

**Marine Institute**

**Report on monitoring sanderling populations  
within Donegal Bay SPA (004151), 2014/15**

**March 2016**

**ATKINS**



# Marine Institute Bird Studies

## Monitoring of Sanderling populations within Donegal Bay SPA (004151), 2014 / 2015

**March 2016**

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# 1. Introduction

## Brief & Context

- 1.1 Atkins (Ecology) was commissioned by the Marine Institute to provide ornithological services in relation to the appropriate assessment of aquaculture and shellfisheries on coastal Special Protection Areas (SPAs).
- 1.2 In 2013, Atkins (Ecology) prepared an Appropriate Assessment of aquaculture on the Donegal Bay SPA (site code 004151) and a risk assessment of fishing activities in the Inner Bay. Durnesh Lough SPA (site code 004145) was also considered in this report, because of its close proximity to the Donegal Bay SPA, and the interchange of birds between the two SPAs (Marine Institute, 2013)<sup>1</sup>.
- 1.3 As part of the preparation of the 2013 assessment, a need for further data on Light-bellied Brent Goose (*Branta bernicla hrota*) and Sanderling (*Calidris canutus*) was identified, as previous work (Gittings and O'Donoghue, 2012) indicated that both species could be negatively affected by intertidal oyster culture, but there were limitations to the available data on their distribution and habitat usage in Donegal Bay. In addition, the precise nature of the response of Light-bellied Brent Goose to intertidal oyster culture was not clear from the previous work at the time. Therefore, a short study of Light-bellied Brent Goose and Sanderling distribution and habitat usage in the main areas occupied by intertidal oyster trestles was carried out between January to March 2013 (refer to Appendix B of the Donegal Bay SPA Appropriate Assessment; Marine Institute, 2013).
- 1.4 The Appropriate Assessment report (Gittings and O'Donoghue, 2013) concluded that there was potential for intertidal oyster culture in the Mountcharles area to cause sizeable displacement impacts to Sanderling, but that there was insufficient data on Sanderling distribution and abundance to assess whether these displacement impacts would be significant in terms of the attributes defined for the conservation objectives of the Donegal Bay SPA.
- 1.5 Following the publication of the Appropriate Assessment of aquaculture in the Donegal Bay SPA in 2013, National Parks and Wildlife Service (NPWS) noted (in their submission) that the assessment had stated that some displacement of Sanderling by the existing oyster trestles had probably already occurred and as a result, the overall numbers within the Mountcharles/Eddrim Estuary area may have been reduced. NPWS were concerned that a further extension of oyster trestle activity in this area may well displace the existing Sanderling that use this area further. The assessment put this displacement at up to 10% of Sanderling by oyster trestle culture and so was in conflict with Sanderling achieving the relevant conservation objective in Donegal Bay SPA. Consequently, further information was requested to increase confidence levels in the predicted impact on Sanderling in Donegal Bay.
- 1.6 As a result, an additional period of monitoring for Sanderling in Donegal Bay was proposed from September 2014 to February 2015. This report details the methodology, results and conclusions of this monitoring period. It also presents a summary of all relevant data sources on Sanderling in Donegal Bay.

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<sup>1</sup> The assessment can be viewed in full at - <https://www.agriculture.gov.ie/media/migration/fisheries/aquacultureforeshoremanagement/aquaculturelicensing/donegalbay/AnnexIIDonegalBay180713250614.pdf>

## Objectives

- 1.8 To summarise, the aims of this monitoring were two-fold: -
- To attempt to provide an accurate figure for Sanderling populations in Donegal Bay. This figure was to be used to provide a reference level against which the significance of the displacement impact was to be assessed; and
  - To observe Sanderling behaviour within the Mountcharles/Eddrim Estuary subsites within Donegal Bay to determine if an impact on Sanderling distribution and habitat use due to intertidal oyster culture is observed.
- 1.9 More specifically, the focus of the assessment is to investigate the potential impact of oyster cultivation on Sanderling at plots T12/396A and T12/446A (see Figure 1.1).

