EMFF Operational Programme 2014-2020

Marine Biodiversity Scheme

Marine Institute Bird Studies

Winter Waterbird Survey

Bannow Bay SPA, County Wexford.

2018-2019

Lead Agency: Marine Institute, Hookhead Shellfish Ltd.

Authors: INIS Environmental Consultants Ltd.

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

Foras na Mara
Marine Institute

Operational Programme	European Maritime and Fisheries Fund (EMFF) Operational Programme 2014-2020
Priority	Union Priority 1 Sustainable Development of Fisheries Union Priority 6 Fostering the implementation of the Integrated Maritime Policy
Thematic Objective	TO 6 - Preserving and protecting the environment and promoting resource efficiency
Specific Objective	UP1 SO1 - Reduction of the impact of fisheries and aquaculture on the marine environment, including the avoidance and reduction, as far as possible, of unwanted catch. UP1 SO2 - Protection and restoration of aquatic biodiversity and ecosystems. UP6 SO1 - Development and implementation of the Integrated Maritime Policy
Measure	Marine Biodiversity Scheme
Project No.	MB/2019/08
EMFF Certifying Body	Finance Division, Department of Agriculture, Food and the Marine
Managing Authority	Marine Agencies & Programmes Division, Department of Agriculture, Food and Marine
Specified Public Beneficiary Body	Marine Institute
Grant Rate	100%
EU Co-Financing Rate	50%
Legal Basis	Article 29, 40 & 80 EMFF
Details	Report to the Marine Institute Inís.

This project or operation is part supported by the Irish government and the European Maritime & Fisheries Fund as part of the EMFF Operational Programme for 2014-2020

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Quality Assurance

The findings outlined within this report and the data we have provided are to our knowledge true and express our bona fide professional opinions. This report has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management (CIEEM) Code of Professional Conduct. Where pertinent, CIEEM Guidelines used in the preparation of this report include the *Guidelines for Ecological Report Writing* (CIEEM, 2017), *Guidelines for Preliminary Ecological Appraisals* (CIEEM, 2015) and *Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine*, (CIEEM, 2018). CIEEM Guidelines include model formats for Preliminary Ecological Appraisal and Ecological Impact Assessment. Also, where pertinent, evaluations presented herein take cognisance of recommended Guidance from the EPA such as *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2017), and in respect of European Sites, *Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC* (European Commission, 2018).

Due cognisance has been given at all times to the provisions of the *Wildlife Act (1976),* the *Wildlife (Amendment) Act (2000)*, the *European Union (Natural Habitats) Regulations (SI 378/2005)*, the *European Communities (Birds and Natural Habitats) Regulations (2011),* EU Regulation on Invasive Alien Species under *EU Regulation 1143/2014*, the *EU Birds Directive 2009/147/EC* and the *EU Habitats Directive 92/43/EEC*.

No method of assessment can completely remove the possibility of obtaining partially imprecise or incomplete information. In line with Best Practice, any limitation to the methods applied or constraints however are clearly identified within the main body of this document.

Version	Date		Name	Signature
1	16/05/19	**Report prepared by:**	Dr. Lesley Lewis BSc PhD MCIEEM	
1	02/07/19	**Report checked by:**	Dr. Alex Copland BSc PhD	
1	04/07/19	**Report signed off by:**	Howard Williams CEnv, MCIEEM CBiol MRSB MIFM	
Title		Bannow Bay Waterbird Survey – Winter 2018-19 Bird Survey Report		

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1. INTRODUCTION

INIS Environmental Consultants Ltd were contracted to co-ordinate a series of waterbird surveys at Bannow Bay, Co. Wexford during the 2018/19 winter season. Following standard methodology used for surveying wintering waterbirds at low tide (Lewis & Tierney, 2014), the surveys included four low tide surveys and a single high tide survey.

This report details the results of the 2018/19 waterbird survey programme. The results are examined and discussed in light of similar surveys undertaken during the four previous winter seasons, and a baseline low tide survey undertaken during 2009/10 as part of the National Parks & Wildlife Service (NPWS) Waterbird Survey Programme (NPWS, 2012).

1.1. Constraints and limitations

There are a number of limitations inherent to field-based surveying. These particularly relate to availability of suitable weather conditions for completing surveys, with good visibility and little wind or rain of paramount importance. As such, when undertaking and completing fieldwork, careful consideration and planning is made to ensure optimal weather conditions during survey periods. The data presented here were all collected in optimal weather conditions.

When counting shorebirds, disturbance can substantially impact on the birds present within small areas if they are able to disperse away from the source of disturbance to adjacent areas of similar habitat but out with the areas where surveying is taking place. Such disturbance may happen in advance of the count taking place or during the survey period. To gauge levels of disturbance Best Practice methods include an assessment of disturbance levels encountered during the recording period. Such an assessment of disturbance allows the likely impact on shorebird numbers and distribution to be determined, particularly when looking at likely response to different disturbance events. Details of recorded disturbance are therefore provided.

Constraints and any limitations to available datasets used for comparative analysis are presented in where known.

1.2. Statement of Authority

Mr Howard Williams MCIEEM CEnv CBiol MRSB MIFM is Lead Ecologist with Inis and has more than 20 years' experience as a professional ecologist, specialising in birds. Following his degree, he worked as a biologist for the ESB for three years (1997-2000). Mr Williams has completed in excess of 500 separate ecology assessments in Ireland and the UK since 2000. Mr Williams is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Chartered Biologist (CBiol) with the Society of Biology. He is also a full member of the Institute of Fisheries Management. Mr Williams is principal ecologist with INIS Environmental Consultants Ltd and currently project manager on all INIS projects in the Republic of Ireland and the UK.

Mr. Chris Cullen Dip. Eng. Dip. Ecol. ACIEEM is a Senior Ecologist with INIS and has more than 10 years' experience as a professional ecologist, specialising in birds. Chris is an Associate Member of the Chartered Institute of Ecology and Environmental Management. He holds a Higher National Diploma in Engineering and a further Diploma in Field Ecology. Chris has a broad range of experience within the environmental sector. He is a specialist in Ornithological survey and assessment and has experience at a professional and voluntary level of a wide range of bird survey techniques. He is interested in wintering wildfowl and has been a contributor to IWeBS and Low Tide count studies across the south of Ireland. He has conducted specific research on the diet of wintering raptors such as Short-eared Owl and Hen Harrier. Chris has been a co-recipient of the BTO Boddy and Sparrow prize in respect of research on the roosting of Barn Swallows.

He also has experience in Project Management, Appropriate Assessment (Case law), Expert Witness testimony, Legal review, Due Diligence, Cumulative Impact Assessment, Habitat Mapping, Mitigation Development, EIA, Collision Risk Modelling, Biomonitoring, Education, and Public Speaking. Over the last number of years Chris has been involved in a number of significant SID Projects and has overseen Ecology requirements from Scoping Stage through planning and oral hearing. Chris has had a number of papers published in peer reviewed publications such as Irish Birds, The Irish Naturalists Journal, The Proceedings of the Royal Irish Academy, Ringing and Migration and In Practice. Chris has also been a named author on additional papers published in journals such as Ibis.

Dr. Alex Copland BSc PhD is Senior Ecologist with INIS and has over 20 years of bird survey experience. He is proficient in experimental design and data analysis and has been working on bird populations in Ireland for over 18 years. He has managed several large-scale, multi-disciplinary conservation projects, including research and conservation work for species of conservation concern, the design and delivery of practical conservation actions, education and interpretation on the environment and the development of co-ordinated, strategic plans for birds and biodiversity in Ireland.

He has written numerous scientific papers, developed and contributed to evidence-based position papers, visions and strategies on birds and habitats in Ireland. He has supervised the successful completion of research theses for several post-graduate students, including doctoral candidates. He lectures to both undergraduate and post-graduate students at UCD, as well as being a collaborative researcher with both UCD and UCC. He sits on the Editorial Panel of the scientific journal, *Irish Birds*.

Dr. Lesley Lewis BSc PhD MCIEEM is a specialist waterbird ecologist. Her PhD focused on the ecological disturbance and effects on estuarine benthic invertebrate communities and their avian predators. Lesley is an accomplished waterbird surveyor having undertaken surveys for her PhD and within the private consultancy sector. As Waterbird Ecologist for NPWS, she was responsible for the design and implementation of the NPWS baseline low tide waterbird survey programme. Lesley was the project manager for the programme of surveys that ran over three winters (2009/10, 2010/11 and 2011/12) with surveys undertaken across 32 coastal Special Protection Areas (SPAs). Data collected from the low tide waterbird survey programme were analysed and used in the process of formulating conservation objectives for coastal SPAs. Lesley worked on all aspects of this process from the initial stages of conception and development, data analysis, through to the production of conservation objectives documents for all 32 coastal SPAs. This work culminated in the publication of standard low-tide survey methods for waterbirds (Lewis & Tierney, 2014).

2. EXISTING ENVIRONMENT

2.1. Site Description

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 2.1.1). 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).

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 (SAC; Site Code 00697) under the EU Habitats Directive[2]. The SPA and SAC site synopses are given in Appendix 1.

2.2. Bannow Bay Waterbirds

Bannow Bay SPA (Figure 2.1.1) covers a total area of 1,364ha and is of special conservation interest for 13 waterbird species (Table 2.2.1), two of which (Light-bellied Brent Goose and Black-tailed Godwit) have occurred in numbers of international importance in the past.

In addition to the 13 waterbird SCI species, a further 15 species occur regularly at the site during winter (NPWS, 2012):

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

[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).

Figure 2.2.1; Location of Bannow Bay SPA, Co. Wexford (source: NPWS, 2012)

Table 2.2.1: 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 *Branta bernicla hrota*	561	International Importance
Shelduck *Tadorna tadorna*	500	All-Ireland Importance
Pintail *Anas acuta*	52	All-Ireland Importance
Oystercatcher *Haematopus ostralegus*	711	All-Ireland Importance
Golden Plover *Pluvialis apricaria*[b]	1,955	All-Ireland Importance
Grey Plover *Pluvialis squatarola*	142	All-Ireland Importance
Lapwing *Vanellus vanellus*	2,950	All-Ireland Importance
Knot *Calidris canutus*	508	All-Ireland Importance
Dunlin *Calidris alpina*	3,038	All-Ireland Importance
Black-tailed Godwit *Limosa limosa*	546	International Importance
Bar-tailed Godwit *Limosa lapponica*[b]	471	All-Ireland Importance
Curlew *Numenius arquata*	891	All-Ireland Importance
Redshank *Tringa totanus*	377	All-Ireland Importance

[a]Five year peak mean for the period 1995/96 – 1999/00; [b]Annex I species

2.2.1. Published status ad trends of Bannow Bay waterbirds

The site trend for waterbird SCI species of Bannow Bay, based on I-WeBS data, was reported in the SPA Conservation Objectives Supporting Document (NPWS, 2012) (Table 2.2.2 column d). However, based on data for the period 1995/96 – 2007/08, this site trend is now considered out-of-date. Examining baseline data (Table 2.2.2, column a) against recent I-WeBS data (column b) in Table 2.2.2 suggests a decline in numbers for seven of the SCI species, while five species have occurred recently in numbers greater than during the baseline period, and one species (Redshank) appears stable. It should be borne in mind however that full count cover during I-WeBS has not been achieved in any of the recent five I-WeBS seasons (maximum 2-3 counts per season) and this may have a bearing on the peak counts recorded.

