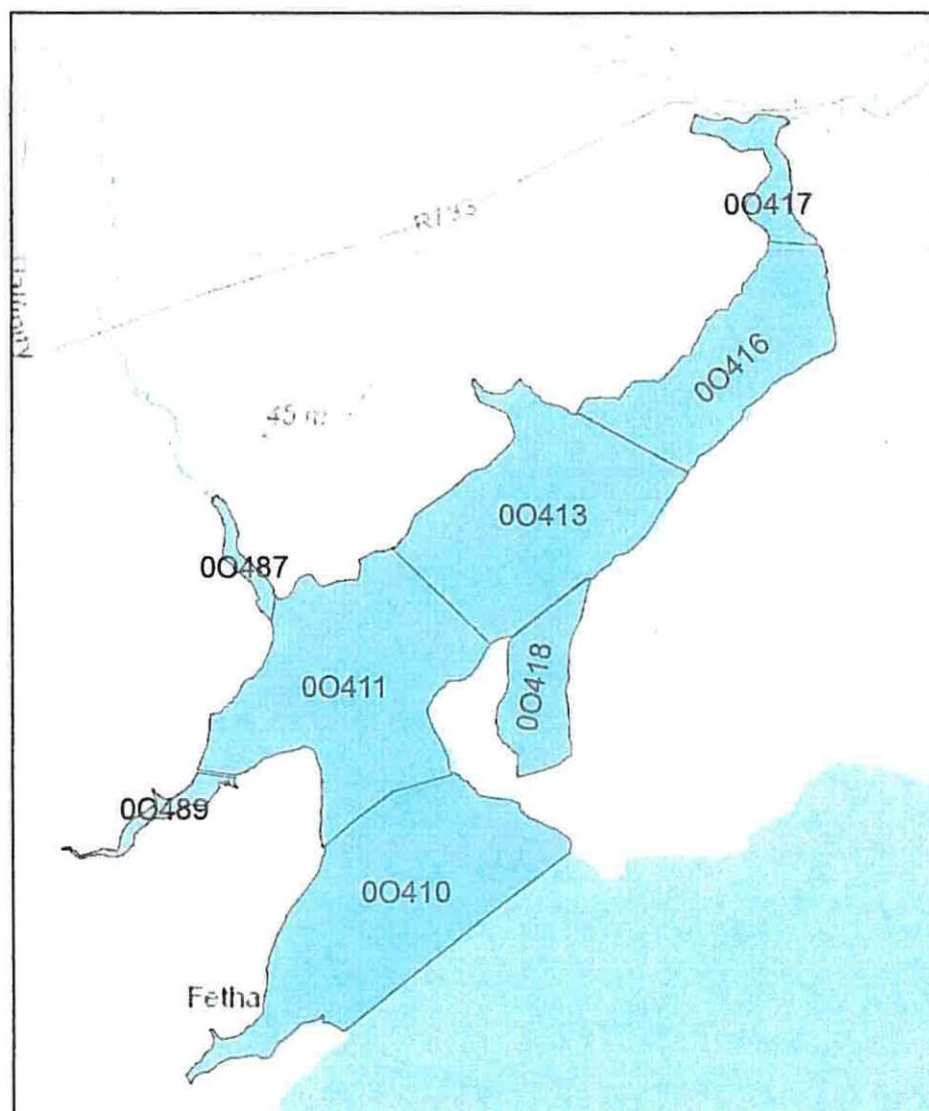
A standard survey programme of four low tide counts and one high tide count was undertaken. Low tide surveys were carried out on 23rd November 2017, 6th December 2017, 21st February 2018 and 16th March 2018. A high tide survey was undertaken on 11th January 2018 but as this survey was badly affected by fog, a second high tide survey was completed on 13th February 2018.

Optimum dates were chosen in each month when the survey period spanned midday to facilitate travel to/from the site, but also to ensure surveys were carried out in the best weather and light conditions. However, as the results section will describe, weather conditions during the 2017/18 season often meant that survey dates had to be re-scheduled and despite the best planning, some surveys were affected by bad weather.

The surveys covered the same count area and count subdivisions (subsites) of Bannow Bay as devised during the 2009/10 NPWS Waterbird Survey Programme. The survey area covering c. 1,400 ha is subdivided into eight count subsites (Table 1; Figure 2) which are counted by three fieldworkers on each survey day. During the 2017/18 season the fieldworkers were: Lesley J Lewis (LJL), Olivia Crowe (OC) and Barry O'Mahony (BOM).

Table 1. Count Subsites of Bannow Bay

Subsite Code	Subsite Name
00410	Fethard Bay
00411	St Kiernans to Saltmills to Big Burrow
00413	Saint Kiernans to Newtown
00416	Kiltra
00417	Clonmines Castle
00418	Bannow Island to Newquay
00487	Tintern Abbey to Tintern Bridge
00489	Pollfur

Figure 2. Count subsites used for the Bannow Bay waterbird surveys.

2.3 Field survey methods

The survey period extended two hours either side of low or high tide (depending on the survey being undertaken).

Waterbirds were counted within each count subsite, and the data for each subsite were recorded separately. Waterbird counts were conducted on the 'look-see' basis (Bibby et al. 2000) which involves scanning across the survey area and counting all birds seen. Birds were recorded according to their species code following the two-letter coding system used by I-WeBS and developed by the British Trust for Ornithology (refer to Appendix 2).

In addition to counts of each species, the behaviour of waterbirds during counts was attributed to one of two categories (foraging or roosting/other) while the position of the birds was recorded as per one of four broad habitat types (intertidal, subtidal, supratidal and terrestrial). Field maps of count subsites were used to map significant flocks of foraging/roosting birds ('flock maps').

Accessory information was also collected which included the presence of activities that could cause disturbance to waterbirds. Following Lewis & Tierney (2014), activity types were categorised as follows:

(1) human, on-foot - shoreline (2) human, on foot – intertidal aquaculture, (3) bait-diggers (4) non-powered watercraft (5) powered watercraft, (6) water-based recreation (e.g. wind-surfers) (7) horse-riding (8) dogs (9) aircraft (10) shooting (11) other (12) winkle pickers (13) aquaculture machinery (14) other vehicles.

When an activity was observed to cause a disturbance, the waterbird species affected were recorded and a letter code system used to indicate the bird's response to the activity as follows:-

W - Weak response, waterbirds move slightly away from the source of the disturbance.

M - Moderate response, waterbirds move away from the source of the disturbance to another part of your subsite; they may return to their original position once the activity ceases.

H - High response, waterbirds fly away to areas outside of your subsite and do not return during the current count session.

The length of the activity was also recorded by adding by the codes **A – D** (see below) and a record was made as to whether the activity was already occurring within the subsite when the count started.

A – short/discrete event.

B – activity occurs for up to 50% of the count period.

C – activity length estimated at >50% but < 100% of the count period.

D – activity continues after the count period has ended.

A detailed methodology for the surveys can be found in Lewis & Tierney (2014).

2.4 Data Analysis

General

Field data were collected in note books and later transferred by field surveyors into Excel datasheets. After each survey, the Excel datasheets were compiled, the data formatted and entered into an Access database (LIL). From Access, data summaries were produced such as site totals, subsite totals etc.

Waterbird numbers were assessed with reference to national and international threshold levels as follows:-

- A waterbird species that occurs in numbers that correspond to 1% or more of the individuals in the all-Ireland population of the species is said to occur in 'nationally important numbers' (or 'numbers of all-Ireland importance'). Current population threshold values are published in Crowe & Holt (2013).
- A waterbird species that occurs in numbers that correspond to 1% or more of the individuals in the biogeographic population of the species or subspecies is said to occur in 'internationally important numbers.' Current population threshold values are published in Wetlands International (2012).

Waterbird distribution

Following the methods used in NPWS (2012) we undertook data analyses to determine the proportional use of subsites by each waterbird Special Conservation Interest (SCI) species, relative to the whole area surveyed on each survey occasion. This gives an indication of the preferred distribution of each species. Analyses were undertaken on datasets as follows:

- Total numbers (low tide surveys);
- Total numbers (high tide survey);
- Total numbers of foraging birds (low tide surveys);
- Intertidal foraging densities (low tide surveys).

For each of the analyses listed above and for each survey date completed, subsites were ranked in succession from the highest to the lowest in terms of their relative contribution to each species' distribution across all subsites surveyed. Subsite rank positions were then converted to categories (see box below). The highest rank position for each subsite across any of the low tide count dates is presented for each SCI species in a subsite by species matrix. For high tide surveys and peak densities, simple rank numbers are presented.

Intertidal foraging density was calculated for SCI species and for each low tide survey occasion, by dividing the number of the species within a subsite by the area of intertidal habitat within the same subsite. Subsites were then ranked based on the peak foraging density recorded.

Subsite Rank Position - Categories

Very High (V)	Any section ranked as 1.
High (H)	Top third of ranking placings (where n = total number of count sections species was observed in)
Moderate (M)	Mid third of ranking placings (where n = total number of count sections species was observed in)
Low (L)	Lower third of ranking placings (where n = total number of count sections species was observed in).

Trends

The peak count from the low tide surveys of the 2017/18, 2016/17, 2015/16 and 2014/15 seasons were compiled together with the peak counts from the 2009/10 NPWS Waterbird Survey Programme. Peak counts were taken from either low tide or high tide surveys. Peak counts were then used to calculate indices. An index for the first season (2008/09) was constrained to a value of one, and indices for all seasons after this were expressed relative to this value. The mean annual change was then calculated to represent a short-term trend reflecting the mean annual change between 2008/19 and 2017/18. Trends are also shown graphically.

It is standard practice to calculate mean peak numbers for waterbirds as the average value dampens down the natural annual variation in numbers (Crowe, 2005). Therefore as an additional assessment of trends, the four-year mean peak count was calculated for the surveys undertaken across the winters 2014/15, 2015/16, 2016/17 and 2017/18. The mean peak value was then compared to the baseline mean peak as used for SPA designation.

3.0 BANNOW BAY WATERBIRDS – AN INTRODUCTION

3.1 Introduction to the waterbirds of Bannow Bay

Bannow Bay SPA (Figure 3) covers a total area of 1,364 ha and is of special conservation interest for 13 waterbird species (Table 2), two of which (Light-bellied Brent Goose and Black-tailed Godwit) occur in internationally-important numbers.