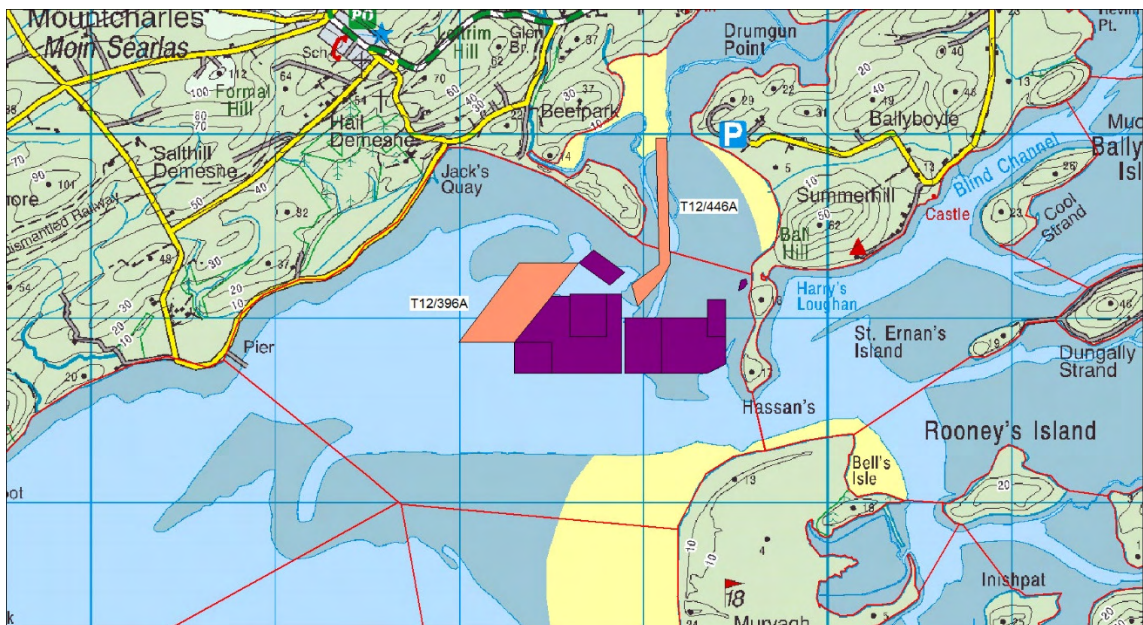


Figure 1.1 – Location of licence application being considered (T12/396A / T12/446A).

## Acknowledgements

- 1.10 We are grateful to Lee McDaid, National Parks and Wildlife Service for providing site data and for providing information about Sanderling activities in Donegal Bay. Thanks also to Francis O'Beirn (Marine Institute); Olivia Crowe (BirdWatch Ireland; IWeBS Office) and David Tierney (NPWS) for ongoing assistance with the Marine Institute bird studies.

## Personnel

- 1.11 The 2014/2015 survey design, analysis and report writing was carried out by Paul O'Donoghue with the assistance of John Deasy and Mike Trewby. The fieldwork was carried out by Mike Trewby. Data entry and mapping was carried out by Mike Trewby and John Deasy. The report was further reviewed by Mike Trewby and Tom Gittings.

## 2. Review of Existing Data

### Introduction

- 2.1 The Appropriate Assessment report (Gittings and O'Donoghue, 2013) examined a range of data sets and undertook a number of consultations including with John Cromie, co-ordinator of IWeBS counts for Donegal Bay and Emmett Johnston, NPWS local conservation ranger in order to gain an understanding of the numbers and distribution of Sanderling in Donegal Bay. This information is summarised below.