Table 2.2.2: 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 (95/96 – 99/00)[I]	(b) Recent data (12/13 – 16/17)[II]	(c) Comparison (a) vs (b)	(d) Reported trend (95/96 – 07/08)[III]
Light-bellied Brent Goose	561 (i)	1,012 (i)	Increase	Intermediate (Unfavourable)
Shelduck	500 (n)	338 (n)	Decrease	Highly Unfavourable
Pintail	52 (n)	0	Decrease	n/c
Oystercatcher	711 (n)	853 (n)	Increase	Favourable
Golden Plover	1,955 (n)	4,525 (n)	Increase	Intermediate (Unfavourable)
Grey Plover	142 (n)	79 (n)	Decrease	Highly Unfavourable
Lapwing	2,950 (n)	1,166 (n)	Decrease	Intermediate (Unfavourable)
Knot	508 (n)	232 (n)	Decrease	Highly Unfavourable
Dunlin	3,038 (n)	1,624 (n)	Decrease	Highly Unfavourable
Black-tailed Godwit	546 (i)	469 (n)	Decrease	Favourable
Bar-tailed Godwit	471 (n)	955 (n)	Increase	Favourable
Curlew	891 (n)	944 (n)	Increase	Intermediate (Unfavourable)
Redshank	377 (n)	374 (n)	Stable	Intermediate (Unfavourable)

[I]Five year peak mean for the period 1995/96 to 1999/00;
[II]Four year peak mean for the period 2012/13 – 2016/17;
[III]Favourable (stable/increasing); intermediate unfavourable (population declines 1.0 – 24.9%); unfavourable (population declines 25.0 – 49.9%); highly unfavourable (population declines > 50%) (NPWS, 2012);
n = numbers of all-Ireland importance (Baseline = after Crowe & Holt, 2013; Current = Burke et al. 2018);
i = numbers of international importance (Baseline = after Wetlands International, 2012; Current = after AEWA, 2018).

3. METHODOLOGIES

3.1. 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 1994/95, have underpinned the designation of Special Protection Areas (SPAs), and have enabled the production of waterbird population estimates and trends at national and at site level (e.g. Crowe & Holt, 2013; Burke *et al*. 2018). 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 (NPWS) 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 2018/19 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, 2016/17 and 2017/18 seasons in addition to the baseline data collected by NPWS in 2009/10.

3.2. Survey design and count area

During the 2018/19 season, a standard survey programme of four low tide counts and one high tide count was undertaken. Low tide surveys were carried out on 10th October 2018, 26th November 2018, 10th December 2018 and 11th February 2019. The high tide survey was undertaken on 15th January 2019.

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.

The surveys covered the same count area and count subdivisions (subsites) of Bannow Bay as used during the 2009/10 NPWS Waterbird Survey Programme. The survey area covering *c.* 1,400 ha was subdivided into eight count subsites (Table 3.2.1; Figure 3.2.1) which were counted by three fieldworkers on each survey day. The 2018/19 season fieldworkers were Lesley J. Lewis (LJL), Barry O'Mahony (BOM) and Alex Copland (AC).

Table 3.2.1 Count Subsites of Bannow Bay

Subsite Code	Subsite Name
0O410	Fethard Bay
0O411	St Kiernans to Saltmills to Big Burrow
0O413	Saint Kiernans to Newtown
0O416	Kiltra
0O417	Clonmines Castle
0O418	Bannow Island to Newquay
0O487	Tintern Abbey to Tintern Bridge
0O489	Pollfur

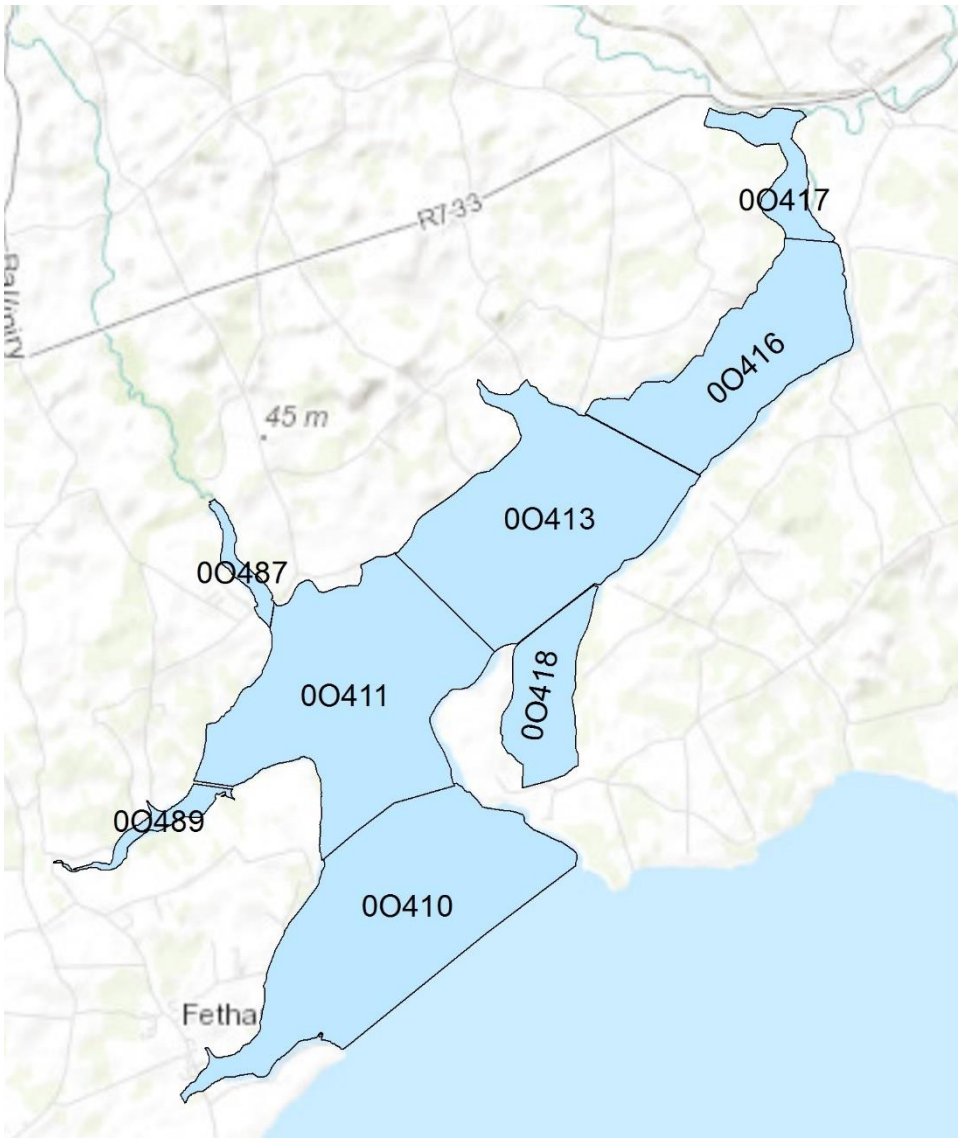


Figure 3.2.1: Count subsites used for the Bannow Bay waterbird surveys.

3.3. 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.

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').

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.

3.4. Data analysis

3.4.1. General

Field data were collected in notebooks and later transferred by field surveyors into Excel datasheets. At the end of the survey season the Excel datasheets were compiled and validated before being formatted and entered into an Access database. 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 numbers of all-Ireland importance. Current population threshold values are published in Burke *et al*. (2018).
- 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 international population threshold values are published by the African-Eurasian Migratory Waterbird Agreement (AEWA) Conservation Status Review 7 (CSR7) (AEWA 2018) (published online at wpe.wetlands.org).

3.4.2. Waterbird distribution

Following the methods used in NPWS (2012) data analyses were undertaken 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).

3.4.3. Trends

The peak count from the low tide surveys of the 2018/19, 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 and were then used to calculate indices. An index for the first season (2009/10) 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 2009/10 and 2018/19.

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 five-year mean peak count was calculated for the surveys undertaken across the winters 2014/15, 2015/16, 2016/17, 2017/18 and 2018/19. The mean peak value was then compared to the baseline mean peak as used for SPA designation.

4. RESULTS

4.1. Survey schedule and conditions

The 2018/19 winter waterbird survey season proceeded relatively unhampered by weather conditions. All surveys were carried out with good weather conditions (Table 4.1.1).

Table 4.1.1: Weather conditions for the 2018/19 survey programme.

Date	Survey	Wind	Cloud	Rain	Visibility	Notes
10.10.18	LT1	Calm	0-33%	None	Good	No survey constraints
26.11.18	LT2	Calm	0-33%	None	Good	No survey constraints
10.12.18	LT3	Calm	0-66%	None	Good	No survey constraints
15.01.19	HT1	Calm	0-33%	None	Good	No survey constraints
11.02.19	LT4	Calm	0-33%	None	Good	No survey constraints

4.2. Species assemblage and diversity

A total of 38 waterbird species were recorded during the 2018/19 surveys, which included 18 wildfowl and allies, 15 wader species, and five gull species (Table 4.2.1).

The total species list includes six species (Red-throated Diver, Great Northern Diver, Slavonian Grebe, Little Egret, Golden Plover and Bar-tailed Godwit) listed on Annex I of the EU Bird's Directive, and 28 species that are on the *Birds of Conservation Concern in Ireland* lists (Colhoun & Cummins, 2013), including five that are Red-listed and are of highest concern, and a further 23 species that are Amber-listed. All Special Conservation Interest (SCI) species listed for Bannow Bay SPA were recorded with the exception of Pintail which was not recorded during any survey.

Species diversity (whole site) during low tide surveys ranged between 27 and 33 species, while 29 species were recorded during the January high tide survey. 24 species were recorded in all five surveys undertaken. Subsite species diversity ranged from a total 13 species (0O487 Tintern Abbey to Tintern Bridge) to a peak 33 species (0O413 Saint Kiernans to Newtown) (Figure 4.2.1, Table 4.2.2). Eight species (Teal, Mallard, Little Egret, Black-tailed Godwit, Curlew, Redshank, Black-headed Gull & Herring Gull) occurred in all eight subsites.

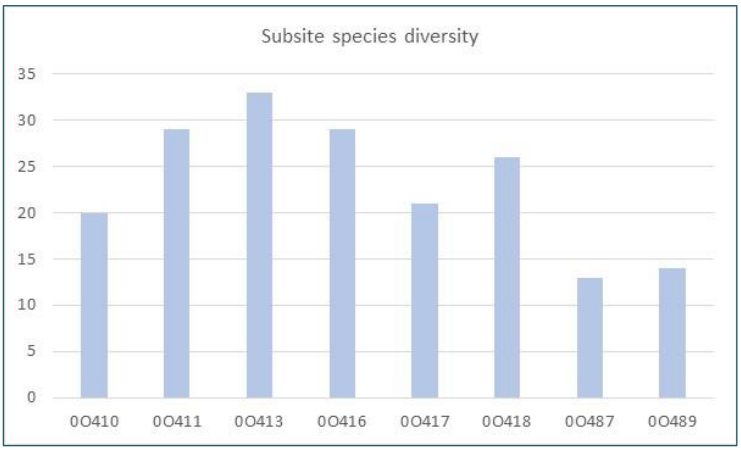


Figure 4.2.1: Subsite diversity

Table 4.2.1: Species recorded during the winter surveys at Bannow Bay. The table highlights Annex I species (EU Bird's Directive) and Red and Amber-listed species under 'Birds of Conservation Concern' (Colhoun & Cummins, 2013).