Table 2. Waterbird Special Conservation Interest (SCI) species listed for Bannow Bay SPA

Special Conservation Interests	Baseline Population ^a	Population status at baseline
Light-bellied Brent Goose <i>Branta bernicla hrota</i>	561	International Importance
Shelduck <i>Tadorna tadorna</i>	500	All-Ireland Importance
Pintail <i>Anas acuta</i>	52	All-Ireland Importance
Oystercatcher <i>Haematopus ostralegus</i>	711	All-Ireland Importance
Golden Plover <i>Pluvialis apricaria</i> ^b	1,955	All-Ireland Importance
Grey Plover <i>Pluvialis squatarola</i>	142	All-Ireland Importance
Lapwing <i>Vanellus vanellus</i>	2,950	All-Ireland Importance
Knot <i>Calidris canutus</i>	508	All-Ireland Importance
Dunlin <i>Calidris alpina</i>	3,038	All-Ireland Importance
Black-tailed Godwit <i>Limosa limosa</i>	546	International Importance
Bar-tailed Godwit <i>Limosa lapponica</i> ^b	471	All-Ireland Importance
Curlew <i>Numenius arquata</i>	891	All-Ireland Importance
Redshank <i>Tringa totanus</i>	377	All-Ireland Importance

^aFive year peak mean for the period 1995/96 – 1999/00; ^bAnnex I species

Bannow Bay supports a diverse range of waterbirds, and a total of 56 species have been recorded at the site previously (1994/95 – 2015/16, unpublished I-WeBS data). In addition to the 13 waterbird SCI species, a further 15 species occur regularly at the site during winter (NPWS, 2012):-

Wigeon (<i>Anas penelope</i>)	Teal (<i>Anas crecca</i>)
Mallard (<i>Anas platyrhynchos</i>)	Red-breasted Merganser (<i>Mergus serrator</i>)
Cormorant (<i>Phalacrocorax carbo</i>)	Little Egret (<i>Egretta garzetta</i>)
Grey Heron (<i>Ardea cinerea</i>)	Ringed Plover (<i>Charadrius hiaticula</i>)
Greenshank (<i>Tringa nebularia</i>)	Turnstone (<i>Arenaria interpres</i>)
Black-headed Gull (<i>Chroicocephalus ridibundus</i>)	Common Gull (<i>Larus canus</i>)
Lesser Black-backed Gull (<i>Larus fuscus</i>)	Herring Gull (<i>Larus argentatus</i>)
Great Black-backed Gull (<i>Larus marinus</i>)	



Figure 3. Bannow Bay SPA (taken from NPWS, 2012)

3.2 Status and trends of Bannow Bay waterbirds – I-WeBS

The status and trends of wintering waterbirds in the Republic of Ireland are based on calculations made using I-WeBS data. The site trend for waterbird SCI species of Bannow Bay was reported in the SPA Conservation Objectives Supporting Document (NPWS, 2012 (Table 3 column d). In addition, examining baseline and recent data in Table 3 suggests a decline in numbers for ten of the SCI species, however it should be borne in mind that full count cover has not been achieved in any of the recent five I-WeBS seasons (maximum 2-3 counts per season) which may have a bearing on the maximum counts recorded.

Table 3. Baseline and recent data for waterbird SCI species of Bannow Bay (I-WeBS data) plus the reported site trend (NPWS, 2012)

Special Conservation Interests	(a) Baseline Period (1995/96 – 1999/00) ⁱ	(b) Recent data (2011/12 – 2016/17) ⁱⁱ	(c) Comparison (a) vs (b)	(d) Reported trend (1995/96 – 2007/08) ⁱⁱⁱ
Light-bellied Brent Goose	561 (i)	882 (i)	Increase	Intermediate (Unfavourable)
Shelduck	500 (n)	284 (n)	Decrease	Highly Unfavourable
Pintail	52 (n)	0	Decrease	n/c
Oystercatcher	711 (n)	655	Decrease	Favourable
Golden Plover	1,955 (n)	3,099 (n)	Increase	Intermediate (Unfavourable)
Grey Plover	142 (n)	71 (n)	Decrease	Highly Unfavourable
Lapwing	2,950 (n)	1,516 (n)	Decrease	Intermediate (Unfavourable)
Knot	508 (n)	173	Decrease	Highly Unfavourable
Dunlin	3,038 (n)	1,152 (n)	Decrease	Highly Unfavourable
Black-tailed Godwit	546 (i)	402 (n)	Decrease	Favourable
Bar-tailed Godwit	471 (n)	638 (n)	Increase	Favourable
Curlew	891 (n)	603 (n)	Decrease	Intermediate (Unfavourable)
Redshank	377 (n)	267	Decrease	Intermediate (Unfavourable)

ⁱFive year peak mean for the period 1995/96 to 1999/00;

ⁱⁱFive year peak mean for the period 2011/12 – 2015/16;

ⁱⁱⁱFavourable (stable/increasing); intermediate unfavourable (population declines 1.0 – 24.9%); unfavourable (population declines 25.0 – 49.9%); highly unfavourable (population declines > 50%);

n = numbers of all-Ireland importance (after Crowe & Holt, 2015); i = numbers of international importance (after Wetlands International, 2012).

4.0 RESULTS FROM THE 2017/18 SURVEYS

4.1 Survey schedule and conditions

Organising field surveys during the winter season of 2017/18 was challenging at times with some months experiencing very wet weather with few dry days with suitable tides for survey. For example, December and January had rainfall totals above their long-term average (Met Éireann, 2018). Un-forecast rain during the December 2017 low tide survey resulted in patchy rain and fog affecting visibility. In addition, the January 2018 high tide survey was affected by fog and despite field surveyors 'sitting it out' the fog got worse instead of better. As a consequence the high tide survey was repeated in February 2018 and any reference to the high tide survey in this report refers to this February count, rather than the January count, unless otherwise mentioned.

Table 4. Weather conditions for the 2017/18 survey programme.

Date	Survey	Wind	Cloud	Rain	Visibility	Notes
23.11.17	LT1	Calm	0-33%	None	Good	
06.12.17	LT2	Breezy	67-100%	Showers	Moderate-Poor	Patchy fog at times
21.02.18	LT3	Light	67-100%	None	Good	
16.03.18	LT4	Calm	67-100%	None	Good	Perfect conditions
11.01.18	HT1	Calm	67-100%	None	Poor	Fog – deteriorated as the day went by
13.02.18	HT2	Light	34-55%	None	Good	Perfect conditions

4.2 Species assemblage and diversity

A total of 37 waterbird species were recorded during the 2017/18 surveys, which included 15 wildfowl and allies, 16 wader species, and six gull species. These species are listed along with their Latin names in Appendix 2.

Species diversity during low tide surveys ranged between 28 and 32 species, while 31 species were recorded during the February high tide survey. 26 species were recorded in all five surveys undertaken. All Special Conservation Interest (SCI) species listed for Bannow Bay SPA were recorded within all counts undertaken with the exception of Pintail that was not recorded during any survey.

4.3 Total numbers of waterbirds

During winter 2017/18, total numbers of waterbirds during low tide surveys ranged from 6,433 (December 2017), to a peak count of 11,942 waterbirds (February 2018). A total of 7,542 waterbirds was counted during the February 2018 high tide survey (Table 5). The December low tide survey was affected by fog which is likely to have affected the accuracy of this count total. The total number of waterbirds showed great variation between months and all counts were substantially lower than recorded in recent previous seasons (Table 5).

Table 5. Total numbers of waterbirds counted at Bannow Bay during the five surveys of 2017/18, plus totals from the four previous low tide surveys undertaken at the site.

Winter	Total Numbers of Waterbirds (Site totals)				
	LT1	LT2	LT3	LT4	HT
2017/18	7,988	6,433 ^a	11,942	6,555	7,542
2016/17	9,372	13,705	13,792	10,166 ^b	14,135
2015/16	9,105	13,190	11,965	14,677	8,014
2014/15	10,155	14,415	14,974	11,795	13,741
2009/10	17,323	10,212	13,865	10,879	7,103 (Jan 10) 12,666 (Feb 10)

^acount affected by fog;

^bincomplete count (only partial count of 00411).

4.4 Species totals

Waterbird species peak counts for the 2017/18 at Bannow Bay are shown in Table 6.

One waterbird was recorded in numbers of international importance: Light-bellied Brent Goose. Peak numbers exceeded the threshold during both low and high tide surveys, however the site peak counts were lower than recent previous years (Table 6). Black-tailed Godwit occurred in numbers of international importance during the baseline period but now occurs in numbers of national importance.

A total of ten waterbird species were recorded in numbers of all-Ireland importance. All waterbird SCI species that occurred in nationally-important numbers during the baseline data period (1995/96 – 1999/00) (Table 3) were recorded in numbers of national importance during the 2017/18 survey programme with the exception of Pintail and Knot. In addition to SCI species, Red-breasted Merganser occurred in numbers of all-Ireland importance during both low and high tide surveys.

Table 6. Peak numbers of waterbirds at Bannow Bay in 2017/18, plus peaks from the previous four low tide survey seasons, highlighting numbers of international (i) and national (n) (all-Ireland) importance (after Wetlands International, 2012 and Crowe & Holt 2013 respectively).
SCI species are in bold font

Species	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide
	2017/18		2016/17		2015/16		2014/15		2009/10	
Mute Swan	1	2	2			1				
Light-bellied Brent Goose	557 (i)	575 (i)	841 (i)	615 (i)	609 (i)	640 (i)	787 (i)	484 (i)	2158 (i)	1354 (i)
Shelduck	470 (n)	202 (n)	413 (n)	395 (n)	308 (n)	279 (n)	518 (n)	244 (n)	393 (n)	354 (n)
Wigeon	493	283	661 (n)	528	356	300	781 (n)	550	226	438
Teal	293	170	619 (n)	806 (n)	478 (n)	219	472 (n)	546 (n)	259	193
Mallard	151	113	206	117	228	113	258	142	66	36
Goldeneye	5	2		7	5	3	9	3	11	16
Red-breasted Merganser	27 (n)	36 (n)	20 (n)	28 (n)	13	5	39 (n)	26 (n)	30 (n)	18
Great Northern Diver	6	6	2		11	5	1	2	12	1
Little Grebe	4	6	8	2	2	6	14	12	7	4
Great Crested Grebe	2		9	2	1	2	5	1	9	1
Cormorant	28	33	34	43	38	7	23	14	49	21
Shag	3*		23		54	21	34	9	3	6
Little Egret	13	5	62 (n)	18	68 (n)	6	53 (n)	14	145 (n)	4
Grey Heron	11	5	23	11	16	1	19	6	34 (n)	
Oystercatcher	754 (n)	590	1,237 (n)	482	1036 (n)	719 (n)	962 (n)	1146 (n)	1477 (n)	1676 (n)
Ringed Plover	86		179 (n)		74		37	118 (n)	47	11
Golden Plover	3,075 (n)	681	3,850 (n)		8020 (n)	281	4459 (n)	550	3517 (n)	503

Grey Plover	39 (n)	9	105 (n)	197 (n)	83 (n)	91 (n)	59 (n)	265 (n)	118 (n)	232 (n)
Lapwing	1,235 (n)	1,229 (n)	1,905 (n)	3,957 (n)	1878 (n)	1875 (n)	2782 (n)	720	3401 (n)	2116 (n)
Knot	247	142	344 (n)	315 (n)	555 (n)	313 (n)	959 (n)	709 (n)	329 (n)	866 (n)
Sanderling	12		72 (n)							
Dunlin	943 (n)	1,739 (n)	2,437 (n)	3,519 (n)	2060 (n)	613 (n)	1992 (n)	1947 (n)	1238 (n)	2438 (n)
Ruff	1									
Snipe	3*		13	4	8	11		18	10	33
Black-tailed Godwit	523 (n)	437 (n)	555 (n)	433 (n)	413 (n)	132	633 (i)	127	5653 (i)	390 (n)
Bar-tailed Godwit	610 (n)	2	559 (n)	656 (n)	470 (n)	700 (n)	644 (n)	1202 (i)	1050 (n)	1736 (i)
Curlew	562 (n)	608 (n)	796 (n)	434 (n)	1171 (n)	254	690 (n)	930 (n)	824 (n)	1043 (n)
Greenshank	10	13	19	34 (n)	18	22 (n)	22 (n)	37 (n)	63 (n)	7
Redshank	355 (n)	309	525 (n)	277	588 (n)	293	385 (n)	396 (n)	905 (n)	307 (n)
Turnstone	26	29	31	50	47	18	34	46	32	123 (n)
Black-headed Gull	1,031	101	2,565	1,057	2951	920	1504	3160	2119	286
Ring-billed Gull	1									
Common Gull	317	128	632	71	178	40	307	182	628	6
Lesser Black-backed Gull	62	16	150	8	64	83	432	65	56	
Herring Gull	277	60	357	61	147	38	203	48	97	6
Great Black-backed Gull	39	10	53	7	28	3	33	3	50	16

4.5 Trends in numbers

Using peak count data from the current (2017/18) and previous four seasons (2016/17, 2015/16, 2014/15 and 2008/09) of co-ordinated low and high tide surveys at Bannow Bay, a simple estimation of trends was calculated following the methods described in Section 2.4. This provides a short-term trend for the period 2009 – 2018 and these results are shown in Table 7 for the waterbird SCI species as well as three additional species: Wigeon, Teal and Red-breasted Merganser. A threshold value of 1.2% was used to determine whether a species was showing an increasing or decreasing trend, values between that determined to be stable.