### Sanderling

- 2.2 Sanderling is a small *Calidris* wader which breeds in high Arctic tundra of eastern Canada, Greenland and Siberia and winters in coastal areas, particularly on sandy beaches. Donegal Bay is listed by Boland and Crowe (2012) as a nationally important site for Sanderling.
- 2.3 During the non-breeding season Sanderling feed on a range of marine invertebrates, mainly polychaetes, molluscs, small crustaceans as well as insects. The polychaete *Scopelopsis squamata* has been found to be an important prey item in parts of NW Europe; as have small bivalves (such as *Donax* sp.) as well as shrimp (*Crangon crangon*); opportunistic feeding on kelp flies, on razorshell (*Ensis* sp.) washed ashore and even mussel shells left by feeding Oystercatcher has also been noted (from Reneerkens *et al.*, 2009).
- 2.4 In previous work, Gittings and O'Donoghue (2012) reported a negative association between Sanderling and intertidal oyster trestles. However, the data for Sanderling in this study was limited and the reported association was based on the position of Sanderling in ordination analyses, rather than the more detailed analyses of species distribution that were possible for some other species. Nevertheless, in the extensive study component of Gittings and O'Donoghue (2012), a total of 524 Sanderling were recorded on 14 counts across four sites and there were only two records, each of single birds, within areas of oyster trestles.
- 2.5 In the trestle watch study carried out in 2013, there were ten separate observations of flock positions within the Mountcharles/Eddrim Estuary area. Sanderling were never recorded within the oyster trestle blocks and the pattern of distribution of the Sanderling flocks is suggestive of Sanderling avoiding the trestles. However, because of the low total number of observations of Sanderling flocks, the dataset does not have sufficient statistical power to demonstrate significant avoidance of the trestle blocks: the probability of all nine flock positions not occurring within the trestle blocks, if they were selecting habitat at random, would have been around 23%. Nevertheless, the data from this study adds to the evidence from the previous work by Gittings and O'Donoghue (2012) for Sanderling showing strong avoidance of oyster trestles. Therefore, for the purposes of this assessment, we have assumed that intertidal oyster cultivation causes complete exclusion of Sanderling from the area occupied by the trestles.

### Subsites

- 2.6 The boundaries of Donegal Bay SPA are shown in Figure 2.1.
- 2.7 Donegal Bay has been divided into 19 subsites for the purposes of waterbird monitoring (Figure 2.1 and Figure 2.2). The same subsites were used for both the IWeBS and the NPWS baseline waterbird survey counts, with the exception of Creevy Pier-Kildoney Point, which was not included in the NPWS baseline waterbird survey. The subsites cover most of the shoreline of the SPA, with

the exception of a section of shoreline between Rossnowlagh and Kildoney and another short section of shoreline at the northern side of the mouth of the Erne Estuary. There are large areas of offshore subtidal habitat which are not included in any of the subsites; these areas are not, however, relevant to Sanderling. As some of the early IWeBS counts used different arrangement of subsites, our analyses are based mainly on recent IWeBS data, which uses the subsites discussed above.

- 2.8 For the purposes of analysing waterbird distribution at a broader scale, the subsites have been also grouped into three broad zones: the Outer Bay, the Inner Bay and the Southern Bay (Figure 2.4).





Figure 2.1 – Donegal Bay & Durnesh Lough SPAs (copy of Figure 1.1 from the AA).