Species name	Scientific name	Code	BoCCI	Annex 1
Mute Swan	*Cygnus olor*	MS	A	
Greylag Goose	*Anser anser*	GJ	A	
Light-bellied Brent Goose	*Branta bernicla hrota*	PB	A	
Shelduck	*Tadorna tadorna*	SU	A	
Wigeon	*Anas penelope*	WN	A	
Teal	*Anas crecca*	T.	A	
Mallard	*Anas platyrhynchos*	MA		
Goldeneye	*Bucephala clangula*	GN	A	
Red-breasted Merganser	*Mergus serrator*	RM		
Red-throated Diver	*Gavia stellata*	RH	A	Yes
Great Northern Diver	*Gavia immer*	ND		Yes
Little Grebe	*Tachybaptus ruficollis*	LG	A	
Great Crested Grebe	*Podiceps cristatus*	GG	A	
Slavonian Grebe	*Podiceps auritus*	SZ		Yes
Cormorant	*Phalacrocorax carbo*	CA	A	
Shag	*Phalacrocorax aristotelis*	SA		
Little Egret	*Egretta garzetta*	ET		Yes
Grey Heron	*Ardea cinerea*	H.		
Oystercatcher	*Haematopus ostralegus*	OC	A	
Ringed Plover	*Charadrius hiaticula*	RP	A	
Golden Plover	*Pluvialis apricaria*	GP	A	Yes
Grey Plover	*Pluvialis squatarola*	GV	A	
Lapwing	*Vanellus vanellus*	L.		
Knot	*Calidris canutus*	KN	R	
Sanderling	*Calidris alba*	SS		
Dunlin	*Calidris alpina*	DN	A	
Snipe	*Gallinago gallinago*	SN	A	
Black-tailed Godwit	*Limosa limosa*	BW	A	
Bar-tailed Godwit	*Limosa lapponica*	BA	A	Yes
Curlew	*Numenius arquata*	CU	R	
Greenshank	*Tringa nebularia*	GK	A	
Redshank	*Tringa totanus*	RK	R	
Turnstone	*Arenaria interpres*	TT		
Black-headed Gull	*Chroicocephalus ridibundus*	BH	R	
Common Gull	*Larus canus*	CM	A	
Lesser Black-backed Gull	*Larus fuscus*	LB	A	
Herring Gull	*Larus argentatus*	HG	R	
Great Black-backed Gull	*Larus marinus*	GB	A	

Table 4.2.2: Subsite diversity (tick marks indicate that a species was recorded in that subsite)

Species	0O410	0O411	0O413	0O416	0O417	0O418	0O487	0O489
Mute Swan	√							
Greylag Goose				√				
Light-bellied Brent Goose	√	√	√	√		√		√
Shelduck		√	√	√		√		
Wigeon		√	√	√	√	√	√	√
Teal	√	√	√	√	√	√	√	√
Mallard	√	√	√	√	√	√	√	√
Goldeneye				√				
Red-breasted Merganser		√	√	√				
Red-throated Diver		√						
Great Northern Diver	√	√	√					
Little Grebe			√		√		√	
Great Crested Grebe		√	√					
Slavonian Grebe			√					
Cormorant	√	√	√	√	√	√		√
Shag	√	√	√	√				
Little Egret	√	√	√	√	√	√	√	√
Grey Heron	√	√	√	√		√	√	√
Oystercatcher	√	√	√	√	√			
Ringed Plover		√	√	√		√		
Golden Plover			√	√	√	√		
Grey Plover		√	√	√	√	√		
Lapwing	√	√	√	√	√	√		√
Knot			√	√	√	√		
Sanderling			√					
Dunlin		√	√	√	√	√		
Snipe			√			√		
Black-tailed Godwit	√	√	√	√	√	√	√	√
Bar-tailed Godwit		√	√	√	√	√		
Curlew	√	√	√	√	√	√	√	√
Greenshank	√	√	√	√	√	√	√	
Redshank	√	√	√	√	√	√	√	√
Turnstone		√	√	√	√	√		
Black-headed Gull	√	√	√	√	√	√	√	√
Common Gull	√	√	√	√	√	√	√	
Lesser Black-backed Gull	√	√	√	√				√
Herring Gull	√	√	√	√	√	√	√	√
Great Black-backed Gull		√	√	√	√	√		

4.3. Total numbers of waterbirds

During winter 2018/19, total numbers of waterbirds during low tide surveys ranged from 6,911 (October 2018), to a peak count of 13,801 waterbirds (February 2019). A total of 10,192 waterbirds was counted during the January 2019 high tide survey (Table 4.3.1). Peak counts from 2018/19 exceeded those recorded during 2017/18 (Figure 4.3.1).

Table 4.3.1: Total numbers of waterbirds counted at Bannow Bay during winter 2018/19, plus totals from previous survey programmes undertaken at the site.

Winter	Total Numbers of Waterbirds (Site totals)				
	LT1	LT2	LT3	LT4	HT
2018/19	6,991	12,411	10,680	13,801	10,192
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)

[a]count affected by fog; [b] incomplete count (only partial count of 0O411).

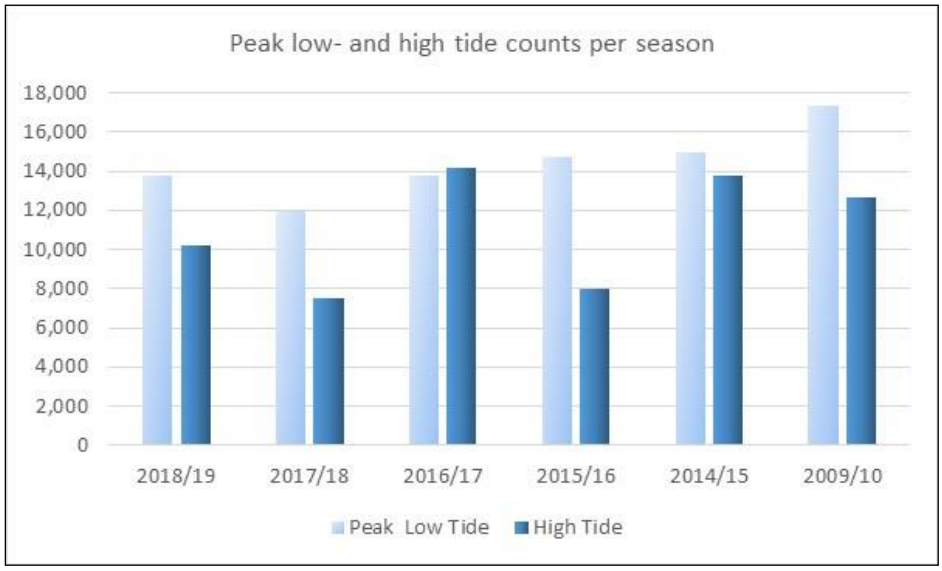


Figure 4.3.1: Peak low-and high-tide counts per season.

4.4. Species totals

Waterbird species peak counts for the 2018/19 at Bannow Bay are shown in Table 4.4.1. One species was recorded in numbers of international importance (Light-bellied Brent Goose). A further 16 species occurred in numbers of all-Ireland importance during winter 2018/19, 11 of which are waterbird SCI species for Bannow Bay SPA.

Table 4.4.1: Peak numbers of waterbirds at Bannow Bay in 2018/19, plus peaks from the previous five low tide survey seasons, highlighting numbers of international (i) and national (n) (all-Ireland) importance. The thresholds used are applicable to the timing of the survey hence all-Ireland thresholds currently follow (Burke et al. *2018) with Crowe & Holt (2013) for previous surveys, while international thresholds currently follow AEWA (2018) with Wetlands International, 2012 used previously. Waterbird SCI species for Bannow Bay SPA 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	Low Tide	High Tide
	2018/19		2017/18		2016/17		2015/16		2014/15		2009/10	
Mute Swan	2		1	2	2			1				
Greylag Goose	1											
Light-bellied Brent Goose	489 (i)	415 (i)	557 (i)	575 (i)	841 (i)	615 (i)	609 (i)	640 (i)	787 (i)	484 (i)	2158 (i)	1354 (i)
Shelduck	325 (n)	353 (n)	470 (n)	202 (n)	413 (n)	395 (n)	308 (n)	279 (n)	518 (n)	244 (n)	393 (n)	354 (n)
Wigeon	564 (n)	140	493	283	661 (n)	528	356	300	781 (n)	550	226	438
Teal	915 (n)	298	293	170	619 (n)	806 (n)	478 (n)	219	472 (n)	546 (n)	259	193
Mallard	359 (n)	250	151	113	206	117	228	113	258	142	66	36
Goldeneye	1	4	5	2		7	5	3	9	3	11	16
Red-breasted Merganser	12	4	27 (n)	36 (n)	20 (n)	28 (n)	13	5	39 (n)	26 (n)	30 (n)	18
Red-throated Diver	1											
Great Northern Diver	5		6	6	2		11	5	1	2	12	1
Little Grebe	14	3	4	6	8	2	2	6	14	12	7	4
Great Crested Grebe	13		2	0	9	2	1	2	5	1	9	1
Slavonian Grebe	2											
Cormorant	51	28	28	33	34	43	38	7	23	14	49	21
Shag	4		3*		23		54	21	34	9	3	6
Little Egret	38 (n)	24 (n)	13	5	62 (n)	18	68 (n)	6	53 (n)	14	145 (n)	4
Grey Heron	15	15	11	5	23	11	16	1	19	6	34 (n)	0
Oystercatcher	1,120 (n)	639 (n)	754 (n)	590	1,237 (n)	482	1036 (n)	719 (n)	962 (n)	1146 (n)	1477 (n)	1676 (n)

Table 4.4.1 (cont.)

Species	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide	Low Tide	High Tide
	2018/19		2017/18		2016/17		2015/16		2014/15		2009/10	
Ringed Plover	23	2	86	0	179 (n)	0	74	0	37	118 (n)	47	11
Golden Plover	4,958 (n)	2,000 (n)	3,075 (n)	681	3,850 (n)	0	8020 (n)	281	4459 (n)	550	3517 (n)	503
Grey Plover	74 (n)	148 (n)	39 (n)	9	105 (n)	197 (n)	83 (n)	91 (n)	59 (n)	265 (n)	118 (n)	232 (n)
Lapwing	2,498 (n)	2,267 (n)	1,235 (n)	1,229 (n)	1,905 (n)	3,957 (n)	1878 (n)	1875 (n)	2782 (n)	720	3401 (n)	2116 (n)
Knot	613 (n)	33	247	142	344 (n)	315 (n)	555 (n)	313 (n)	959 (n)	709 (n)	329 (n)	866 (n)
Sanderling	145 (n)		12	0	72 (n)							
Dunlin	1,580 (n)	976 (n)	943 (n)	1,739 (n)	2,437 (n)	3,519 (n)	2060 (n)	613 (n)	1992 (n)	1947 (n)	1238 (n)	2438 (n)
Snipe	37		3*		13	4	8	11	0	18	10	33
Black-tailed Godwit	390 (n)	62	523 (n)	437 (n)	555 (n)	433 (n)	413 (n)	132	633 (i)	127	5653 (i)	390 (n)
Bar-tailed Godwit	245 (n)	850 (n)	610 (n)	2	559 (n)	656 (n)	470 (n)	700 (n)	644 (n)	1202 (i)	1050 (n)	1736 (i)
Curlew	690 (n)	297	562 (n)	608 (n)	796 (n)	434 (n)	1171 (n)	254	690 (n)	930 (n)	824 (n)	1043 (n)
Greenshank	17	13	10	13	19	34 (n)	18	22 (n)	22 (n)	37 (n)	63 (n)	7
Redshank	454 (n)	326 (n)	355 (n)	309	525 (n)	277	588 (n)	293	385 (n)	396 (n)	905 (n)	307 (n)
Turnstone	15	57	26	29	31	50	47	18	34	46	32	123 (n)
Black-headed Gull	1,433	937	1,031	101	2,565	1,057	2951	920	1504	3160	2119	286
Common Gull	50	14	317	128	632	71	178	40	307	182	628	6
Lesser Black-backed Gull	48	4	62	16	150	8	64	83	432	65	56	0
Herring Gull	139	24	277	60	357	61	147	38	203	48	97	6
Great Black-backed Gull	40	9	39	10	53	7	28	3	33	3	50	16

4.5. Trends in waterbird numbers

Using peak count data from the current (2018/19) and previous five seasons (2017/18, 2016/17, 2015/16, 2014/15 and 2009/10) of co-ordinated low and high tide surveys at Bannow Bay, an estimation of trends was calculated following the methods described in Section 3.4. This provides a short-term trend for the period 2009 – 2018 and these results are shown in Table 4.5.1 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.

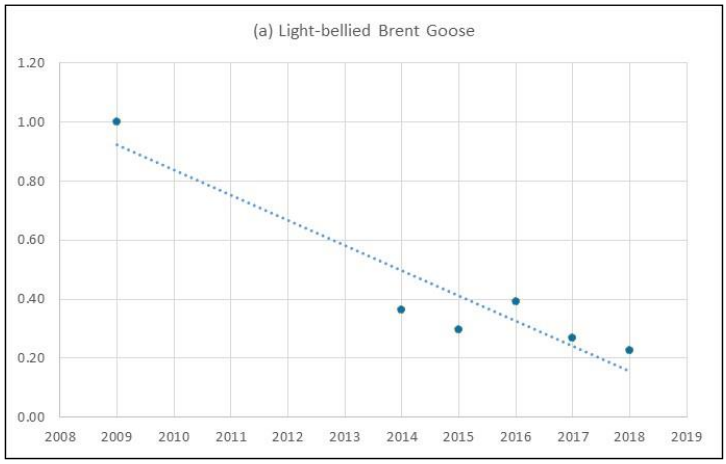
Table 4.5.1 shows declining trends for 11 of the 15 species assessed, with two species (Teal and Golden Plover) increasing in number and two species (Shelduck and Wigeon) stable. Species exhibiting notable declines in numbers are shown in Figure 4.5.1.