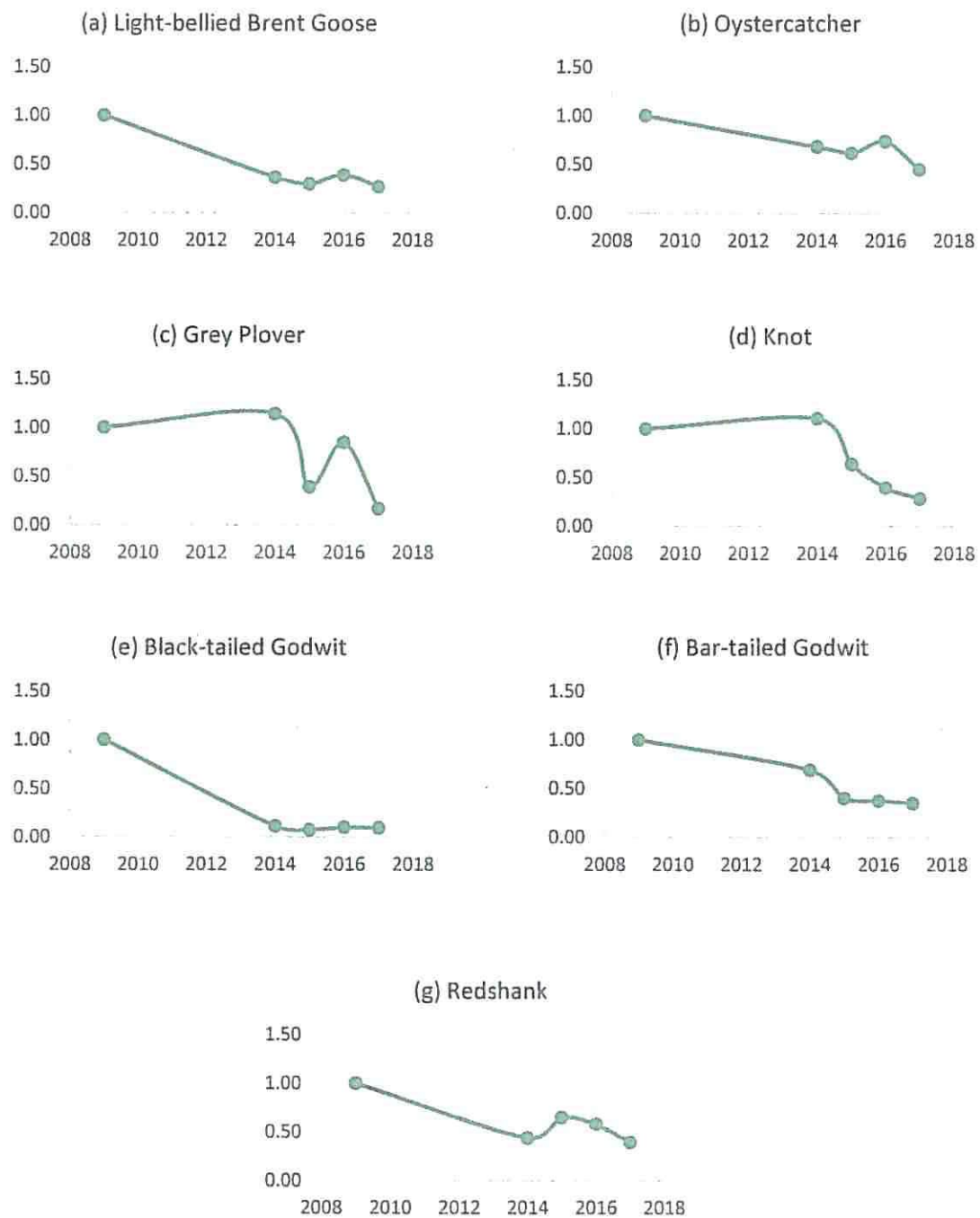
Table 7 shows declining trends for nine of the 15 species assessed with three species increasing and three species stable. Species exhibiting notable declines in numbers are shown in Figure 4.

Table 7. Baseline data for waterbird SCI species of Bannow Bay plus the average peak count from the surveys undertaken in 2016/17, 2015/16 and 2014/15.

Special Conservation Interest Species	Mean Annual Change (%) 2009/10 – 2017/18	Trend
Light-bellied Brent Goose	- 13	Decrease
Shelduck	+ 2	Increase
Wigeon	+ 12	Increase
Teal	+ 7	Increase
Red-breasted Merganser	- 0.8	Stable
Oystercatcher	- 7	Decrease
Golden Plover	+ 1	Stable
Grey Plover	- 12	Decrease
Lapwing	- 6	Decrease
Knot	- 11	Decrease
Dunlin	- 1	Stable
Black-tailed Godwit	- 25	Decrease
Bar-tailed Godwit	- 11	Decrease
Curlew	- 4	Decrease
Redshank	- 8	Decrease

The largest decline is seen for the Black-tailed Godwit. Numbers have declined since a very large peak count of 5,653 individuals during 2009/10. However this peak count was a 'one-off' with other counts in the same season ranging from 62 to 390 individuals, and potentially attributed to staging birds that had stopped off *en route* on migration during early October (NPWS, 2012). Re-calculating this trend using the second highest count value actually results in this wader showing an increasing trend (+3% mean annual change).

Figure 4 (a-g). Species showing the largest trends for decline in numbers.



It is standard practice to calculate mean peak numbers for waterbirds as the average value dampens down the natural annual variation in numbers (Crowe, 2005). Therefore as an additional assessment of trends, the four-year mean peak count was calculated for the surveys undertaken across the winters 2014/15, 2015/16, 2016/17 and 2017/18. The mean peak value was then compared to the baseline mean peak as used for SPA designation.

This assessment reveals that five of the waterbird SCI species now occur in numbers higher than the baseline average (Light-bellied Brent Goose, Oystercatcher, Golden Plover, Bar-tailed Godwit and Redshank). Six species have declined in recent seasons in lower numbers than during the baseline period (Shelduck, Pintail, Lapwing, Dunlin, Black-tailed Godwit and Curlew) and two species occur in such similar numbers that they are considered to be stable (Grey Plover and Knot) (Table 8).

Table 8. Baseline data for waterbird SCI species of Bannow Bay plus the average peak count from the surveys undertaken in 2017/18, 2016/17, 2015/16 and 2014/15. The change of direction is simply whether the most recent mean peak is greater or less than the baseline value.

Special Conservation Interests	Baseline Period (1995/96 – 1999/00) ⁱ	4-year mean peak (2014/15 – 2017/18) ⁱⁱ	Change in direction
Light-bellied Brent Goose	561 (i)	711 (i)	↑
Shelduck	500 (n)	427 (n)	↓
Pintail	52 (n)	-	↓
Oystercatcher	711 (n)	1,043 (n)	↑
Golden Plover	1,955 (n)	4,851 (n)	↑
Grey Plover	142 (n)	148 (n)	Stable/↑
Lapwing	2,950 (n)	2,463 (n)	↓
Knot	508 (n)	526 (n)	Stable/↑
Dunlin	3,038 (n)	2,316 (n)	↓
Black-tailed Godwit	546 (i)	531 (n)	↓
Bar-tailed Godwit	471 (n)	792 (n)	↑
Curlew	891 (n)	877 (n)	↓
Redshank	377 (n)	466 (n)	↑

ⁱFive year peak mean for the period 1995/96 to 1999/00;

ⁱⁱFour year peak mean for the surveys undertaken in 2014/15, 2015/16, 2016/17 and 2017/18. Peak counts from either low or high tide surveys.

n = numbers of all-Ireland importance (after Crowe & Holt, 2015); i = numbers of international importance (after Wetlands International, 2012).

4.6 Subsite totals

During 2017/18, 00416 (Kiltra) supported the largest number of waterbirds on each low tide survey occasion (Table 9) and the second highest numbers of birds during the high tide survey; consistent with recent previous surveys at the site. 00418 (Bannow Island to Newquay) and 00413 (Saint Kiernan's to Newtown) each supported the second highest numbers on two survey occasions which is also consistent with recent previous surveys at the site. The small upper estuary subsite 00417 (Clonmines Castle) supported the overall peak subsite count (3,383) during the February high tide survey.

Table 9. Total numbers of waterbirds within subsites across the survey programme 2017/18 (peak number in each survey shown in red font and second highest count in blue font)

Subsite Code	Subsite Name	LT1	LT2	LT3	LT4	HT	Peak Count 2016/17
00410	Fethard Bay	496	586	484	308	206	797 (LT)
00411	St Kiernans to Saltmills to Big Burrow	1,097	496	565	495	440	2,006 (LT)
00413	Saint Kiernans to Newtown	665	732	825	794	385	2,304 (LT)
00416	Kiltra	3,234	2,508	5,711	3,647	1,470	7,482 (LT)
00417	Clonmines Castle	518	469	588	525	3,383	2,075 (HT)
00418	Bannow Island to Newquay	1,350	1,316	513	514	1,415	3,385 (HT)
00487	Tintern Abbey to Tintern Bridge	140	219	167	49	74	354 (LT)
00489	Pollfur	488	107	280	223	169	354 (HT)

Of note was that the peak counts in 00411 (St Kiernans to Saltmills to Big Burrow) and 00413 (Saint Kiernan's to Newtown) during 2017/18 were much lower than recorded during 2016/17. To assess this further, peak counts from the previous three surveys are compared to those from 2017/18 in Table 10. This shows large variation in annual peak counts for 00413 while numbers within 00411, 00418 and 00416 were at their lowest during 2017/18.

Table 10. Peak numbers of waterbirds within subsites for the four previous survey seasons and whether the peaks were recorded during low tide (LT) or high tide (HT). Peaks are shown in bold.