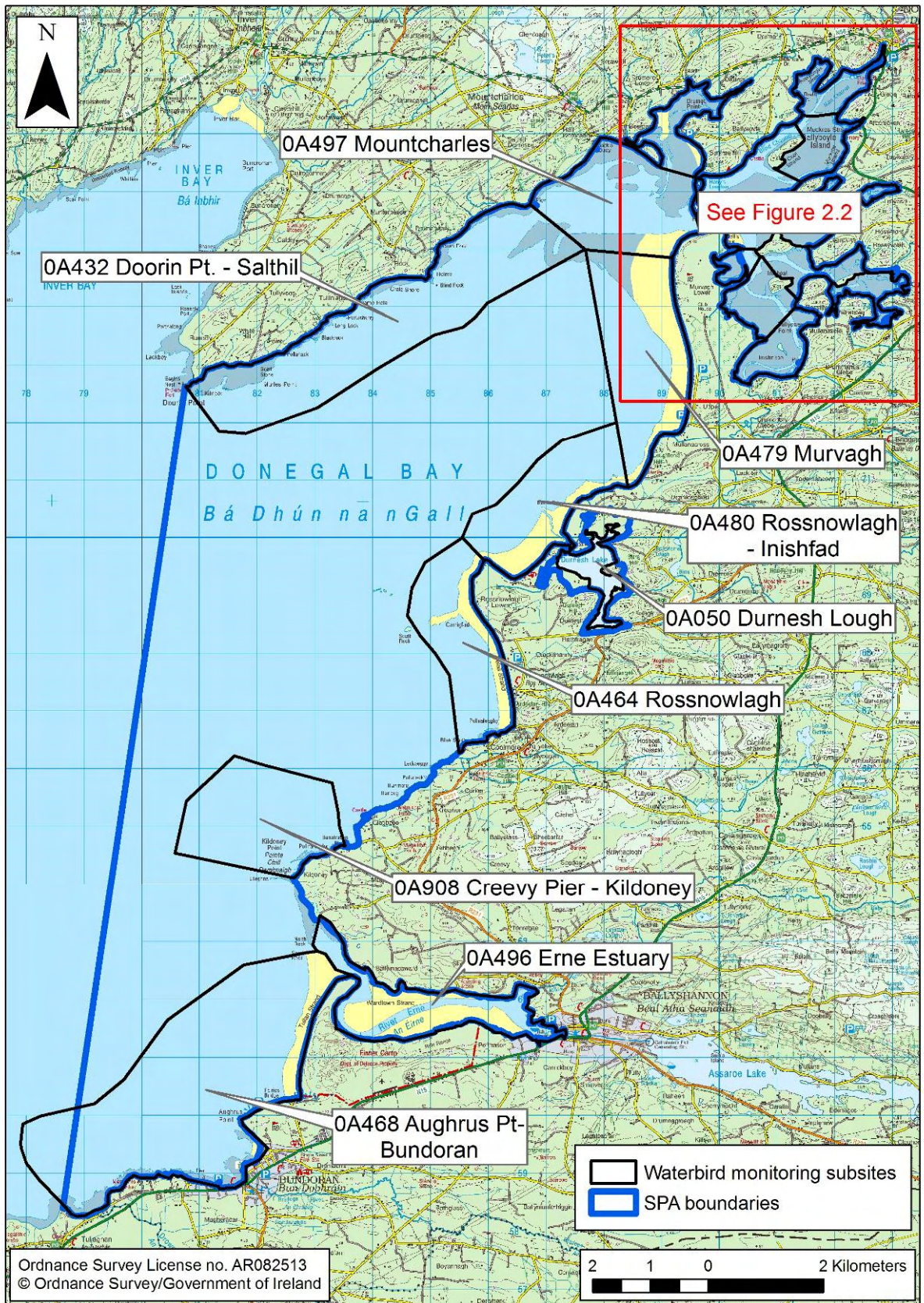


Figure 2.2 – Waterbird monitoring subsites in Donegal Bay (Outer Bay) (copy of Figure 3.1. from the AA).