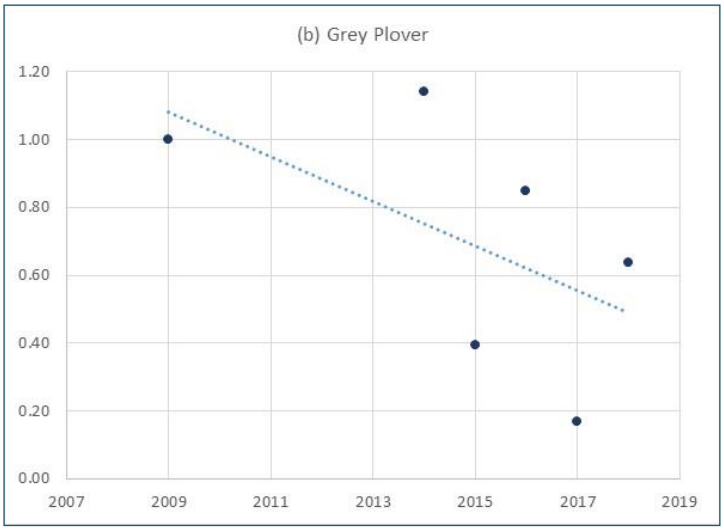
Table 4.5.1: Trend (mean annual change %) for the period 2009/10-2018/19

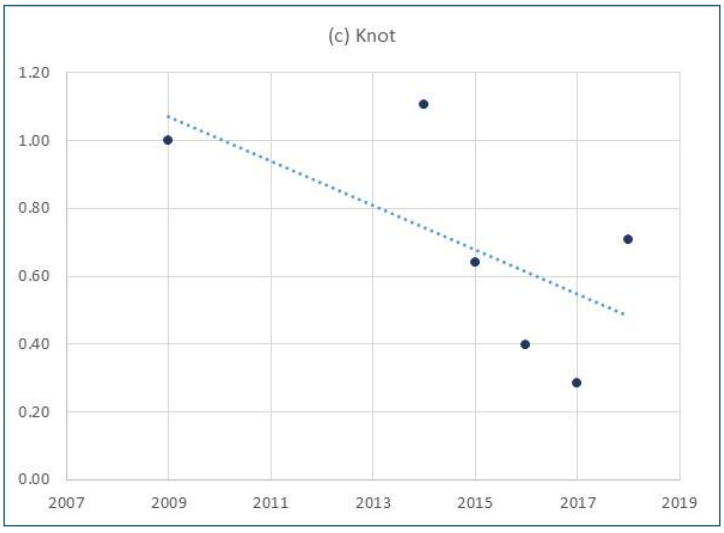
Special Conservation Interest Species	Mean Annual Change (%) 2009/10 – 2018/19	Trend
Light-bellied Brent Goose	- 14.6	Decrease
Shelduck	+0.88	Stable
Wigeon	+ 0.44	Stable
Teal	+ 10.8	Increase
Red-breasted Merganser	- 5.6	Decrease
Oystercatcher	- 5.7	Decrease
Golden Plover	+ 1.7	Increase
Grey Plover	- 10.7	Decrease
Lapwing	- 5	Decrease
Knot	- 9.4	Decrease
Dunlin	- 2.9	Decrease
Black-tailed Godwit	- 25.5 / +1.3	Decrease / Increase*
Bar-tailed Godwit	- 10.3	Decrease
Curlew	- 5.1	Decrease
Redshank	- 8.0	Decrease

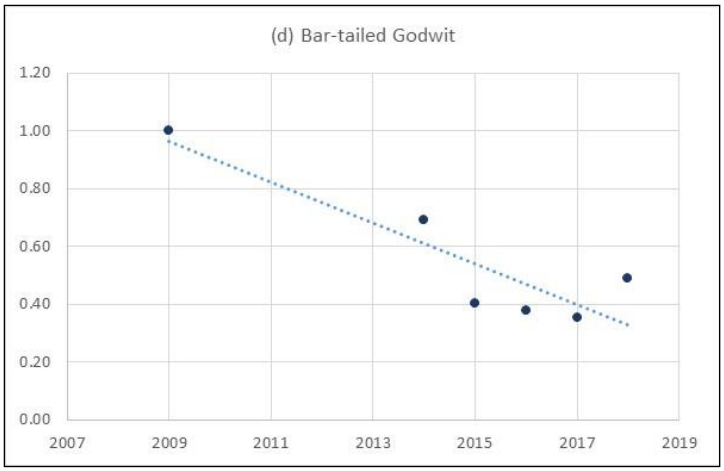
The largest decline in seen for the Black-tailed Godwit. Numbers have declined since a very large peak count of 5,653 individuals during 2009/10. However this peak count was a 'one-off' and attributed to staging birds that had stopped off *en route* on migration during early October 2009 (NPWS, 2012). Other counts in the same season ranged from 62 to 390 total individuals. Re-calculating the trend in Table 4.6 using the second highest count value from 2009/10 results in this wader showing an increasing trend (+1.3% mean annual change*).

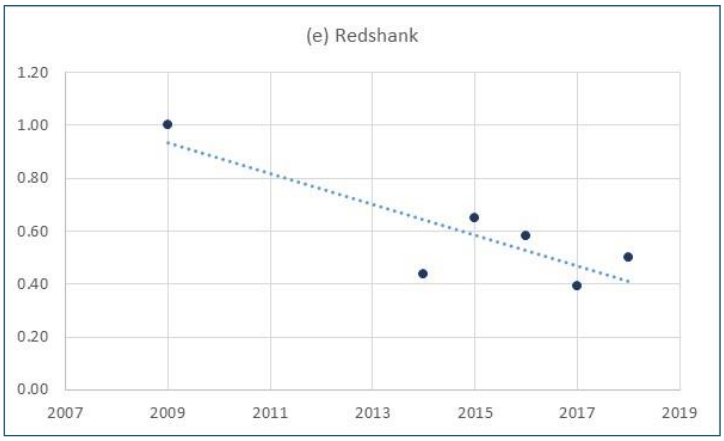
Figure 4.5.1 (a-e): Species showing the largest trends for decline in numbers.











As an additional assessment of trends, the five-year mean peak was calculated for selected species using data from surveys undertaken across the winters 2014/15 – 2018/19 inclusive. The mean peak value was then compared to the baseline mean peak as used for SPA designation (Table 4.5.2).

This assessment reveals that seven of the waterbird SCI species now occur in numbers higher than the baseline average (Light-bellied Brent Goose, Oystercatcher, Golden Plover, Grey Plover, Knot, Bar-tailed Godwit and Redshank). Six species have declined in recent seasons with lower numbers than during the baseline period (Shelduck, Pintail, Lapwing, Dunlin, Black-tailed Godwit and Curlew) (Table 4.5.2).

4.6. Subsite totals for waterbirds

During the 2018/19 season, 0O416 (Kiltra) supported the largest number of waterbirds on three low tide survey occasions (Table 4.6.1) with 0O418 (Bannow Island to Newquay) supporting peak numbers on one low tide survey occasion.

0O417 (Clonmines Castle) supported the largest number of waterbirds during the high tide survey with numbers equivalent to 56% of the total number of birds counted on that date; consistent with previous annual surveys.

Table 4.5.2: Baseline data for waterbird SCI species of Bannow Bay plus five-year mean peak from recent waterbird survey programmes at Bannow Bay (2014/15 – 2018/19). The change of direction indicates if the most recent mean peak is greater or less than the baseline value.

Special Conservation Interests	Baseline Period (1995/96 – 1999/00)[I]	5-year mean peak (2014/15 – 2018/19[II]	Change in direction
Light-bellied Brent Goose	561 (i)	666 (i)	↑
Shelduck	500 (n)	412 (n)	↓
Pintail	52 (n)	0	↓
Oystercatcher	711 (n)	1,059 (n)	↑
Golden Plover	1,955 (n)	4,872 (n)	↑
Grey Plover	142 (n)	148 (n)	↑
Lapwing	2,950 (n)	2,470 (n)	↓
Knot	508 (n)	544 (n)	↑
Dunlin	3,038 (n)	2,169 (n)	↓
Black-tailed Godwit	546 (i)	503 (n)	↓
Bar-tailed Godwit	471 (n)	804 (n)	↑
Curlew	891 (n)	839 (n)	↓
Redshank	377 (n)	464 (n)	↑

[I]Five year peak mean for the period 1995/96 to 1999/00;
[II]Five year peak mean for the surveys undertaken in 2014/15, 2015/16, 2016/17, 2017/18. Peak counts from either low or high tide surveys.
n = numbers of all-Ireland importance (Baseline = after Crowe & Holt, 2013; Current = Burke et al. 2018);
i = numbers of international importance (Baseline = after Wetlands International, 2012; Current = after AEWA, 2018).

Table 4.6.1: Total numbers of waterbirds within subsites across the survey programme 2018/19 plus the peak count from the 2017/18 season.

Subsite Code	Subsite Name	LT1	LT2	LT3	LT4	HT	Peak Count 2017/18
0O410	Fethard Bay	325	535	582	338	377	586 (LT)
0O411	St Kiernans to Saltmills to Big Burrow	340	1,115	903	604	965	1,097 (LT)
0O413	Saint Kiernans to Newtown	936	903	1,084	1,031	386	825 (LT)
0O416	Kiltra	1,593	6,603	5,375	5,590	832	5,711 (LT)
0O417	Clonmines Castle	1,071	1,667	1,094	4,533	5,668	3,383 (HT)
0O418	Bannow Island to Newquay	2,518	1,187	1,130	910	1,438	1,415 (HT)
0O487	Tintern Abbey to Tintern Bridge	17	252	307	522	263	219 (LT)
0O489	Pollfur	191	149	205	273	263	488 (LT)

The peak counts in 0O417 (Clonmines Castle) and 0O487 (Tintern Abbey to Tintern Bridge) during 2018/19 were the highest counts for these subsites across all low tide surveys undertaken in recent years (Table 4.6.2). Subsites 0O416, 0O417 and 0O418 have consistently held the most birds during low tide survey programmes (Table 4.6.2, Figure 4.6.1).

Table 4.6.2: Peak numbers of waterbirds within subsites for the four previous survey seasons and 2018/19, and whether the peaks were recorded during low tide (LT) or high tide (HT). Overall peak across the seasons shown in bold.