Subsite Code	Subsite Name	2017/18	2016/17	2015/16	2014/15
00410	Fethard Bay	586 (LT)	797 (LT)	291 (LT)	916 (LT)
00411	St Kiernans to Saltmills to Big Burrow	1,097 (LT)	2,006 (LT)	2,477 (LT)	2,551 (LT)
00413	Saint Kiernans to Newtown	825 (LT)	2,304 (LT)	1,600 (LT)	898 (LT)
00416	Kiltra	5711 (LT)	7,482 (LT)	6,285 (LT)	8,849 (LT)
00417	Clonmines Castle	3,383 (HT)	2,075 (HT)	4,838 (LT)	1,527 (HT)
00418	Bannow Island to Newquay	1,415 (LT)	3,385 (HT)	2,813 (LT)	2,101 (LT)
00487	Tintern Abbey to Tintern Bridge	219 (LT)	354 (LT)	217 (LT)	248 (LT)
00489	Pollfur	488 (LT)	354 (HT)	320 (LT)	234 (LT)

4.7 Waterbird densities

00417 (Clonmines Castle) supported the greatest average density of total waterbirds (Table 11), and recorded the greatest maximum density. This was closely followed by 00416 (Kiltra). These represent the two inner estuarine subsites of Bannow Bay. The smallest subsite 00487 (Tintern Abbey to Tintern Bridge) supported relatively good densities and recorded the third highest density overall (32.32 birds ha⁻¹).

Table 11. Average density of total waterbirds (min-max) within count subsites 2017/18.

Subsite Code	Subsite Name	Average density	Min	Max
00410	Fethard Bay	6.49	4.27	8.12
00411	St Kiernans to Saltmills to Big Burrow	2.36	1.76	3.90
00413	Saint Kiernans to Newtown	2.87	2.53	3.14
00416	Kiltra	21.21	14.09	32.02
00417	Clonmines Castle	30.44	27.19	34.09
00418	Bannow Island to Newquay	12.11	6.73	17.70
00487	Tintern Abbey to Tintern Bridge	13.14	4.48	20.01
00489	Pollfur	17.66	6.88	31.39

Peak foraging densities ranged from 0.2 birds ha⁻¹ (Grey Plover 00417) to 15.8 Dunlin ha⁻¹ (00417 Clonmines Castle) (Table 12). As in 2016/17, Light-bellied Brent Goose was more densely distributed in the outer bay subsite 00410 (Fethard Bay) during the winter of 2017/18. Highest densities of Shelduck were recorded for 00418 (Bannow Island to Newquay), consistent with the results from the previous four winter surveys. The small inner estuarine subsite 00489 (Pollfur) supported highest densities of two waders: Black-tailed Godwit and Redshank (Table 12).

Table 12. Peak intertidal foraging densities (birds/ha⁻¹) recorded during the 2017/18 surveys and subsite it was recorded for (in brackets); plus results from 2015/16, 2014/15 and 2009/10.

Special Conservation Interests (SCIs) ^a	2017/18 birds ha ⁻¹ (subsite)	2016/17 birds ha ⁻¹ (subsite)	2015/16 birds ha ⁻¹ (subsite)	2014/15 birds ha ⁻¹ (subsite)	2009/10 birds ha ⁻¹ (subsite)
Light-bellied Brent Goose	2.0 (00410)	1.6 (00410)	1.8 (00418)	2.8 (00418)	1.8 (00410)
Shelduck	4.6 (00418)	4.0 (00418)	2.9 (00418)	2.4 (00418)	3.4 (00418)
Oystercatcher		5.1 (00417)	6.1 (00418)	8.4 (00418)	9.0 (00418)
Grey Plover	0.2 (00417)	1.0 (00418)	0.3 (00416)	0.3 (00417)	11.0 (00418)
Knot	2.5 (00418)	1.7 (00416)	4.7 (00418)	2.1 (00416)	2.4 (00418)
Dunlin	15.8 (00417)	9.4 (00416)	5.1 (00416)	11.0 (00416)	4.9 (00487)
Black-tailed Godwit	7.2 (00489)	1.7 (00417)	1.7 (00417)	6.0 (00489)	3.2 (00487)
Bar-tailed Godwit	3.0 (00416)	2.2 (00416)	5.5 (00417)	2.4 (00416)	3.8 (00416)
Curlew	1.4 (00416)	7.5 (00417)	3.9 (00417)	2.4 (00417)	3.5 (00487)
Redshank	4.9 (00489)	1.9 (00489)	3.0 (00418)	2.0 (00418)	4.9 (00418)

^a Note- not calculated for Golden Plover and Lapwing that do not forage to a great extent in intertidal habitat.

Table 13. Top three count subsites ranked in terms of peak intertidal foraging density recorded during 2017/18.

Special Conservation Interests (SCIs) ^a	00410	00411	00413	00416	00417	00418	00487	00489
Light-bellied Brent Goose	1	3				2		
Shelduck		2		3		1		
Oystercatcher				2	3	1		
Grey Plover				3	1	2		
Knot			3	2		1		
Dunlin		3		2	1			
Black-tailed Godwit				3		2		1
Bar-tailed Godwit				1	2	3		
Curlew				1	2		3	
Redshank					2	3		1

4.8 Waterbird distribution

Waterbird distribution was examined by ranking the proportional use of subsites by waterbirds following the methods described in Section 2.3. The relative importance of each subsite is shown as a category (very high, high, moderate or low), or simply as ranked numbers in the case of the high tide survey.

00416 (Kiltra) supported the largest number of species (eight) in numbers ranked as 'very high' (Table 14) suggesting that this subsite is the most important, or most preferred, by the largest number of waterbird SCI species. 00411 and 00418 both supported four species in numbers ranked as 'very high'.

Further results are presented in Tables 15a to 15c which are followed by a short synopsis on the distribution of each of the waterbird SCI species.

Table 14. Relative importance of each subsite based on total numbers of SCI species during low tide surveys.

Subsite Code	Subsite Name	Very High	High	Moderate
00410	Fethard Bay	PB		OC, GV, L, CU
00411	St Kiernans to Saltmills to Big Burrow	PB, SU, GV, CU	OC, GP, DN, BA, RK	L, BW
00413	Saint Kiernans to Newtown	OC, GV	L, KN, DN, BW, BA, CU	PB, RK
00416	Kiltra	GP, GV, L, KN, DN, BW, BA, CU	SU, OC, RK	PB
00417	Clonmines Castle	L, DN	GV, BW, RK	BA, CU
00418	Bannow Island to Newquay	SU, OC, KN, RK	GP, GV, CU	DN, BW, BA
00487	Tintern Abbey to Tintern Bridge			BW, CU
00489	Pollfur	BW, RK		PB, SU, CU

Table shows waterbird species by their standard codes, these can be found in Appendix 2.

Table 15a. Subsite ranking (categories) based on total numbers during low tide surveys.

(letters in brackets refers to the category recorded during the 2016/17, 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a zero count in the subsite.

Subsites ▲	00410	00411	00413	00416	00417	00418	00487	00489
Species ▼								
PB	V (V, M, H, H)	V (V, V, V, V)	M (V, V, V, V)	M (V, V, H, V)	- (- - - M)	L (H, V, V, V)	- (- - - -)	M (- - - M)
SU	- (L, - - H)	V (M, H, M, H)	L (H, H, V, M)	H (V, H, H, V)	L (M, L, L, H)	V (V, V, V, V)	- (- L, - M)	M (M - - H)
OC	M (M, M, M, H)	H (M, M, H, H)	V (V, H, H, V)	H (H, V, H, V)	L (M, M, H, M)	V (V, V, V, V)	- (L, L, L, L)	L (L, L, L, L)
GP	- (- - - -)	H (V, H, H, V)	- (- - M, H)	V (V, V, V, V)	- (- H, H, H)	H (H, H, M, V)	- (- - - -)	- (- - - M)
GV	M (- - - -)	V (V, M, H, V)	V (H, M, -, V)	V (V, V, V, M)	H (V, H, H, M)	H (V, V, V, V)	- (- - - -)	L (- - - M)
L	M (L, L, M, M)	M (M, V, H, H)	H (L, L, M, H)	V (V, V, V, V)	V (V, V, H, V)	- (H, H, H, M)	- (- - - H)	- (- - L, -)
KN	- - (- - -)	- (H, H, H, V)	H (M, H, -, H)	V (V, V, V, V)	- (- - - -)	V (V, V, H, V)	- (- - - -)	- (- - - -)
DN	- (- - - -)	H (V, H, H, V)	H (H, V, M, H)	V (V, V, V, V)	V (M, V, H, M)	M (V, V, H, V)	- (- - -, M)	- (- - - -)
BW	- (- - - -)	M (H, M, H, M)	H (H, V, H)	V (V, V, V, V)	H (V, M, H, M)	M (V, V, H, M)	M (M, L, M, H)	V (M, M, H, H)
BA	- (- - -, L)	H (H, H, H, H)	H (H, H, H, V)	V (V, V, V, V)	M (H, H, M, M)	M (- -, M, M)	- (- - - -)	- (L, - - M)
CU	M (M, L, L, L)	V (H, H, H, H)	H (H, H, H, H)	V (V, V, V, V)	M (V, V, H, H)	H (H, H, M, V)	M (L, L, L, M)	M (M, M, L, M)
RK	L (L, L, L, M)	H (M, H, V, V)	M (H, H, H, H)	H (V, V, V, H)	H (M, M, L, M)	V (V, V, V, V)	L (L, L, L, L)	V (M, M, H, M)

Table 15b. Subsite ranking based on **total numbers** during the high tide survey.

(numbers in brackets refers to the category recorded during the 2016/17, 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a zero count in the subsite.

Subsites ▶	00410	00411	00413	00416	00417	00418	00487	00489
Species ▼								
PB	6 (2, -, 6, 4)	4 (3, 2, 1, 1)	2 (4, -, 5, 3)	1 (6, 1, 3, 2)	- (-, 4, -)	3 (1, -, 2, 1)	- (- - -)	5 (5, -, 5)
SU	- (- - -)	2 (2, 2, 2, 2)	- (-, 1, -, 4)	- (4, 4, -, 5)	- (5, 3, -, 3)	1 (1, 1, 1, 1)	- (- - -)	3 (3, 3, 1, 2)
OC	3 (6, -, 5, 4)	4 (2, 1, 3, 2)	5 (4, 5, 4, 4)	2 (3, 3, 2, 2)	- (-, 4, -, 3)	1 (1, 2, 1, 1)	- (- - -)	5 (- - -)
GP	- (- - -)	- (-, -, 3, 3)	- (- -, 1)	- (- -, 1, 1)	1 (-, 1, -, 2)	2 (- -, 2, 2)	- (- - -)	- (- - -)
GV	- (- - -)	- (- - -)	- (- -, 3)	- (1, 2, 1, 1)	- (3, -, 3, 2)	1 (2, 3, 2, 1)	- (- - -)	- (- -, 5)
L	- (6, 5, -)	3 (4, 2, 2, 3)	3 (5, 4, 6, 5)	2 (1, 3, 1, 2)	1 (2, 1, 3, 1)	5 (3, 5, 4, 4)	- (- -, 2)	- (- - -)
KN	- (- - -)	- (- -, -, 4)	- (- -, 3)	- (-, 2, 1, 2)	- (- -, 2, 1)	1 (1, -, 1)	- (- - -)	- (- - -)
DN	- (- - -)	- (4, 1, -, 3)	- (- -, 4)	2 (1, 3, 2, 1)	1 (3, 2, 1, 2)	3 (2, 4, 3, 1)	- (- - -)	- (- - -)
BW	- (- - -)	- (- -, 1, 3)	- (2, - -)	2 (- -, 1)	1 (4, -, 1)	- (1 -, 2, -)	- (- - -)	- (3, - -)
BA	- (- - -)	- (3, 3, -, 4)	1 (- -, 3)	- (1, 1, 1, 1)	- (2, 2, -, 2)	- (- -, 2, 2)	- (- - -)	- (- - -)
CU	4 (7, -, 2, 6)	5 (4, 5, 4, 3)	3 (1, 3, 6, 4)	6 (2, 1, 1, 1)	1 (3, 4, 3, 3)	6 (5, 2, 5, 2)	- (6 -, 1)	2 (6, -, 5)
RK	7 (7, -, 8, 5)	5 (5, 5, 3, 3)	2 (1, 3, 2, 4)	4 (2, 2, 4, 1)	1 (6, 4, 5, 2)	3 (3, 1, 1, 1)	8 (8, 6, 6, 7)	6 (4, -, 7, 5)

Table 15c. Subsite ranking based on numbers foraging intertidally during low tide surveys.