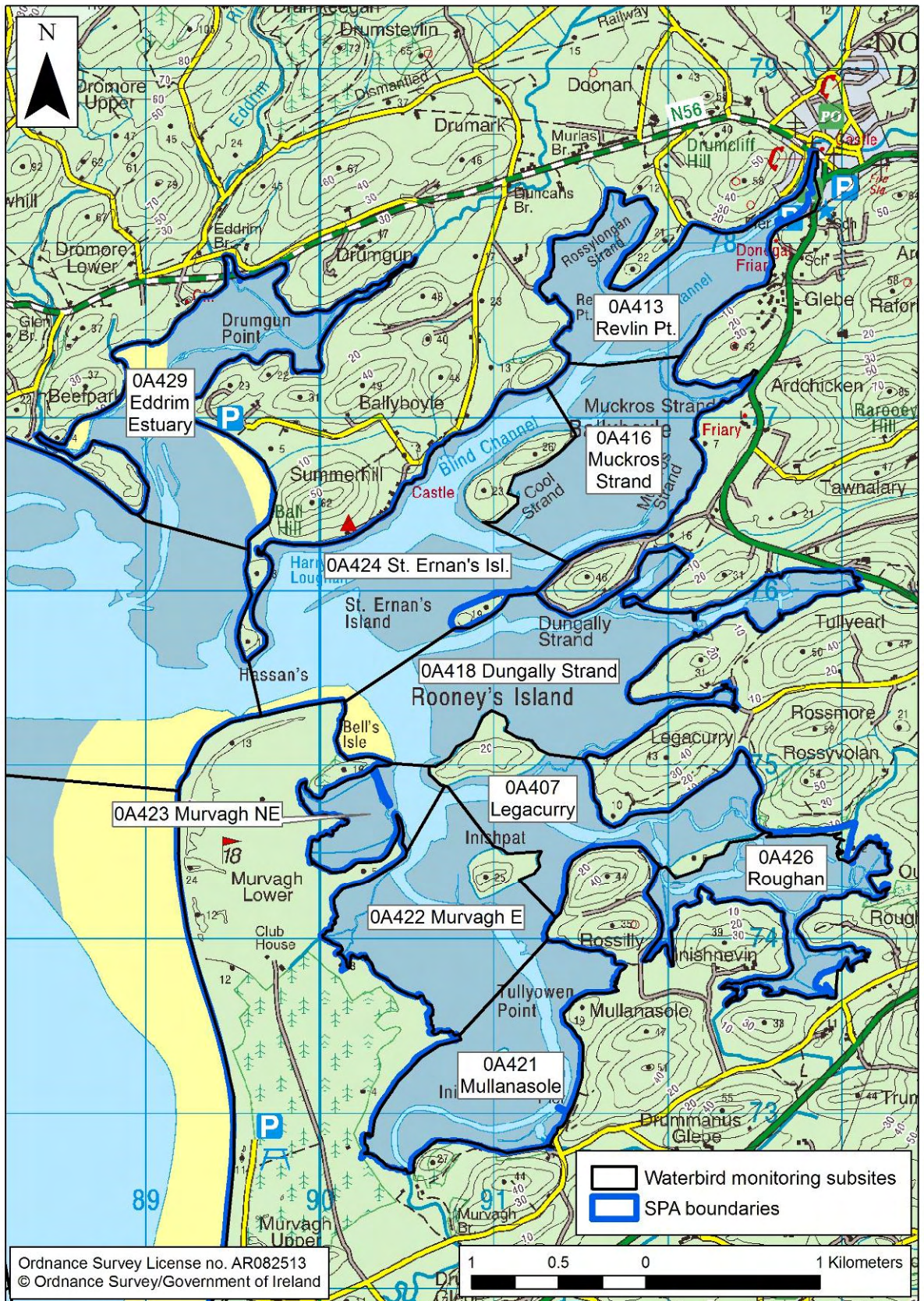


Figure 2.3 - Waterbird monitoring subsites in Donegal Bay (Inner Bay) (copy of Figure 3.2. from the AA).