Subsite Code	Subsite Name	2018/19	2017/18	2016/17	2015/16	2014/15
0O410	Fethard Bay	582 (LT)	586 (LT)	797 (LT)	291 (LT)	**916 (LT)**
0O411	St Kiernans to Saltmills to Big Burrow	1,115 (LT)	1,097 (LT)	2,006 (LT)	2,477 (LT)	**2,551 (LT)**
0O413	Saint Kiernans to Newtown	1,084 (LT)	825 (LT)	**2,304 (LT)**	1,600 (LT)	898 (LT)
0O416	Kiltra	6,603 (LT)	5711 (LT)	7,482 (LT)	6,285 (LT)	**8,849 (LT)**
0O417	Clonmines Castle	**5,668 (HT)**	3,383 (HT)	2,075 (HT)	4,838 (LT)	1,527 (HT)
0O418	Bannow Island to Newquay	2,518 (LT)	1,415 (LT)	**3,385 (HT)**	2,813 (LT)	2,101 (LT)
0O487	Tintern Abbey to Tintern Bridge	**522 (LT)**	219 (LT)	354 (LT)	217 (LT)	248 (LT)
0O489	Pollfur	273 (LT)	**488 (LT)**	354 (HT)	320 (LT)	234 (LT)

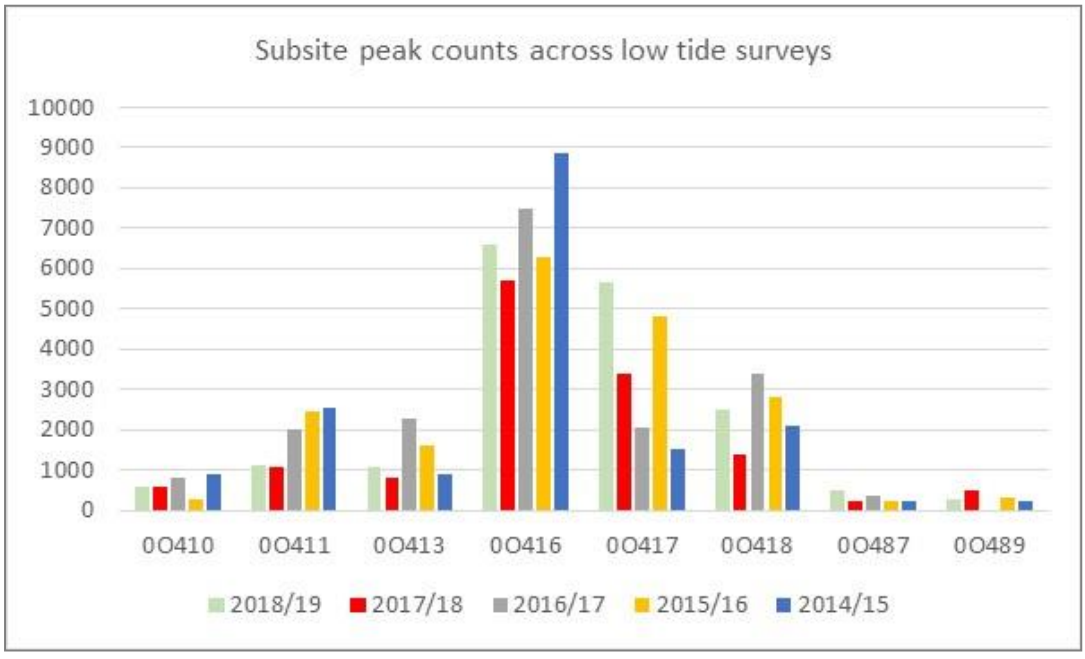


Figure 4.6.1: Subsite peak counts across low tide survey programmes.

4.7. Waterbird densities

0O417 (Clonmines Castle) supported the greatest average density of total waterbirds (Table 4.7.1) and recorded the greatest maximum density. This result in 2018/19, while consistent with previous low tide survey programmes, was a result of a very high number of waterbirds in this subsite in the February low tide survey (4,533) equivalent to 262.8 waterbirds/ha.

0O416 (Kiltra) and the smallest subsite 0O487 (Tintern Abbey to Tintern Bridge) supported relatively good densities and recorded the second and third highest densities overall (26.9 and 25.1 birds/ha respectively).

Table 4.7.1: Average density of total waterbirds (min-max) within count subsites 2018/19.

Subsite Code	Subsite Name	Average density (birds/ha)	Min	Max
0O410	Fethard Bay	6.2	4.5	8.1
0O411	St Kiernans to Saltmills to Big Burrow	2.6	1.2	4.0
0O413	Saint Kiernans to Newtown	3.8	3.4	4.1
0O416	Kiltra	26.9	8.9	37.1
0O417	Clonmines Castle	121.3	62.1	262.8
0O418	Bannow Island to Newquay	18.8	11.9	33.0
0O487	Tintern Abbey to Tintern Bridge	25.1	1.6	47.7
0O489	Pollfur	13.2	9.6	17.6

Peak foraging densities during the 2018/19 season ranged from 0.3 birds/ha (Grey Plover 0O417) to 15.8 Dunlin/ha (0O417) (Table 4.7.2). Overall, Light-bellied Brent Goose was more densely distributed in the outer bay subsite 0O410 (Fethard Bay) during the winter of 2018/19, consistent with three previous annual surveys. Highest densities of Shelduck were recorded for 0O418 (Bannow Island to Newquay), consistent with the results from all previous surveys. Oystercatcher foraging density in 0O417 (11.9 birds/ha) was the highest recorded to-date (Table 4.7.2).

Table 4.7.2: Peak intertidal foraging densities (birds/ha^{-1}) recorded during the 2018/19 surveys for selected waterbird SCIs and subsite it was recorded for (in brackets); plus results from previous surveys.

Special Conservation Interests (SCIs)[a]	2018/19	2017/18	2016/17	2015/16	2014/15	2009/10
Light-bellied Brent Goose	1.8 (0O410)	2.0 (0O410)	1.6 (0O410)	1.8 (0O418)	2.8 (0O418)	1.8 (0O410)
Shelduck	2.5 (0O418)	4.6 (0O418)	4.0 (0O418)	2.9 (0O418)	2.4 (0O418)	3.4 (0O418)
Oystercatcher	11.9 (0O417)	7.0 (0O418)	5.1 (0O417)	6.1 (0O418)	8.4 (0O418)	9.0 (0O418)
Grey Plover	0.3 (0O417)	0.2 (0O417)	1.0 (0O418)	0.3 (0O416)	0.3 (0O417)	11.0 (0O418)
Knot	3.2 (0O418)	2.5 (0O418)	1.7 (0O416)	4.7 (0O418)	2.1 (0O416)	2.4 (0O418)

Special Conservation Interests (SCIs)[a]	2018/19	2017/18	2016/17	2015/16	2014/15	2009/10
Dunlin	15.8 (0O417)	15.8 (0O417)	9.4 (0O416)	5.1 (0O416)	11.0 (0O416)	4.9 (0O487)
Black-tailed Godwit	5.7 (0O417)	7.2 (0O489)	1.7 (0O417)	1.7 (0O417)	6.0 (0O489)	3.2 (0O487)
Bar-tailed Godwit	0.7 (0O417)	3.0 (0O416)	2.2 (0O416)	5.5 (0O417)	2.4 (0O416)	3.8 (0O416)
Curlew	3.6 (0O417)	1.4 (0O416)	7.5 (0O417)	3.9 (0O417)	2.4 (0O417)	3.5 (0O487)
Redshank	5.9 (0O417)	4.9 (0O489)	1.9 (0O489)	3.0 (0O418)	2.0 (0O418)	4.9 (0O418)

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

During 2018/19, seven of the ten waterbird species assessed recorded highest foraging densities in 0O417 (Clonmines Castle) (Table 4.7.3).

Table 4.7.3: Top three count subsites ranked in terms of peak intertidal foraging density recorded during 2018/19.

Special Conservation Interests (SCIs)[A]	00410	0O411	0O413	0O416	0O417	0O418	0O487	0O489
Light-bellied Brent Goose	1		3					2
Shelduck		3		2		1		
Oystercatcher				3	1	2		
Grey Plover			3		1	2		
Knot			2	3		1		
Dunlin		3		2	1			
Black-tailed Godwit				3	1	2		
Bar-tailed Godwit				2	1	3		
Curlew				2	1			3
Redshank					1		3	2

4.8. Waterbird distribution

During low tide surveys, 0O416 (Kiltra) supported the largest number of species (eight) in numbers ranked as 'very high' (Table 4.8.1) suggesting that this subsite is the most important, or most preferred, by the largest number of waterbird SCI species. This result is consistent with previous surveys. 0O411, 0O413, 0O417 and 0O418 all supported five species in numbers ranked as 'very high'.

Table 4.9.1: Relative importance of each subsite based on total numbers of waterbird SCI species during low tide surveys.

Subsite Code	Subsite Name	Very High	High	Moderate
0O410	Fethard Bay	PB, L.		OC, RK
0O411	St Kiernans to Saltmills to Big Burrow	PB, GV, DN, CU, RK	BA, BW	SU, OC, L.
0O413	Saint Kiernans to Newtown	PB, GV, KN, DN, BW	SU, OC, CU, RK	GP, L., BA
0O416	Kiltra	PB, GP, L., KN, DN, BA, BW, CU	SU, OC, GV, RK	
0O417	Clonmines Castle	GP, GV, L., BW, RK	DN, BA, CU	OC
0O418	Bannow Island to Newquay	SU, OC, GP, KN, RK	GV, L., DN, BA, BW	PB, CU
0O487	Tintern Abbey to Tintern Bridge			BW, CU, RK
0O489	Pollfur		RK	PB, BW, CU

Table shows waterbird species by their standard codes: BA Bar-tailed Godwit, BW Black-tailed Godwit, CU Curlew, DN Dunlin, GP Golden Plover, GV Grey Plover, KN Knot, OC Oystercatcher, PB Light-bellied Brent Goose, RK Redshank, SU Shelduck.

Three subsites held peak numbers of waterbird species during the high tide survey (0O416, 0O417 and 0O418). 0O417 and 0O418 both held peak numbers of six waterbird species (Table 4.8.2, Figure 4.8.1).

Table 4.8.2 Relative importance of each subsite ranked by total numbers during the high tide survey.

Subsite Code	Subsite Name	Ranked 1	Ranked 2	Ranked 3
0O410	Fethard Bay		PB	
0O411	St Kiernans to Saltmills to Big Burrow		L., DN	PB
0O413	Saint Kiernans to Newtown			CU, RK
0O416	Kiltra	PB	SU, OC, CU	L.
0O417	Clonmines Castle	GP, L., DN, BA, CU, RK	GV	OC
0O418	Bannow Island to Newquay	SU, OC, GV, KN, BW, RK		DN
0O487	Tintern Abbey to Tintern Bridge		BW	
0O489	Pollfur			BW

Table shows waterbird species by their standard codes: BA Bar-tailed Godwit, BW Black-tailed Godwit, CU Curlew, DN Dunlin, GP Golden Plover, GV Grey Plover, KN Knot, OC Oystercatcher, PB Light-bellied Brent Goose, RK Redshank, SU Shelduck.

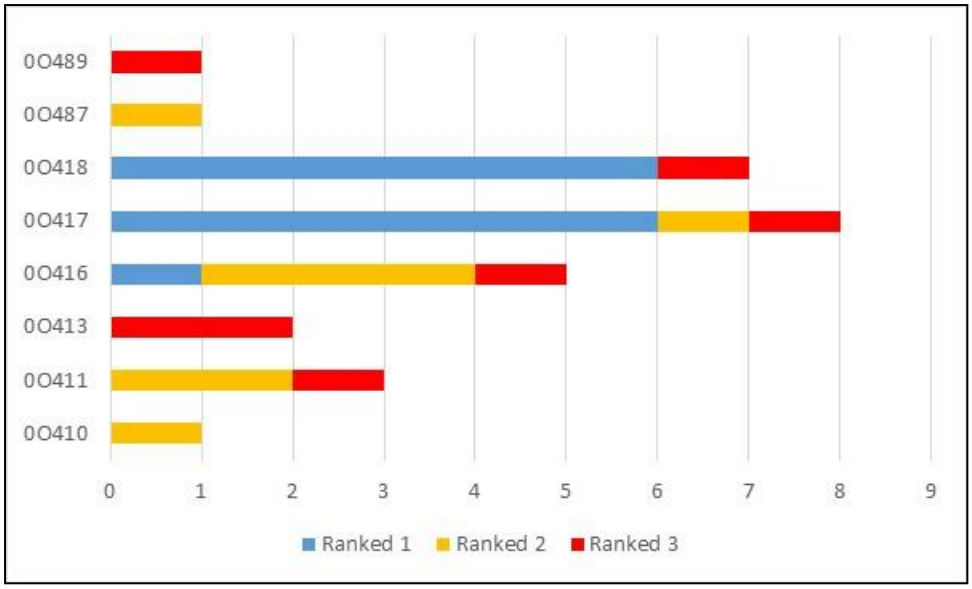


Figure 4.8.1 Numbers of waterbird species within each subsite ranked as 1, 2, or 3 in terms of total numbers during the high tide survey.

Tables 4.8.3 – 4.8.5 provide an assessment of waterbird distribution whereby subsites are ranked in succession from the highest to the lowest in terms of their relative contribution to each species' distribution during low tide, high tide, and for selected species foraging intertidally.