(letters in brackets refers to the category recorded during the 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a zero count in the subsite.

Subsites ▶	00410	00411	00413	00416	00417	00418	00487	00489
Species ▼								
PB	V (V, M, V, H)	H (V, V, H, V)	M (V, V, V, V)	M (V, V, M, -)	- (- - - -)	L (V, V, V, H)	- (- - - -)	- (- - - , L)
SU	- (- - - -)	V (M, V, M, H)	L (H, -, M, L)	H (V, M, V, V)	- (L, M, M, H)	V (V, V, V, V)	- (-, L, -, M)	M (- - - , H)
OC	M (M, M, M, H)	M, (H, H, H, H)	H (H, H, H, H)	H (V, V, V, V)	L (M, M, H, M)	V (V, V, V, V)	- (L, L, L, L)	L (L, L, L, M)
GV	- (-, L, - -)	V (V, M, H, V)	V (H, M, -, H)	V (M, V, V, M)	H (V, H, H, L)	H (V, V, V, V)	- (- - - -)	L (- - - -)
L	- (- - - -)	M (-, M, M, V)	- (-, L, M, H)	V (V, V, V, V)	V (V, V, V, V)	- (- - - -)	- (- - -, H)	- (- - - -)
KN	- (- - - -)	- (V, -, H, V)	H (H, H, -, H)	V (V, V, V, V)	- (- - - -)	V (V, V, H, V)	- (- - - -)	- (- - - -)
DN	- (- - - -)	H (V, H, H, V)	H (H, V, M, H)	V (V, V, V, V)	V (M, L, H, M)	M (V, V, H, V)	- (- - -, M)	- (- - - -)
BW	- (- - - -)	M (V, M, H, M)	H (V, V, H, V)	V (V, V, V, V)	H (H, M, V, H)	V (M, V, V, H)	H (-, L, H, V)	V (-, L, V, H)
BA	- (- - -, L)	H (H, M, H, H)	H (H, V, V, V)	V (V, V, V, V)	H (H, H, L, M)	M (-, L, M, M)	- (- - - -)	- (- - -, L)
CU	M (L, L, L, M)	H (H, H, H, H)	H (V, V, H, H)	V (V, V, V, V)	M (V, V, H, M)	H (M, H, M, V)	M (L, L, M, M)	M (L, L, L, M)
RK	L (L, L, L, L)	H (M, H, V, V)	M (H, H, H, H)	H (V, V, V, H)	M (M, M, L, M)	V (V, V, V, V)	L (L, L, L, M)	V (M, M, H, M)

The following species accounts discuss the low tide distribution of SCI species at Bannow Bay during 2017/18. These data are examined in light of data collected during 2016/17, 2015/16, 2014/15 and 2009/10.

Light-bellied Brent Goose

In terms of total numbers, two subsites – 00410 (Fethard Bay) and 00411 (St Kiernans to Saltmills to Big Burrow) supported the largest low tide numbers during 2017/18 with 00410 (Fethard Bay) holding peak numbers on three low tide survey occasions. These two subsites also held the largest proportions of intertidally foraging Brent Goose at low tide, ranging from 51% (LT4) to 100% (LT2) of the total number across the four low tide surveys.

00416 (Kiltra) supported largest numbers during the high tide survey with the subsite peak count of 355 individuals. It is worthy of note that the abandoned January high tide survey also recorded 765 Brent Goose in 00416, more than double the aforementioned subsite peak count. However the data suggests that 00416 was not as favoured at low tide as in previous surveys. Similarly, 00413 (Saint Kiernans to Newtown) that held numbers ranked as 'very high' in all four seasons of previous low tide surveys at the site, held substantially lower numbers of Brent Goose during 2017/18. Overall this suggests that Brent Geese may now be distributing in outer subsites (00410 and 00411) to a greater extent, with less reliance on the mid estuarine subsites 00413 and 00416.

The distribution of Brent geese across the site is most likely related to food supply. 00411 is noted for the presence of a *Zostera noltii*-dominated community that occurs in the upper and mid shore between Gorteens and Saltmills (NPWS, 2011). The seagrass occurs as a patchy meadow intermixed with the filamentous green alga *Ulva* sp³ and is difficult to map with accuracy (ASU, 2010), and has a potential to occur as a patchy habitat across a wider area which may explain the general observations of small but widely distributed flocks of Brent Geese within this subsite. Across the wider site, the geese are likely foraging on a range of algae species and particularly in 00410 (Fethard Bay) where it occurs widely along the tideline as well as being washed up in certain conditions.

Shelduck

Consistent with the four previous surveys, 00418 (Bannow Island to Newquay) held peak numbers of Shelduck during three out of four low tide surveys and during the high tide survey where the numbers represented 79% of the total recorded. 00411 (St Kiernans to Saltmills to Big Burrow) held peak numbers during one low tide survey. In terms of intertidal foraging, 00418 supported between 59% and 88% of the site total numbers of Shelduck during the first three low tide surveys.

This species has therefore been highly consistent in terms of subsite faithfulness across the total of five winters of surveys undertaken. The sediment of 00418 comprises fine sand and silt particles, and based on previous macroinvertebrate sampling (NPWS, 2011) the mollusc *Hydrobia ulvae*, a favoured prey of Shelduck, is likely to be found.

Oystercatcher

00418 (Bannow Island to Newquay) held peak numbers of Oystercatchers during three of the four low tide surveys, and during the high tide survey, with between 55% and 82% of the site total numbers. This is highly consistent with the previous surveys, and 00418 is the only

³ formerly classified as *Enteromorpha* sp.

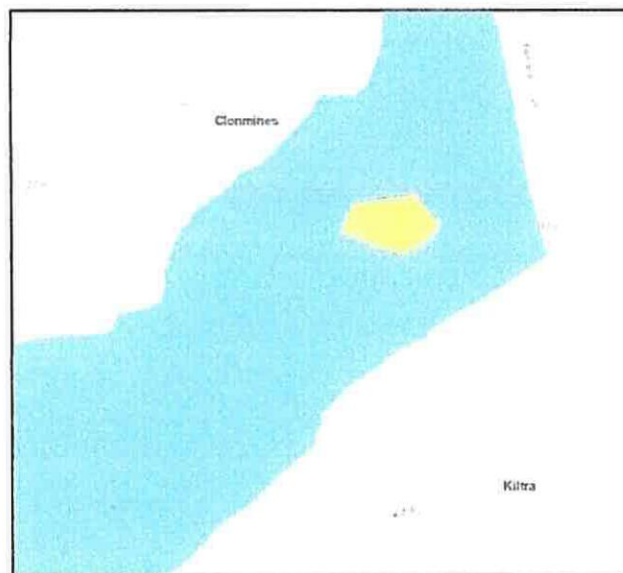
subsite to have supported numbers ranked as 'very high' in all previous surveys. While Cockles (*Cerastoderma edule*) are known to occur in OO418, benthic data for Bannow Bay are not detailed enough to fully understand the subsite preference of Oystercatchers. Despite this subsite preference, Oystercatchers do forage widely across Bannow Bay and occurred overall in seven of the eight subsites. The two smaller inner areas OO487 and OO489 are used relatively little, but OO413 (Saint Kiernans to Newtown) and OO416 (Kiltra) supported good proportions of birds, and OO416 held numbers of intertidally foraging Oystercatchers ranked as the second highest across all four low tide surveys. During the high tide survey, exposed mud was available so the largest proportion of Oystercatchers were foraging in OO418 (307 individuals). The largest number of roosting Oystercatchers (87) was recorded within OO416 (Kiltra) with further roosting birds recorded in OO410 (peak 45 individuals) and OO411 (peak 56 individuals). During the abandoned January high tide survey, a flock of 77 Oystercatchers roosted along the southern shoreline of OO413 in a position where aquaculture machinery gain access to the shoreline.

Golden Plover

During winter, Golden Plovers feed primarily within agricultural grassland and arable land and tidal flats are used as roosting habitats. As a consequence, large flocks of Golden Plover can be recorded roosting intertidally at low tide. Like many wader species, Golden Plover appear faithful to their roost sites so one would expect the same subsites to be used preferentially year after year. At Bannow Bay, this holds true, with OO416 (Kiltra) having been the favoured subsite throughout all surveys. During 2017/18, between 98 and 100% of all Golden Plovers were recorded in this subsite during low tide surveys with a peak number of 3,075 during the February low tide count. The birds tend to occur as one flock roosting on the intertidal flats (Figure 5) and the flock position has also been highly consistent across the years, highlighting the species' roost site fidelity.

During high tide, 681 Golden Plover were roosting in almost equal numbers terrestrially adjacent to OO417 (Clonmines Castle) and intertidally within OO418 (Bannow Island to Newquay).

Figure 5. Approximate position of the low tide roosting Golden Plover flock in OO416 (Kiltra).



Grey Plover

Grey Plover was recorded in seven subsites during 2017/18, although two of these (Fethard Bay (00410) and Polfur (00489)) held very low numbers (1-3 individuals) on one survey occasion only. The remaining five subsites (00411, 00413, 00416, 00417 and 00418) have consistently recorded this wader during previous low tide surveys at the site.

During 2017/18, three subsites held peak numbers both in terms of total numbers, and numbers foraging intertidally: 00411 (St Kiernans to Saltmills to Big Burrow), 00413 (Saint Kiernans to Newtown) and 00416 (Kiltra). 00417 (Clonmines Castle) and 00418 (Bannow Island to Newquay) held peak numbers during 2016/17 but were ranked as 'high' during the current 2017/18 season. However, overall results across the years have been relatively consistent with this species distributed across mid estuarine subsites, and absent or rare in the inner estuary and outer estuary (Figure 6).

During the February high tide survey, total numbers were low (nine birds) and these were located in 00418. This same subsite however, recorded 57 individuals during the abandoned January high tide survey, which regardless of the poor weather conditions on the day, was the peak subsite count during the entire survey season. These birds were foraging intertidally.

Figure 6. Distribution of Grey Plover foraging during low tide surveys (across all four surveys). 1 dot = 1 bird. Dots are placed randomly.



Lapwing

Like Golden Plover, Lapwings forage mostly terrestrially and use intertidal flats as safe roosting habitat during periods of low tide. During 2017/18, Lapwing were recorded in six subsites overall, consistent with previous surveys. This wader rarely occurs within the two inner subsites 00487 and 00489.

Peak low tide numbers occurred in 00416 (Kiltra) and 00417 (Clonmines Castle), highly consistent with previous surveys. 00413 (Saint Kiernans to Newtown) held numbers ranked as 'high' on one survey occasion (378 individuals). The subsite peak count was 620 individuals within 00416 during the November low tide survey. The majority of individuals were roosting; and during low tide counts only low proportions (8-23%) of individuals were recorded foraging intertidally.

The second largest whole site count was recorded during the February high tide survey (1229 birds) when 785 of these were located in 00417 (Clonmines Castle); the majority of these roosting supratidally (Figure 7).

Figure 7. Location of supratidal roost in inner estuarine subsite 00417 (Clonmines castle).



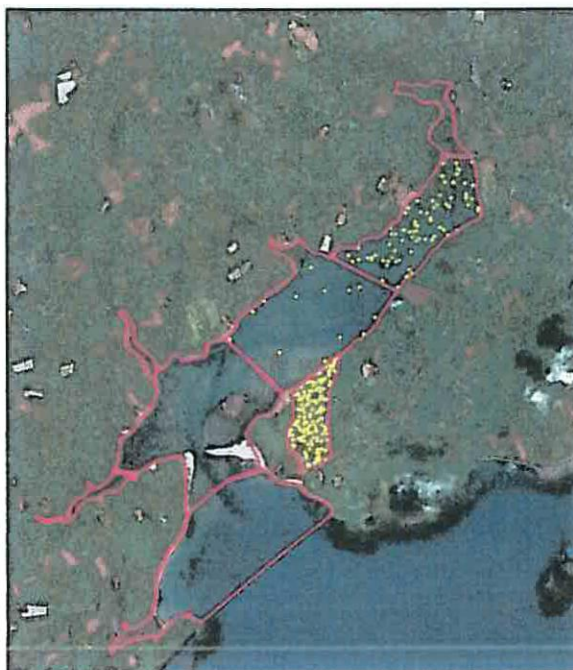
Knot

Knot was recorded in three subsites overall (00413 (Saint Kiernans to Newtown), 00416 (Kiltra) and 00418 (Bannow island to Newquay)), with highest numbers within the latter two subsites; highly consistent with the results from the previous winter surveys.

Whole-site low tide numbers peaked at 247 individuals during the November low tide survey when 63% of the birds were in 00416, the rest in 00418. These two subsites consistently held the highest numbers of foraging birds (Figure 8).

During the high tide survey, all Knot were recorded in 00418. As there was exposed mud at the time, these birds (142 individuals) were foraging intertidally. However, it is worthy of note that the abandoned January high tide survey recorded 255 foraging Knot within 00418 which is the largest count of this wader recorded across the 2017/18 winter survey period.

Figure 8. Distribution of Knot foraging during low tide surveys (across all four surveys). 1 dot = 2 birds. Dots are placed randomly.



Dunlin

Dunlin have consistently used five subsites during the 2017/18 and previous four winter surveys (00411, 00413, 00416, 00417 and 00418).

Peak numbers during low tide counts of 2017/18, and peak numbers recorded foraging intertidally, were recorded for 00416 (Kiltra) on three survey occasions, and 00417 (Clonmines Castle) on one survey occasion. The peak subsite count of foraging birds was 930 individuals in 00416 during February; other surveys recording between 195 and 552 individuals. Of note was 00411 that supported good numbers of foraging individuals (peak 315) on two survey occasions.

The site peak count was recorded during the February high tide survey (1,739 Dunlin); when over 50% of these birds were in 00417. Of the Dunlin in 00417, 700 individuals roosted supratidally within the mixed species flock shown in Figure 7, the largest single roosting flock. Of note, was the abandoned January high tide count which recorded a total 1,074 Dunlin and 95% of these birds were foraging intertidally within 00418 (Bannow Island to Newquay), a subsite only holding numbers ranked as 'moderate' during low tide surveys.

Black-tailed Godwit

As in previous surveys, Black-tailed Godwits occurred in seven of the eight count subsites during 2017/18; all except 00410 (Fethard Bay).

Peak low tide numbers were recorded in 00416 (Kiltra) and 00489 (Polfur). The latter has never held numbers ranked as 'very high' during previous low tide surveys and the peak count of 235 birds during the November low tide survey was the peak subsite low tide count of the season, and represented 45% of all this species recorded on that date.

Peak numbers foraging intertidally were recorded in 00416 on two survey occasions (December and March), 00418 (November) and 00489 (February) (Figure 9).

The benthic community of 00416 (Kiltra) is classified as 'fine sand with *Pygospio elegans* and *Corophium volutator*' (NPWS, 2011). The sediment comprises largely fine material, with fine sand in samples ranging from 8% to 82%, very fine sand from 1% to 51% and silt-clay from 0.1% to 58% (NPWS, 2011). Characterising species of this community type that may form prey of Black-tailed Godwits include the bivalve *Scrobicularia plana*, and polychaetes *Hediste diversicolor* and *Arenicola marina*, while the bivalve *Macoma balthica* was also recorded (ASU, 2010).

During the high tide survey, 00417 (Clonmines Castle) held peak numbers of Black-tailed Godwits (353 birds) representing 81% of the total count on that date. These birds roosted as part of a mixed species roost (see Figure 7).

Figure 9. Distribution of Black-tailed Godwit foraging during low tide surveys (across all four surveys). 1 dot = 2 birds. Dots are placed randomly.



Bar-tailed Godwit

Bar-tailed Godwits occurred in five subsites during 2017/18: (00411 (St Kiernans to Saltmills to Big Burrow), 00413 (Saint Kiernans to Newtown), 00416 (Kiltra), and 00417 (Clonmines Castle) and 00418 (Bannow Island to Newquay). Peak numbers in all four low tide surveys were recorded in 00416 (Kiltra); highly consistent with the results from previous winter surveys. The peak subsite count was 542 individuals within 00416 during the March low tide survey. 00416 also held peak numbers of foraging individuals during all four low tide surveys (Figure 10).

Figure 10. Distribution of Bar-tailed Godwit foraging during low tide surveys (across all four surveys). 1 dot = 5 birds. Dots are placed randomly.



Curlew

The Curlew has a widespread distribution across Bannow Bay, occurring in all eight subsites. Despite this widespread nature however, a subsite preference is still evident as OO416 (Kiltra) supported peak numbers on three survey dates during 2017/18, and during all four previous winter surveys. Peak numbers in OO416 during 2017/18 represented between 34% and 72% of all Curlew counted on those survey dates. OO411 (St Kiernans to Saltmills to Big Burrow) held peak numbers on one low tide survey date. Overall this wader shows good consistency in subsite use across all low tide survey seasons.

Peak numbers during the high tide survey were recorded in OO417 (Clonmines Castle) representing 58% of all Curlew recorded on that date. Within OO417, 152 Curlew roosted supratidally within the mixed species flock shown in Figure 7, while a further 200 Curlew roosted terrestrially adjacent the inner estuary; these two the largest single roosting flocks recorded.

Redshank

Redshanks were widespread and recorded within all eight subsites during all low tide surveys. OO418 (Bannow Island to Newquay) held peak numbers during three low tide surveys while OO489 (Polfur) held peak numbers during the final March low tide survey. These results are highly consistent with results from previous winter surveys with OO418 recording peak numbers during all low tide surveys undertaken. OO416 (Kiltra) which held peak numbers during previous surveys was still important during 2017/18 with numbers ranked as 'high' during all four low tide surveys.

OO417 (Clonmines Castle) held peak numbers during the high tide survey with a total of 96 Redshank. The majority of these roosted supratidally within the mixed species flock shown in Figure 7. OO413 (Saint Kiernans to Newtown) recorded the second largest number of Redshank; the majority foraging.

4.9 Activities and disturbance

Activities at Bannow Bay centred upon 00413 (Saint Kiernans to Newtown) where five different activities were recorded overall but with two of these related to aquaculture (Table 16).

Sandy beaches at 00410 (Fethard Bay) are used regularly by walkers, often with dogs, but this activity was only recorded on one of the survey days. In addition, surveying 00410 and the southern section of 00411 (St Kiernans to Saltmills to Big Burrow) requires the fieldworker to walk along the shoreline for some distance. This in itself can cause disturbance to waterbirds, but during 2017/18 only Light-bellied Brent Geese were observed to be affected and their behavioural response was to move slightly further down shore only.

Activities associated with intertidal aquaculture (trestles) were recorded on two survey days only and involved tractors and fishermen attending Oyster (*Crassostrea gigas*) trestles. Five waterbird response records were noted and all were of a moderate nature, whereby the birds moved to another part of the subsite.

Table 16. Activities recorded at Bannow Bay 2017/18.

Subsite Code	Subsite Name	Activity	Number of survey occasions activity recorded
00410	Fethard Bay	Human on foot shoreline Dogs	1
00411	St Kiernans to Saltmills to Big Burrow	Horse riding	1
00413	Saint Kiernans to Newtown	Horse riding	2
		Shellfish Picker	1
		Bait diggers	1
		Human on foot, shoreline	2
		Aquaculture machinery	2
00416	Kiltra	Bait Diggers	1

5.0 DISCUSSION

5.1 Species assemblage and diversity

The total of 37 waterbird species recorded during the 2017/18 survey programme is reasonably consistent with previous low tide surveys at the site, and higher than the number of species recorded during the previous five I-WeBS seasons (range 29-36). The 2017/18 species list includes 29 bird species that are on the *Birds of Conservation Concern in Ireland* lists (Colhoun & Cummins 2013), including nine that are Red-listed and are of highest concern, and a further 18 species that are Amber-listed. All Special Conservation Interest (SCI) species listed for Bannow Bay SPA were recorded within all counts undertaken with the exception of Pintail that was not recorded during any survey. Pintail was last recorded during I-WeBS during the 2005/06 season, and very low numbers were recorded during the 2016/17 low tide surveys, but overall it appears that this dabbling duck no longer occurs at Bannow Bay.

5.2 Waterbird numbers and trends

While the total number of waterbirds showed great variation between months, all site counts during the 2017/18 season were lower than recorded in recent previous seasons. While weather conditions played a part in some surveys, overall the reason for this is not clear and it may be due to natural variation between seasons; hence the reason why waterbird data are usually shown as five-year averages to dampen natural annual fluctuations.

To examine waterbird trends, two methods were used in this report. The first method, that used an indexing method and generation of mean annual change across the total of five co-ordinated low tide surveys, revealed declining trends for nine of the 15 species assessed, with three species increasing, and three species stable. While the largest decline was seen for Black-tailed Godwit, this is perhaps misleading as the trend is driven by one exceptionally large count during the 2009/10 season and without this one large count, the species' trend would actually be for increase. However, relatively large declines were shown for Light-bellied Brent Goose, Grey Plover, Knot, Bar-tailed Godwit and Redshank across the period 2009/10 to 2017/18.

The second method to assess trends compared the four-year mean peak count for the surveys undertaken across the winters 2014/15, 2015/16, 2016/17 and 2017/18, with the baseline mean peak used for SPA designation. These results showed that five of the waterbird SCI species now occur in higher numbers than during the baseline period (Light-bellied Brent Goose, Oystercatcher, Golden Plover, Bar-tailed Godwit and Redshank), while six species appear to have declined in recent seasons as they occur in lower numbers than during the baseline period (Shelduck, Pintail, Lapwing, Dunlin, Black-tailed Godwit and Curlew) and two species occur in such similar numbers that they are considered to be stable (Grey Plover and Knot). The results of the short-term trend analysis and the longer term analysis are therefore not consistent, nor is there consistency with the trends as calculated using I-WeBS data in Section 3.2 with the exception of declines for Shelduck, Lapwing, Dunlin and Black-tailed Godwit. Nevertheless, the short-term trends for decline in a range of species cannot be ignored. While these results are notable, the data period is relatively short (five seasons of data) so further annual monitoring is paramount to continue building on the solid database of good quality and co-ordinated count data, as is regular updates of trend analyses.