*Table 4.8.3: Subsite ranking (categories) based on **total numbers** during low tide surveys.*

Subsites / Species	0O410	0O411	0O413	0O416	0O417	0O418	0O487	0O489
PB	V (V, V, M, H, H)	V (V, V, V, V, V)	V (M, V, V, V, V)	V (M, V, V, H, V)	- (- - - - M)	M (L, H, V, V, V)	- (- - - - -)	M (M, - - - M)
SU	- (- L, - - H)	M (V, M, H, M, H)	H (L, H, H, V, M)	H (H, V, H, H, V)	- (L, M, L, L, H)	V (V, V, V, V, V)	- (- - L, - M)	- (M, M - - H)
OC	M (M, M, M, M, H)	M (H, M, M, H, H)	H (V, V, H, H, V)	H (H, H, V, H, V)	M (L, M, M, H, M)	V (V, V, V, V, V)	- (- L, L, L, L)	L (L, L, L, L, L)
GP	-(- - - - -)	- (H, V, H, H, V)	M (- - - M, H)	V (V, V, V, V, V)	V (- - H, H, H)	V (H, H, H, M, V)	- (- - - - -)	- (- - - - M)
GV	- (M, - - - -)	V (V, V, M, H, V)	H (V, H, M, -, V)	H (V, V, V, V, M)	V (H, V, H, H, M)	H (H, V, V, V, V)	- (- - - - -)	- (L, - - - M)
L.	V (M, L, L, M, M)	M (M, M, V, H, H)	M (H, L, L, M, H)	V (V, V, V, V, V)	V (V, V, V, H, V)	H (- H, H, H, M)	- (- - - - H)	L (- - - L, -)
KN	- (- - - - -)	- (- H, H, H, V)	V (H, M, H, -, H)	V (V, V, V, V, V)	H (- - - - -)	H (V, V, V, H, V)	- (- - - - -)	- (- - - - -)
DN	- (- - - - -)	V (H, V, H, H, V)	V (H, H, V, M, H)	V (V, V, V, V, V)	H (V, M, V, H, M)	H (M, V, V, H, V)	- (- - - -, M)	- (- - - - -)
BW	L (- - - - -)	H (M, H, M, H, M)	V (H, H, V, H)	V (V, V, V, V, V)	V (H, V, M, H, M)	H (M, V, V, H, M)	M (M, M, L, M, H)	M (V, M, M, H, H)
BA	- (- - - -, L)	M (H, H, H, H, H)	M (H, H, H, H, V)	V (V, V, V, V, V)	H (M, H, H, M, M)	H (M, - -, M, M)	- (- - - - -)	- (- L, - - M)
CU	L (M, M, L, L, L)	V (V, H, H, H, H)	H (H, H, H, H, H)	V (V, V, V, V, V)	H (M, V, V, H, H)	M (H, H, H, M, V)	M (M, L, L, L, M)	M (M, M, M, L, M)
RK	M (L, L, L, L, M)	V (H, M, H, V, V)	H (M, H, H, H, H)	H (H, V, V, V, H)	V (H, M, M, L, M)	V (V, V, V, V, V)	M (L, L, L, L, L)	H (V, M, M, H, M)

NOTE: letters in brackets refers to the category recorded during the 2017/18, 2016/17, 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a previous zero count in the subsite.

*Table 4.8.4: Subsite ranking based on **total numbers** during the high tide survey.*

Subsites / Species	0O410	0O411	0O413	0O416	0O417	0O418	0O487	0O489
PB	2 (6, 2, -, 6, 4)	3 (4, 3, 2, 1,1)	5 (2, 4, -, 5,3)	1 (1, 6, 1, 3,2)	- (- - -, 4,-)	- (3, 1, -, 2,1)	- (- - - - -)	4 (5, 5, - -,5)
SU	- (- - - - -)	- (2, 2, 2,2,2)	- (- - 1, -,4)	2 (- 4, 4, -,5)	- (- 5, 3, -,3)	1 (1, 1, 1, 1,1)	- (- - - - -)	- (3, 3, 3, 1,2)
OC	4 (3, 6, -, 5,4)	6 (4, 2, 1, 3,2)	5 (5, 4, 5, 4,4)	2 (2, 3, 3, 2,2)	3 (- - 4, -,3)	1 (1, 1, 2, 1,1)	- (- - - - -)	7 (5 - - - -)
GP	- (- - - - -)	- (- -, -, 3,3)	- (- - - -,1)	- (- - -, 1,1)	1 (1, -, 1, -,2)	- (2, - -, 2,2)	- (- - - - -)	- (- - - - -)
GV	- (- - - - -)	- (- - - - -)	- (- - - -,3)	- (- 1, 2, 1,1)	2 (- 3, -, 3,2)	1 (1, 2, 3, 2,1)	- (- - - - -)	- (- - - -,5)
L.	- (- 6, 5,- -)	2 (3, 4, 2, 2,3)	5, (3, 5, 4, 6,5)	3 (2, 1, 3, 1,2)	1 (1, 2, 1, 3,1)	3 (5, 3, 5, 4,4)	- (- - - -,2)	6 (- - - - -)
KN	- (- - - - -)	- (- - -, -, 4)	- (- - - -,3)	- (- -, 2, 1,2)	- (- - -, 2,1)	1 (1, 1, - -,1)	- (- - - - -)	- (- - - - -)
DN	- (- - - - -)	2 (- 4, 1, -,3)	- (- - - -,4)	- (2, 1, 3, 2,1)	1 (1, 3, 2, 1,2)	3 (3, 2, 4, 3,1)	- (- - - - -)	- (- - - - -)
BW	- (- - - - -)	4 (- - -, 1,3)	5 (- 2, - - -)	- (2 - - -,1)	- (1, 4, - -,1)	1 (- 1 -, 2,-)	2 (- - - - -)	3 (- 3, - - -)
BA	- (- - - - -)	- (- 3, 3, -,4)	- (1, - - -,3)	- (- 1, 1, 1,1)	1 (-, 2, 2, -,2)	- (- - -, 2,2)	- (- - - - -)	- (- - - - -)
CU	- (4, 7, -, 2,6)	7 (5, 4, 5, 4,3)	3 (3, 1, 3, 6,4)	2 (6, 2, 1, 1,1)	1 (1, 3, 4, 3,3)	5 (6, 5, 2, 5,2)	6 (-, 6- -,1)	- (2, 6, - -,5)
RK	7 (7, 7, -, 8,5)	4 (5, 5, 5, 3,3)	3 (2, 1, 3, 2,4)	6 (4, 2, 2, 4,1)	2 (1, 6, 4, 5,2)	1 (3, 3, 1, 1,1)	5 (8, 8, 6, 6,7)	- (6, 4, - 7,5)

NOTE: letters in brackets refers to the category recorded during the 2017/18, 2016/17, 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a previous zero count in the subsite.

*Table 4.8.5: Subsite ranking based on numbers **foraging intertidally** during low tide surveys.*

Subsites / Species	0O410	0O411	0O413	0O416	0O417	0O418	0O487	0O489
PB	V (V, V, M, V, H)	V (H, V, V, H, V)	V (M, V, V, V,V)	- (M, V, V, M, -)	- (- - - - -)	H (L, V, V, V, H)	- (- - - - -)	M (- - - -, L)
SU	- (- - - - -)	H (V, M, V, M, H)	M (L, H, -, M, L)	V (H, V, M, V, V)	- (- L, M, M, H)	V (V, V, V, V, V)	- (- -, L, -, M)	- (M, - - -, H)
OC	M (M, M, M, M, H)	H (M, H, H, H, H)	M (H, H, H, H, H)	H (H, V, V, V, V)	H (L, M, M, H, M)	V (V, V, V, V, V)	- (- L, L, L, L)	L (L, L, L, L, M)
GV	- (- -, L, - -)	V (V, V, M, H, V)	V (V, H, M, -, H)	H (V, M, V, V, M)	V (H, V, H, H, L)	H (H, V, V, V, V)	- (- - - - -)	- (L - - - -)
KN	- (- - - - -)	- (- V, -, H, V)	V (H, H, H, -, H)	V (V, V, V, V, V)	- (- - - - -)	V (V, V, V, H, V)	- (- - - - -)	- (- - - - -)
DN	- (- - - - -)	V (H, V, H, H, V)	V (H, H, V, M, H)	V (V, V, V, V, V)	H (V, M, L, H, M)	H (M, V, V, H, V)	- (- - - -, M)	- (- - - - -)
BW	- (- - - - -)	H (M, V, M, H, M)	V (H, V, V, H, V)	V (V, V, V, V, V)	V (H, H, M, V, H)	H (V, M, V, V, H)	- (H, -, L, H, V)	M (V, -, L, V, H)
BA	- (- - - -,L)	H (H, H, M, H, H)	H (H, H, V, V, V)	V (V, V, V, V, V)	V (H, H, H, L, M)	H (M, -, L, M, M)	- (- - - - -)	- (- - - -, L)
CU	L (M, L, L, L, M)	V (H, H, H, H, H)	H (H, V, V, H, H)	V (V, V, V, V, V)	H (M, V, V, H, M)	M (H, M, H, M, V)	L (M, L, L, M, M)	M (M, L, L, L, M)
RK	M (L, L, L, L, L)	H (H, M, H, V, V)	H (M, H, H, H, H)	H (H, V, V,V, H)	V (M, M, M, L,M)	V (V, V, V, V, V)	M (L, L, L, L, M)	H (V, M, M, H, M)

NOTE: letters in brackets refers to the category recorded during the 2017/18, 2016/17, 2015/16, 2014/15 and 2009/10 surveys respectively; a line (-) refers to a previous zero count in the subsite.

4.9. Waterbird distribution – species summaries

The following species accounts discuss the low tide distribution of SCI species at Bannow Bay during 2018/19. These data are evaluated against data collected during previous low tide surveys at the site.

4.9.1. Light-bellied Brent Goose

In terms of total numbers, four subsites held peak numbers during the four low tide surveys of 2018/19 (0O410, 0O411, 0O413 and 0O416). In October 2018 however, only a single goose was recorded across the site, unusual perhaps as often several hundred can be counted at Bannow Bay during October, but possibly due to later dispersion from Strangford Lough which supports around 75% of the population during the late autumn (October-November) (Robinson *et al*. 2004). During November 2018, numbers reached a season peak of 489 individuals, and over 60% of these birds were located in 0O413 (Saint Kiernans to Newtown). Thereafter, both 0O416 (Kiltra) and 0O410 (Fethard Bay) held peak monthly subsite counts.

Overall the distribution across subsites 0O410, 0O411, 0O413 and 0O416 remains relatively consistent with previous low tide surveys (refer to Table 18a), with only low numbers recorded in two other subsites (0O418 and 0O489). This distribution is most likely related to food supply. 0O411 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* spp. and is difficult to map with accuracy (ASU, 2010), but 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 0O410 (Fethard Bay) where it occurs widely along the tideline as well as being washed up in certain conditions.

During the high tide survey, only c. 10% of the geese were recorded roosting and the largest count was of 270 individuals foraging terrestrially adjacent to 0O416 (Kiltra).

4.9.2. Shelduck

Consistent with the all previous surveys, 0O418 (Bannow Island to Newquay) held peak numbers of Shelduck during all four low tide surveys and during the high tide survey where the numbers represented 98% of the total recorded across the site. 0O411, 0O413 and 0O416 were the only other subsites to support Shelduck, and besides 0O418, 0O416 (Kiltra) was the only other subsite to hold peak numbers of foraging birds. These results therefore point to a high level of subsite faithfulness. The sediment of 0O418 comprises fine sand and silt particles, and based on previous macroinvertebrate sampling (NPWS, 2011) the mollusc *Hydrobia ulvae*, is likely to be found. This is a favoured prey of Shelduck, and the distribution of this small mud snail has been shown to determine the distribution of Shelduck across a site (e.g. Buxton, 1981).

Such a high degree of site faithfulness is important in terms of site management.

4.9.3. Oystercatcher

Oystercatchers are generally a widely distributed wading bird and are found within estuarine sites, along non-estuarine shores and often foraging terrestrially. During 2018/19, they were recorded within seven of the eight count subsites at Bannow Bay but 0O418 (Bannow Island to Newquay) held peak numbers of Oystercatchers (total birds and foraging birds) during all four low tide surveys, and during the high tide survey. This is highly consistent with the previous surveys, with 0O418 being the only subsite to have supported numbers ranked as 'very high' in all previous surveys. While Cockles (*Cerastoderma edule*) are known to occur in 0O418, benthic data for Bannow Bay are not detailed enough to fully understand the subsite preference of Oystercatchers.