5.3 Waterbird distribution

While bird count data collected over the past four winter seasons at Bannow Bay have proved important to assess waterbird numbers and trends, the primary use of these data is to provide an understanding of waterbird distribution across the site, and importantly track any changes in this distribution over time. Despite the inherent variability in estuarine ecosystems, broad-scale low tide distribution of waterbirds should remain relatively consistent over time, so long as major changes do not occur at a site (Musgrove et al. 2003; Lewis & Kelly, 2012; Lewis et al. 2016). It is therefore noteworthy that on the whole, distribution of the waterbird SCI species across Bannow Bay has remained relatively consistent over time. Several species for example Shelduck, Golden Plover and Oystercatcher, remain highly faithful to certain subsites for either foraging or roosting. In terms of foraging behaviour, this suggests that macroinvertebrate communities remain of a reasonably consistent quality year on year.

Bannow Bay is relatively sheltered with large parts of the site inaccessible and unsuitable for human recreation. High levels of human activity associated with recreation (walking, dog walking, surfers, boating etc) do not seem to occur to any great extent at Bannow Bay during winter. Activities at the site are therefore centred on aquaculture which occurs within one subsite (00413 (Saint Kiernans to Newtown)).

One subsite, 00416 (Kiltra) remains very important for a range of species; with total numbers during low tide ranked as 'very high' (peak) for a total of eight of the 12 waterbird SCI species assessed. However, the 2017/18 study has also shown how all subsites can be important at certain times. For example the outer bay (00410 Fethard Bay) can support peak numbers of foraging Light-bellied Brent Goose on occasion and particularly on spring low tides when areas with algae are uncovered that offer opportunistic foraging opportunities. The small inner estuarine subsite 00489 (Polfur) supported peak numbers of Redshank on one occasion representing a relatively high foraging density, while 00413 (Saint Kiernans to Newtown) despite supporting aquaculture and its associated activities, recorded two species in numbers ranked as 'very high' and six species in numbers ranked as 'high'.

5.4 Conclusions

The importance of intertidal estuaries for wintering waterbirds is well documented (Birdlife International, 2001), and these important coastal wetlands have long been the focus of conservation interest, often because they are surrounded by dense human populations, or there may be a conflict between conservation priorities and human activities such as waste disposal, land claim, shellfishing and recreation (dit Durrell et al. 2005; McNaghten & Crowe 2010). Key to the effective management of sites such as Bannow Bay is an effective monitoring programme which can underpin any management decisions put in place.

This report has provided results from the fifth season of low tide monitoring of wintering waterbirds at Bannow Bay. Overall the results are mixed. Assessment of waterbird trends suggests that some species have decreased in number in recent seasons for unknown reasons, and further annual monitoring is paramount to continue building on the solid database of good quality and co-ordinated count data, as is regular updates of trend analyses. Low tide distribution however, shows good consistency across the survey years, with several species

exhibiting a high degree of subsite fidelity. It is vital that surveys continue at this site to further inform trends.

REFERENCES & INFORMATION SOURCES

- ASU (2010) A survey of mudflats and sandflats in Ireland. An intertidal soft sediment survey of Bannow Bay. Report commissioned by the Marine Institute by The Aquatic Services Unit. April 2010.
- Austin, G.E., Calbrade, N.A., Mellan, H.J., Musgrove, A. J., Hearn, R.D., Stroud, D.A., Wotton, S. R. & Holt, C.A. (2014) Waterbirds in the UK 2012/13: The Wetland Bird Survey. BTO, RSPB and JNCC, in association with WWT. British Trust for Ornithology, Thetford.
- Bibby, C. J., Burgess, N. D., Hill, D. A. & Mustoe, S. H. (2000). *Bird Census Techniques*. Academic Press.
- BirdLife International (2001) Important Bird Areas and potential Ramsar Sites in Europe. BirdLife International, Wageningen, the Netherlands.
- Colhoun, K. & Cummins, S. (2013) Birds of conservation concern in Ireland 2014-2019. *Irish Birds* 9, 523-544.
- Crowe, O. (2005) *Ireland's Wetlands and their waterbirds: Status and Distribution*. BirdWatch Ireland. Newcastle, Co Wicklow.
- Crowe, O. & Holt, C. (2013) Estimates of waterbird numbers wintering in Ireland 2006/07 – 2010/11. *Irish Birds* 9, 545-552.
- Crowe, O., Austin, G. E., Colhoun, K., Cranswick, P., Kershaw, M. & Musgrove, A. J. (2008) Estimates and trends of waterbird numbers wintering in Ireland, 1994/95-2003/04. *Bird Study* 55, 66-77.
- Dalby, L., Fox, A.D., Petersen, I.K., Delany, S. & Svenning, J-C. (2013) Temperature does not dictate the wintering distributions of European dabbling duck species. *Ibis* 155, 80–88.
- Dit Durell, S., McGorty, S., West, A., Clarke, R., Goss-Custard, J. D. & Stillman, R. A. (2005) A strategy for baseline monitoring of estuary Special Protection Areas. *Biological Conservation* 121, 289–301
- DoEHLG (2009) *Shellfish Pollution Reduction Programme. As required by Article 5 of the Shellfish Water Directive 2006/113/EC and Section 6 of the Quality of Shellfish Waters Regulations, 2006 (S.I. No. 268 of 2006). Characterisation Report Number 11. Bannow Bay Shellfish Area. County Wexford* Department of the Environment, Health and Local Government.
- Frost, T.M., Austin, G.E., Calbrade, N.A., Holt, C.A., Mellan, H.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. & Balmer, D.E. (2016) Waterbirds in the UK 2014/15: The Wetland Bird Survey. BTO, RSPB and JNCC, in association with WWT. British Trust for Ornithology, Thetford.
- Fossitt, J.A. (2000) *A Guide to the Habitats of Ireland*. The Heritage Council, Ireland.
- Lewis, L. J. & Kelly, T. C. (2012) Aspects of the spatial ecology of waders along an estuarine gradient. *Irish Birds* 9, 375-384.
- Lewis L. J. & Tierney, T. D. (2014) Low tide waterbird surveys: survey methods and guidance notes. *Irish Wildlife Manuals* No. 80. National Parks & Wildlife Service, Department of the Arts, Heritage and Gaeltacht.
- Lewis, J. L., Tierney, N., Boland, H. & Tierney, T. D. (2016) Tidal variation in the use of Dublin Bay by wintering waterbirds. *Irish Birds* 10, 373 – 382.
- Limosa Environmental (2017) Wintering waterbirds of Bannow Bay, Co Wexford. 2016/17. Report for Inis Environmental Consultants. March 2017.
- Limosa Environmental (2016) Wintering waterbirds of Bannow Bay, Co Wexford. 2015/16. Report for Inis Environmental Consultants. March 2016.
- Limosa Environmental (2015) Wintering waterbirds of Bannow Bay, Co Wexford. 2014/15 Report for Inis Environmental Consultants. March 2015.
- McNaghten, L. & Crowe, O. (2010) *Change in status and distribution of non-breeding waterbirds in Ireland 1970 – 2008*. Report by BirdWatch Ireland to the Heritage Council. November 2010.
- Met Éireann (2018) Weather summary for winter 2018. <http://www.met.ie/climate/monthly-weather-reports.asp>.
- Musgrove, A J, Langston, R H W, Baker, H and Ward, R M (eds) (2003) *Estuarine Waterbirds at Low Tide: the WeBS Low Tide Counts 1992/93 to 1998/99*. WSG/BTO/WWT/RSPB/JNCC, Thetford.
- NPWS (2011) *Bannow Bay Sac (Site Code 0697) Conservation Objectives Supporting Document*. Version 1. November 2011.

- NPWS (2012) Bannow Bay Special Protection Area. Site Code 4033. Conservation Objectives Supporting Document. Version 1. February 2012. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Overview Volume 1. Unpublished report, National Parks & Wildlife Service. Department of the Environment, Heritage and Local Government, Ireland.
- Wetlands International (2012) *Waterfowl Population Estimates – Fifth Edition*. Wetlands International, Wageningen, The Netherlands.

APPENDIX 1

SITE NAME: BANNOW BAY SPA

SITE CODE: 004033

Bannow Bay is a large, very sheltered, estuarine system with a narrow outlet to the sea, situated on the south coast of Co. Wexford. It is up to 14 km long along its north-east/south-west axis and has an average width of about 2 km. A number of small- to medium-sized rivers flow into the site, the principal being the Owenduff and the Corock which enter at the top end of the estuary. Very extensive intertidal mud and sand flats are exposed at low tide. The sediments have a rich macroinvertebrate fauna, with such species as Peppery Furrow-shell (*Scrobicularia plana*), Ragworm (*Hediste diversicolor*) and Lugworm (*Arenicola arenaria*) occurring frequently. Mats of green algae (*Ulva* spp.) are present on the intertidal flats and shorelines. Salt marshes are well-developed in the sheltered areas of the site and are characterised by species such as Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Saltmarsh Rush (*Juncus gerardi*) and Sea Rush (*Juncus maritimus*). Swards of Glasswort (*Salicornia* spp.) occur on the lower zones of the salt marshes and extend onto the intertidal flats.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Light-bellied Brent Goose, Shelduck, Pintail, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

Bannow Bay supports an excellent diversity of wintering waterfowl and is one of the most important sites in the south-east. Of particular note is an internationally important population of Light-bellied Brent Goose (561) and Black-tailed Godwit (546) - all figures are mean peaks for the 5 winters 1995/96-1999/2000. The site also supports nationally important numbers of a further eleven species: Shelduck (500), Pintail (52), Oystercatcher (711), Golden Plover (1,955), Grey Plover (142), Lapwing (2,950), Knot (508), Dunlin (3,038), Bar-tailed Godwit (471), Curlew (891) and Redshank (377). The populations of Shelduck and Bar-tailed Godwit are of particular note as they comprise 3.4% and 3.0% of the respective all-Ireland totals. Other species which occur in numbers of regional importance include Wigeon (412), Teal (256), Ringed Plover (38) and Turnstone (50). The intertidal sand and mud flats provide excellent feeding for the waterfowl species, while suitable high tide roosts are provided by the salt marshes and other shoreline habitats. Part of the site is a Wildfowl Sanctuary.

Bannow Bay SPA is an excellent example of an enclosed estuarine system. It supports internationally important populations of Light-bellied Brent Goose and Black-tailed Godwit as well as nationally important populations of a further eleven species. Two of the species that occur, i.e. Golden Plover and Bar-tailed Godwit, are listed on Annex I of the E.U. Birds Directive.

Site Name: Bannow Bay**SAC Site Code: 000697**

Bannow Bay SAC is a relatively large estuarine site, approximately 14 km long, on the south coast of Co. Wexford. Small rivers and streams to the north and south-west flow into the bay and their sub-estuaries from part of the site. The bay contains large areas of mud and sand, and the underlying geology is mainly of Ordovician slates with the exception of the areas to the east of Bannow Island which are underlain by Cambrian slates.

The site is a Special Area of Conservation (SAC) selected for the following habitats and/or species listed on Annex I / II of the E.U. Habitats Directive (* = priority; numbers in brackets are Natura 2000 codes):

- [1130] Estuaries
- [1140] Tidal Mudflats and Sandflats
- [1210] Annual Vegetation of Drift Lines
- [1220] Perennial Vegetation of Stony Banks
- [1310] *Salicornia* Mud
- [1330] Atlantic Salt Meadows
- [1410] Mediterranean Salt Meadows
- [1420] Halophilous Scrub
- [2110] Embryonic Shifting Dunes
- [2120] Marram Dunes (White Dunes)
- [2130] Fixed Dunes (Grey Dunes)*

The estuary, including the saltmarshes, makes up just over 80% of the site. At low tide up to three-quarters of the substrate is exposed. There are mudflats in the narrow northern part and also in the south-west and south-east. The sediments of the inner estuary associated with the Corock and Owenduff Rivers are generally black anoxic mud, with some fine sand and broken shell. Mats of green algae (*Enteromorpha* spp.) are present and seaweeds (*Fucus* spp.) have colonised stony substrates, particularly further south.

Saltmarshes of exceptional species diversity are found above the sand and mudflats, particularly at the south of the site. Communities associated with cord-grass (*Spartina* sp.) and glassworts (*Salicornia* spp.) occur in the saltmarsh and on its fringes. A diverse range of glassworts has been recorded, including *Salicornia pusilla*, *S. ramosissima*, *S. europaea*, *S. fragilis* and *S. dolichostachya*.

The main areas of saltmarsh are on the islands at Clonmines, at the mouth of the tributary at Clonmines, at the mouth of the tributary at Taulaght, close to Saint Kieran's House, at the north-west of Big Burrow, at the south-east of Bannow Island and at the west of Rabbit Burrow in Fethard Bay. Very small fragmented linear strips of saltmarsh occur in the upper estuary as far north as the confluence of the Corock and Owenduff Rivers and along the other tributaries. The main type of saltmarsh present is Atlantic salt meadow, although the Mediterranean type is also found. Typical species of the former include Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Thrift (*Armeria maritima*), Sea Plantain (*Plantago maritima*), Red Fescue (*Festuca rubra*), Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardi*), Sea Arrowgrass (*Triglochin maritima*) and Sea Beet (*Beta vulgaris* subsp. *maritima*). An abundance of Sea Purslane (*Halimione portulacoides*) is found in Fethard and in part of the Taulaght saltmarshes. In the larger areas of saltmarsh Sea Rush (*Juncus maritimus*), a species more typical of Mediterranean salt meadows, is found. Other plants recorded are Lax-flowered Sea-lavender (*Limonium humile*) and Common Scurvygrass (*Cochlearia officinalis*).

Good conditions for the community 'annual vegetation of drift lines' exist on the seaward side of dune systems at this site. Typical species which have been recorded include Sea Rocket (*Cakile maritima*), mayweed (*Matricaria* sp.), Sea Spurge (*Euphorbia paralias*), Sea-holly (*Eryngium maritimum*), orache species (*Atriplex* spp.), *Polygonum* spp. and Sea Beet (*Beta vulgaris* subsp. *maritima*). Areas of habitat

which are likely to be suitable for the development of the community 'perennial vegetation of stony banks' exist at this site, but are small in area.

Also linked with saltmarshes in places are stony beaches and reedbeds. Narrow shingle beaches up to 30 m wide occur in places along the edge of the estuary. The fringing reed communities are mainly confined to the tributaries and are relatively small in extent. They support Sea Club-rush (*Scirpus maritimus*), Grey Club-rush (*S. tabernaemontani*), Hemlock Water-dropwort (*Oenanthe crocata*) and abundant Common Reed (*Phragmites australis*). Halophilous scrub occurs in four of the larger saltmarsh areas. It is characterised by the presence of the legally protected (Flora (Protection) Order, 1999) and Red Data Book-listed plant Perennial Glasswort (*Arthrocnemum perenne*), which occurs in only a few sites in the country.

A mosaic of sand dune habitats occurs in three areas at the edge of the estuary. Embryonic shifting dunes and white dunes are characterised by the presence of Lyme-grass (*Leymus arenarius*), Marram (*Ammophila arenaria*), Sea Spurge and Seaholly in both Big Burrow and to the south east of Bannow Island.

The priority habitat fixed grey dune is also present. Typical species here include Common Bird's-foot-trefoil (*Lotus corniculatus*), Kidney Vetch (*Anthyllis vulneraria*), Wild Thyme (*Thymus praecox*), stork's-bill species (*Erodium* spp.), Ribwort Plantain (*Plantago lanceolata*), Common Restharrow (*Ononis repens*), Mouse-ear Hawkweed (*Hieracium pilosella*), Field Wood-rush (*Luzula campestris*) and Wild Carrot (*Daucus carota*). Some areas of this dune type contain a carpet of the moss *Tortula ruraliformis* and lichens (*Cladonia* sp.). There is some gorse (*Ulex* sp.) present beside the mossy area at the south-east of the site. Bee Orchid (*Ophrys apifera*) and Pyramidal Orchid (*Anacamptis pyramidalis*) have also been recorded. Sharp Rush (*Juncus acutus*) occurs in a dune slack associated with the grey dunes at Big Burrow. At the west of the system, east of Bannow Island, the dunes are quite high, reaching almost 15m. Non-native plant species, including Tree Mallow (*Lavatera arborea*), occur in several parts of the site.

Some freshwater habitats occur at the northern end of the site. These consist mainly of a mosaic of marsh, reedbed and willows (*Salix* spp.). Species present include Common Reed, with young willows scattered throughout and Hemlock Waterdropwort abundant in the ground layer. In other areas the wetland vegetation consists of a mosaic of Phragmites reedbed, patches of Hard Rush (*Juncus inflexus*), Meadowsweet (*Filipendula ulmaria*), Creeping Buttercup (*Ranunculus repens*), Marsh Bedstraw (*Galium palustre*), Greater Tussock-sedge (*Carex paniculata*), Marshmarigold (*Caltha palustris*) and occasional Bulrush (*Typha latifolia*), along some old drains. The wetland areas generally merge into a narrow band of dense scrub dominated by Blackthorn (*Prunus spinosa*) and Hawthorn (*Crataegus monogyna*), with some Ash (*Fraxinus excelsior*), willow and gorse.

Most of the estuary has been designated a Special Protection Area (SPA) under the E.U. Birds Directive because of its significant bird interest, particularly during the winter. Parts of this area have also been designated a Wildfowl Sanctuary. Large numbers of wintering wildfowl and waders feed on the mudflats and sandflats, and use the fringing vegetation of reedbed and saltmarsh for roosting and feeding. Populations present include internationally important numbers of Light-bellied Brent Goose (819), and nationally important numbers of Shelduck (475), Pintail (85), Golden Plover (3,144) - a species listed on Annex I of the E.U. Birds Directive, Lapwing (2,000), Knot (508), Dunlin (3,850), Black-tailed Godwit (697), Bar-tailed Godwit (334) and Redshank (377) (all figures mean peaks 1994/95 to 1997/98).

Important breeding populations found within the site include two species listed on Annex I of the E.U. Birds Directive (Little Tern and Kingfisher), a colony of Sand Martins in the cliffs at the west of the site and a heronry

Otter and Common Seal occur within the site.

Land use at the site consists mainly of shellfish farming; approximately 20 ha of the intertidal area is under cultivation. Current annual production of oysters is approximately 100 tonnes, concentrated mainly on three farms. There are other farms, but these are in the initial stages of cultivation and current production is negligible. There is evidence of poor farm management in some locations. There are numerous abandoned trestles in the intertidal zone and along the top of the shore. Grading equipment is permanently left on the shore and some areas of saltmarsh are being used as a grading area for oysters. In some areas damage is caused to the shingle vegetation and to the substrate by tractors accessing the aquaculture farms. Any further increase in aquaculture poses a threat.

Other land uses include shooting, bird-watching, conservation management, grazing in some of the dune areas, horse-riding on the beach and Big Burrow sand dunes, picnicing, swimming, sailboarding, jet-skiing, line fishing and bait digging. The removal of sand and beach material also occurs at the site.

The site is of considerable conservation significance for the large number of E.U. Habitats Directive Annex I habitats that it contains, including the priority habitat fixed grey dune. The legally protected and Red Data Book plant species Perennial Glasswort also occurs. The site is also an SPA because of the important numbers of wintering wildfowl it supports, including an internationally important population of Light-bellied Brent Goose.

APPENDIX 2

Waterbird species recorded during the winter of 2017/18, plus listing on Annex I (Birds Directive) plus an indication of conservation concern in Ireland (BoCCI, Red or Amber-listed) after Colhoun & Cummins (2013)(species listed in alphabetical order).

Code	Species Name	Latin name	Annex I	BoCCI
BA	Bar-tailed Godwit	<i>Limosa lapponica</i>	Y	Amber
BH	Black-headed Gull	<i>Chroicocephalus ridibundus</i>		Red
BW	Black-tailed Godwit	<i>Limosa limosa</i>		Amber
CM	Common Gull	<i>Larus canus</i>		Amber
CA	Cormorant	<i>Phalacrocorax carbo</i>		Amber
CU	Curlew	<i>Numenius arquata</i>		Red
DN	Dunlin	<i>Calidris alpina</i>		Red
GP	Golden Plover	<i>Pluvialis apricaria</i>	Y	Red
GN	Goldeneye	<i>Bucephala clangula</i>		Red
GB	Great Black-backed Gull	<i>Larus marinus</i>		Amber
GG	Great Crested Grebe	<i>Podiceps cristatus</i>		Amber
ND	Great Northern Diver	<i>Gavia immer</i>	Y	Amber
GK	Greenshank	<i>Tringa nebularia</i>		
H.	Grey Heron	<i>Ardea cinerea</i>		
GV	Grey Plover	<i>Pluvialis squatarola</i>		Amber
HG	Herring Gull	<i>Larus argentatus</i>		Red
KN	Knot	<i>Calidris canutus</i>		Amber
L.	Lapwing	<i>Vanellus vanellus</i>		Red
LB	Lesser Black-backed Gull	<i>Larus fuscus</i>		Amber
PB	Light-bellied Brent Goose	<i>Branta bernicla hrotra</i>		Amber
ET	Little Egret	<i>Egretta garzetta</i>	Y	
LG	Little Grebe	<i>Tachybaptus ruficollis</i>		Amber
MA	Mallard	<i>Anas platyrhynchos</i>		
MS	Mute Swan	<i>Cygnus olor</i>		Amber
OC	Oystercatcher	<i>Haematopus ostralegus</i>		Amber
RM	Red-breasted Merganser	<i>Mergus serrator</i>		
RK	Redshank	<i>Tringa totanus</i>		Red
IN	Ring-billed Gull	<i>Larus delawarensis</i>		
RP	Ringed Plover	<i>Charadrius hiaticula</i>		
RU	Ruff	<i>Philomachus pugnax</i>		
SS	Sanderling	<i>Calidris alba</i>		
SA	Shag	<i>Phalacrocorax aristotelis</i>		Amber
SU	Shelduck	<i>Tadorna tadorna</i>		Amber
SN	Snipe	<i>Gallinago gallinago</i>		Amber
T.	Teal	<i>Anas crecca</i>		Amber
TT	Turnstone	<i>Arenaria interpres</i>		
WN	Wigeon	<i>Anas penelope</i>		Red