In addition to 0O418, 0O413 (Saint Kiernans to Newtown) and 0O416 (Kiltra) also supported good proportions of birds, again highly consistent with previous annual surveys. This suggests not only a high degree of subsite faithfulness, but also that these subsites provide a good food resource all winter.

During the high tide survey, the largest proportion (46% of roosting individuals/42% of all individuals) of roosting Oystercatchers were located on the tip of Bannow Island (Figure 4.9.1).

Figure 4.9.1: Position of large Oystercatcher roost on the tip of Bannow Island during the January 2019 high tide survey.

4.9.4. Golden Plover

During winter, Golden Plovers are attracted to winter cereals, stubbles, fallows, harvest-fields and closed-grazed pastures, with the use of intertidal habitats restricted to roosting behaviour (Béchet, 2006). Wintering Golden Plovers are considered to be site faithful but individual roosting and foraging sites within the sites have the potential to differ within and between years (Wernham *et al*. 2002).

Roost sites within Bannow Bay have been highly consistent over time with the subsite 0O416 (Kiltra) having been the favoured subsite throughout all surveys (ranked 'very high' in terms of total numbers across all surveys). During the 2018/19 season however, the main Golden Plover flock was also recorded in 0O418 (Bannow Island to Newquay) (1,870 birds in October 2018) and 0O417 (Clonmines Castle) (3,000 birds in February 2019). The presence in 0O417 is relatively unusual given that the wader was not recorded in this subsite during the previous two survey seasons. However overall, this species shows a high degree of subsite faithfulness and consistency with the results of previous surveys.

During the high tide survey, all recorded Golden Plover (2,000 birds) were in 0O417 where they roosted as one flock together with a mixed-species roost comprising Dunlin, Lapwing, Wigeon and Black-headed Gull (Figure 4.9.2). The low tide roost position in 0O416 (Kiltra) remains consistent with the mapped position during 2017/18 (Figure 4.9.3) with only minimal positional shifts in any given direction.

Figure 4.9.2: Position of the Golden Plover roost during the high tide survey.

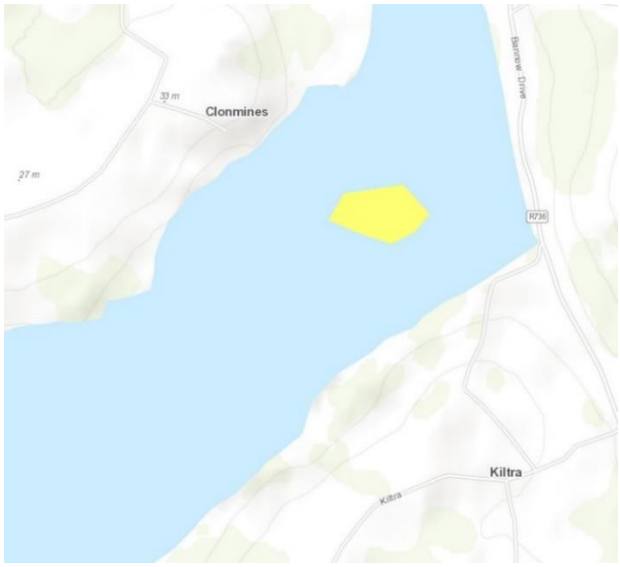


Figure 4.9.3: *Approximate position of the low tide roosting Golden Plover flock in 0O416 (Kiltra).*

4.9.5. Grey Plover

Grey Plover was recorded within five subsites during the 2018/19 season (0O411, 0O413, 0O416, 0O417 and 0O418). Numbers were relatively low throughout with a low tide peak site count of 74 individuals distributed across the five subsites during the February low tide survey, with peak numbers (36) in 0O413 (Saint Kiernans to Newtown). Given low numbers, no single subsite appeared to be more favoured than another but results across the years have been relatively consistent with this wader species distributed across mid estuarine subsites, and absent or rare in the inner estuary and outer estuary.

The high tide survey recorded the overall site peak count of Grey Plover (148) where 93% of the birds were located within 0O418 (Bannow Island to Newquay) roosting as a single flock (Figure 4.9.4).

Figure 4.9.4: Grey Plover roost (138 birds) during the January 2019 high tide survey.

4.9.6. Lapwing

Like Golden Plover, Lapwings forage mostly terrestrially and use intertidal flats as safe roosting habitat during periods of low tide. During 2018/19, Lapwing were recorded in seven subsites overall, consistent with previous surveys; the species very rarely recorded in 0O487 (Tintern Abbey to Tintern Bridge).

Three subsites recorded peak subsite counts (0O410 – LT1; 0O416 – LT2 & LT4, and 0O417 – LT3), but 0O416 (Kiltra) held the greatest numbers overall, and together with 0O417 (Clonmines Castle) appears to be the most favoured subsite overall. While 0O416 held the largest low tide number (1,365), 0O417 recorded the largest proportion of individuals (69%) during the high tide survey. The largest high tide roost (1,350 birds) was located supratidally on the island within 0O417, the same position as the largest high tide roost recorded during the 2017/18 season (Figure 4.9.5).

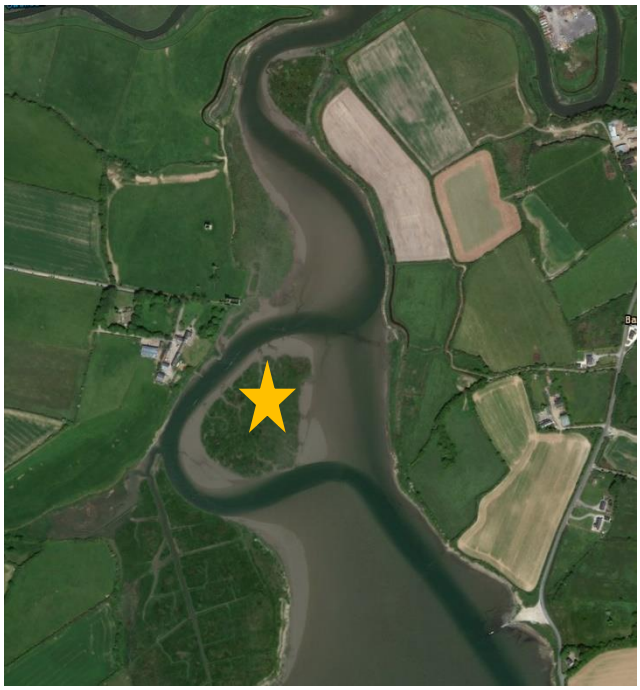


Figure 4.9.5: Location of supratidal roost in inner estuarine subsite 0O417 (Clonmines Castle).

4.9.7. Knot

Knot was recorded in three subsites overall (0O413 (Saint Kiernans to Newtown), 0O416 (Kiltra) and 0O418 (Bannow island to Newquay)), highly consistent with the results from the previous winter surveys (Figure 4.9.6). All three subsites recorded peak counts that exceed the threshold for all-Ireland importance.

0O416 (Kiltra) held peak numbers on two low tide occasions and 0O413 (Saint Kiernans to Newtown) held the subsite peak count of 372 individuals during the February 2019 low tide count. The distribution of Knot can therefore be described as mid-estuarine, with no birds recorded in the very

inner or outer subsites. 0O418 (Bannow island to Newquay) recorded the peak intertidal foraging density of 3.2 individuals/ha.

During the high tide survey, just 33 Knot were recorded in 0O418 (Bannow island to Newquay), these birds recorded roosting adjacent to the Grey Plover flock shown in Figure 4.9.4.

Figure 4.9.6: Distribution of Knot foraging during low tide surveys of 2018/19. 1 dot = 10 birds. Dots are placed randomly.

4.9.8. Dunlin

Dunlin have consistently used five subsites during the 2018/19 and previous five winter surveys (0O411, 0O413, 0O416, 0O417 and 0O418). Peak numbers during 2018/19 (both total numbers and numbers foraging) were recorded in 0O411 (St Kiernans to Saltmills to Big Burrow), 0O413 (Saint Kiernans to Newtown) and 0O416 (Kiltra), while numbers ranked as 'high' were recorded in 0O417 (Clonmines Castle) and 0O418 (Bannow Island to Newquay). These results are highly consistent with previous winter surveys.

During the January 2019 high tide survey, Dunlin were distributed across three subsites (0O411, 0O416 and 0O417). The inner estuary subsite 0O417 supported the largest number of Dunlin (410) and the largest single roost was of 350 individuals located alongside Golden Plover (refer to Figure 4.9.2). 0O416 (Kiltra) held a further 266 roosting Dunlin, these birds positioned together with Knot, adjacent to the Grey Plover roost as shown in Figure 4.9.4. A further 300 Dunlin roosted in the northern section of 0O411, just off the north-western tip of Bannow Island.

4.9.9. Black-tailed Godwit

Black-tailed Godwits were recorded in all eight count subsites during 2018/19, and for the first time (across all current and previous low tide surveys) within 0O410 (Fethard Bay) albeit in low numbers (15). Otherwise, subsite distribution remained consistent with previous surveys, in that 0O413, 0O416 and 0O417 recorded peak numbers.

Peak numbers foraging were recorded for 0O413 (Saint Kiernans to Newtown), 0O416 (Kiltra), and 0O417 (Clonmines Castle); inner to mid-estuarine subsites. 0O418 (Bannow Island to Newquay) held numbers ranked as 'high' on two occasions and based on numbers all four aforementioned subsites are apparently important for foraging Black-tailed Godwits. Nevertheless, 0O416 (Kiltra) consistently held good numbers and peak numbers twice, which is consistent with previous surveys at the site.

The benthic community of 0O416 (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).

Overall numbers of godwits were higher during the October and November low tide surveys and much lower thereafter. As at other sites (L.J. Lewis *pers. comm*), it is likely that many of these waders move onto land to forage terrestrially in mid-winter, although this was not recorded to any great extent close to the estuary. The high tide survey also recorded relatively few (62) individuals and it is also likely that many more were foraging terrestrially at this time.

4.9.10. Bar-tailed Godwit

Bar-tailed Godwits occurred in five subsites during 2018/19: (0O411 (St Kiernans to Saltmills to Big Burrow), 0O413 (Saint Kiernans to Newtown), 0O416 (Kiltra), and 0O417 (Clonmines Castle) and 0O418 (Bannow Island to Newquay). Numbers during low tide surveys were relatively low; site totals of 14, 11, 56 and 245 birds recorded for the low tide surveys. As this species does not forage terrestrially, this would suggest that at times, the godwits may fly to other intertidal sites (e.g. Ballyteigue Burrow) during low tide periods; perhaps returning to Bannow Bay to roost.

Peak numbers in all four low tide surveys were recorded in 0O416 (Kiltra); highly consistent with the results from previous winter surveys. The peak subsite count was 225 individuals within 0O416; nearly half of the peak count during 2017/18. However the site peak count (850 individuals in one roosting flock) was recorded for 0O417 (Clonmines Castle) when the entire site population (numbers of all-Ireland importance) was supported by this subsite. These birds roosted just south of the island (Figure 4.9.7).

Figure 4.9.7: Position of Bar-tailed Godwit roost (850 birds), 0O417 (Clonmines Castle) in January 2019.

4.9.11. 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 0O416 (Kiltra) and 0O411 (St Kiernans to Saltmills to Big Burrow) both supported peak numbers on two survey dates during 2018/19, which is highly consistent with previous survey results. The subsite peak count was 386 Curlew within 0O416 during October 2018; equivalent to 56% of the site total on that survey day.

Peak numbers during the high tide survey were recorded in 0O417 (Clonmines Castle), while O417 and 0O416 collectively held 80% of the total number of Curlew recorded. This is again consistent with previous survey results.

4.9.12. Redshank

Redshanks were widespread and recorded within all eight subsites during low tide surveys of the 2018/19 season. Three subsites held peak numbers, and peak numbers foraging intertidally (0O411 (St Kiernans to Saltmills to Big Burrow), 0O417 (Clonmines Castle) and 0O418 (Bannow Island to Newquay)). Collectively these subsites held between 33% and 60% of all recorded Redshank on survey days. 0O418 has consistently held peak numbers during previous low tide surveys, and in 2018/19 supported peak numbers on two occasions. 0O418 also held peak numbers during the high tide survey with a total of 121 Redshank. 0O417 supported a further 101 individuals at high tide, and these two aforementioned subsites, collectively supported 68% of all Redshank counted during the survey.

Foraging density has been highest for 0O418 and 0O489 in previous annual surveys, but during 2018/19 was highest in 0O417 (peak foraging density of 4.9 Redshank/ha).

Across the surveys, 0O487 (Tintern Abbey to Tintern Bridge) and 0O410 (Fethard Bay) recorded the least number of Redshanks, with subsite peak counts of 31 and 52 individuals respectively. This result is consistent with previous surveys.

4.10. Activities and disturbance

During the 2018/19 season, activities at Bannow Bay centred upon 0O411 (St Kiernans to Saltmills to Big Burrow) and 0O413 (Saint Kiernans to Newtown) where four different activities were recorded overall but with most of these recorded on one day only (Table 16). Aquaculture activities were the exception; recorded during three survey days in 0O413 (Saint Kiernans to Newtown).

The sandy shores of 0O410 (Fethard Bay) are likely to be used regularly by walkers, often with dogs, but this is likely to be more frequent during summer months and at weekends. During the 2018/19 survey programme this activity was recorded on three survey days with little or no disturbance responses noted. As reported previously, surveying 0O410 and the southern section of 0O411 (St Kiernans to Saltmills to Big Burrow) requires the fieldworker (LJL) to walk along the shoreline for some distance. This in itself can cause disturbance to waterbirds, but appears to cause little disturbance as most waterbirds are on the lower shore and appear little affected by people walking along the upper shore.

A White-tailed Sea Eagle (*Haliaeetus* albicilla) was present on every survey day and on one day (10th October 2018) caused a moderate response from wading birds on the tidal flat of 0O417 (Clonmines Castle) as the eagle flew over.

Overall, the three records of aquaculture activities within 0O413 resulted in the following responses from waterbirds:

- 10th October 2018 – weak movement from waterbirds, largely waders.
- 26th November 2018 – no effect, no response from waterbirds.
- 11th February 2019 – moderate effect – birds moved to another part of subsite as a tractor and trailer drove onto shore.

Table 4.10.1 Activities recorded at Bannow Bay 2018/19.

Subsite Code	Subsite Name	Activity	Number of survey occasions activity recorded
0O410	Fethard Bay	Human on foot shoreline	3
		Dogs	3
0O411	St Kiernans to Saltmills to Big Burrow	Human on foot shoreline	1
		Dogs	1
		Shellfish Picker	1
		Aquaculture machinery	1
0O413	Saint Kiernans to Newtown	Bait diggers	1
		Human on foot, shoreline	1
		Aquaculture machinery	3
		Aquaculture personnel on shoreline	2
0O417	Clonmines Castle	Predation - disturbance	1
0O418	Bannow Island to Newquay	Bait Diggers	2
0O489	Pollfur	Human on foot, shoreline	1

5. DISCUSSION

5.1. Overview of the 2018/19 season

The 2018/19 winter waterbird survey programme at Bannow Bay marks the fifth consecutive season that this survey programme has been carried out. The winter season of 2018/19 provided relatively good and settled weather throughout which certainly aided the collection of good quality count data across the site on each survey occasion.

A total of 38 waterbird species were recorded during the winter, which included 18 wildfowl and allies, 15 wader species, and five gull species. Species diversity was consistent with previous low tide surveys at the site and was higher than recorded during the previous five I-WeBS seasons. The species list included six species listed on Annex I of the EU Bird's Directive (Red-throated Diver, Great Northern Diver, Slavonian Grebe, Little Egret, Golden Plover and Bar-tailed Godwit). The record of Slavonian Grebe was a first for Bannow Bay. This species is a relatively scarce wintering species in Ireland, occurring in largest numbers at Lough Swilly (Donegal) and Blacksod Bay (Co. Mayo) (Boland & Crowe, 2012; Wernham *et al*. 2013).

All Special Conservation Interest (SCI) species listed for Bannow Bay SPA were recorded during winter 2018/19 with the exception of Pintail. This dabbling duck was last recorded at Bannow Bay during the 2005/06 I-WeBS season, with very low numbers also recorded during the 2016/17 low tide surveys. While the flyway population of Pintail is stable/fluctuating (AEWA, 2018) there has been a long-term decline in this species throughout I-WeBS (e.g. Burke *et al.* 2018). Similar declines in the UK but increasing winter populations in the Netherlands, suggest that the species winter distribution is shifting eastwards in response to milder winters, but this is yet to be confirmed.

5.2. Waterbird numbers and trends

The total number of waterbirds recorded across Bannow Bay each winter clearly shows great variation between months. There was a difference of over 6,000 waterbirds between the minimum and maximum counts recorded during 2018/19. There is also wide variation between low and high tide counts, both within and between seasons. These results underpin the need to have replicated surveys (i.e. monthly) each winter.

Of note was that the peak low tide count of 2018/19 (13,801) was larger than that recorded during the previous two winter seasons. However, despite this positive result, re-assessment of trends for waterbird SCI species using data from the current and previous four winter seasons revealed that ten of the 15 species assessed have declined in number, while three species have increased in number and two species are considered stable. While calculations suggested a large decline in the numbers of Black-tailed Godwit this trend is likely misleading as it was influenced by a very large and unusual early season count during 2009/10 that were likely staging birds that had stopped off *en route* to wintering grounds elsewhere (NPWS, 2012). Re-calculating the trend omitting this once-off record count results in an increasing trend for this wading bird which is consistent with the national trend.

The second method to assess trends compared the five-year mean peak count for the surveys undertaken across the winters 2014/15 to 2018/19 inclusive, with the baseline mean peak used for

SPA designation. This assessment revealed that seven of the waterbird SCI species now occur in numbers higher than the baseline average while six species have declined and are present in lower numbers than during the baseline period.

The two trend calculations obviously have differing results but perhaps are best viewed as an assessment of short-term trends (indexing of low tide data) and long-term trends (comparison of recent peak counts vs baseline data). Table 5.2.1 compares these results, alongside the short-term trends published by Burke *et al*. (2018). This shows that with the exception of Shelduck, Golden Plover and Bar-tailed Godwit, short-term trends (largely declines) at Bannow Bay are consistent with all-Ireland trends i.e. such declines in numbers are in line with declines in wintering waterbird numbers on a national scale.

Table 5.2.1: Comparison of site-based trends for SCI species in Bannow Bay SPA calculated using data from the low tide survey programmes at Bannow Bay, with all-Ireland trends.

	10-year trend 2009/10-2018/19	24-year trend trend Baseline (95/96-99/00) vs Current (14/15-18/19)	All-Ireland short-term trend based on Burke et at al. 2018
Light-bellied Brent Goose	Decrease	Increase	Decrease
Shelduck	Stable	Decrease	Decrease
Pintail	Decrease	Decrease	Decrease
Oystercatcher	Decrease	Increase	Decrease
Golden Plover	Increase	Increase	Decrease
Grey Plover	Decrease	Increase	Decrease
Lapwing	Decrease	Decrease	Decrease
Knot	Decrease	Increase	Decrease
Dunlin	Decrease	Decrease	Decrease
Black-tailed Godwit	Increase	Decrease	Increase
Bar-tailed Godwit	Decrease	Increase	Increase
Curlew	Decrease	Decrease	Decrease
Redshank	Decrease	Increase	Decrease

Burke *et al*. (2018) in presenting updated waterbird population estimates, showed that wintering waterbirds in Ireland have declined by almost 500,000 since the mid 1990's, equivalent to a decline of 40%. Such a large decline nationally obviously has implications for numbers at individual sites, but conversely, declines at individual sites across the country will have driven the observed national trends. While the impacts of climate change are being mooted as a possible explanation for declining numbers of some species, with birds simply not migrating as far as Ireland for winter, site-level factors no doubt have, and continue to contribute to such observed trends, especially when various activities and human use of wetland sites are considered in a cumulative way.

5.3. Waterbird distribution

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).

While bird count data collected over the past five 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. It is therefore noteworthy that on the whole, distribution of the waterbird SCI species across Bannow Bay has remained highly consistent over time.

As with previous surveys, one subsite, 0O416 (Kiltra) remains very important for a range of species at low tide; with total numbers during low tide ranked as 'very high' for a total of eight of the 12 waterbird SCI species assessed. Four other subsites (0O411, 0O413, 0O417 and 0O418) all supported five species in numbers ranked as 'very high'. While the importance of certain subsites remains high, the results also show how all subsites can be important at certain times. For example the outer bay (0O410 Fethard Bay) can support high 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 0O489 (Polfur) supported high numbers of Redshank, while this subsite and the equally small 0O487 (Tintern Abbey to Tintern Bridge), support nearly all of the site's Teal population.

Several species continue to show a high degree of within-site fidelity (subsite faithfulness). Shelduck has a high degree of within-site fidelity to subsite 0O418 (Bannow Island to Newquay) and peak numbers have been recorded in this one area in all previous low tide surveys. While this highlights site faithfulness, it also suggests that adequate food resources are available all winter, with the species not needing to distribute more widely to feed because of prey depletion. However, such a high degree of site faithfulness is also relevant in terms of site management i.e. any future changes in the human use or habitat quality of 0O418 could potentially lead to displacement of a large proportion of the wintering population of Bannow Bay. With the majority of estuarine wetland sites across Ireland not receiving the survey attention of Bannow Bay, such important site-based information is unavailable for most sites.

Other species showing a high degree of subsite faithfulness included Golden Plover. The key low tide roost position of this species in 0O416 (Kiltra) remains relatively consistent season after season, with the mapped flock position only showing minimal positional shifts in any given direction.

Numbers of Bar-tailed Godwit were relatively low during low tide surveys, but good numbers of all-Ireland importance, were recorded at high tide. Numbers of Knot varied greatly during low tide surveys, and the species was present in very low numbers during high tide. These results suggest that these two species are highly mobile and may utilise other sites during certain tidal states. The godwits perhaps fly to other intertidal sites (e.g. Ballyteigue Burrow) to forage during low tide periods; returning to Bannow Bay to roost, while Knot perhaps both forage and roost elsewhere at times. Both Bar-tailed Godwits and Knot are known to be relatively 'mobile' and less site-faithful than some species of wader. Recent research regarding Knot, suggests that this is not simply a species-specific characteristic, but rather a response to the local prey resource (Oudman *et al*. 2018). Importantly this implies that there could be direct consequences of environmental change on bird population

distribution (Oudman, 2017). Given that both Bar-tailed Godwits and Knot preferentially feed upon bivalve molluscs, perhaps this is a direct consequence of annual variation in prey resource.

6. CONCLUSION

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, shellfisheries or recreation (dit Durrell *et al.* 2005; McNaghten & Crowe 2010). Key to the effective management of these sites is an effective monitoring programme which can underpin any management decisions put in place.

This report has provided results from the fifth consecutive season of low tide monitoring of wintering waterbirds at Bannow Bay. Some important results have emerged. The trend results are particularly interesting as contrasting long- and short-term trends are emerging. In terms of 'long-term assessment,' seven waterbird SCI species now occur in numbers higher than during the baseline average while six species have declined and are present in lower numbers than during the baseline period. This contrasts to ten out of the 12 species showing short-term declines. These results are consistent with national trends, whereby wintering waterbirds are now known to have declined steeply over the long-term but with on-going short-term declines also evident. How such declines can be addressed and/or reversed is not known. However, annual monitoring is essential in order to continue building on the solid database of good quality and co-ordinated count data, which ultimately can underpin our knowledge of both waterbird site distribution and trends.

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APPENDIX I: BANNOW BAY SPA/SAC SITE SYNOPSES

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.

Further details available on www.emff.marine.ie

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This project or operation is part supported by the Irish government and the European Maritime & Fisheries Fund
as part of the EMFF Operational Programme for 2014-2020

Ireland's EU Structural and Investment Funds Programmes 2014 - 2020
Co-funded by the Irish Government and the European Union

An Roinn Talmhaíochta, Bia agus Mara
Department of Agriculture, Food and the Marine

EUROPEAN UNION
This measure is part-financed by the European Maritime and Fisheries Fund

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