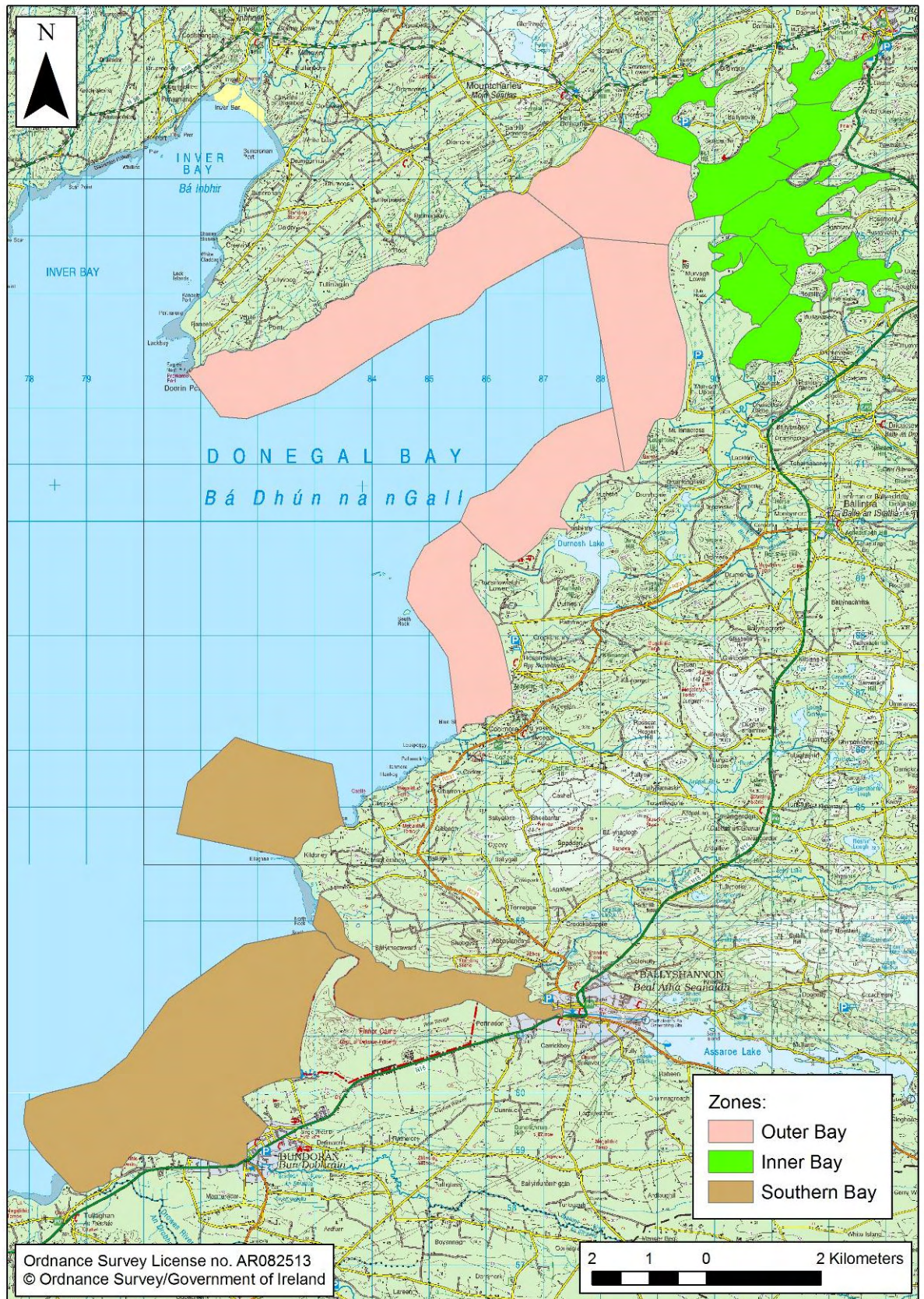


Figure 2.4 – Zones used for broad-scale analysis of waterbird distribution (copy of Figure 3.3. from the AA).



## Distribution & numbers within Donegal Bay

- 2.9 As noted, we consulted with the local IWeBS co-ordinator in order to gain an overview of Sanderling usage of Donegal Bay. Within the bay the main areas which Sanderling tend to use have been described as the sandy shoreline west and south of the Beefpark peninsula (Mountcharles subsite); the sandflats at the northern end of Murvagh around the boundary between the Murvagh and Mountcharles subsites; and the upper shore in the Murvagh subsites, with some also in the Rossnowlagh subsite (John Cromie, pers. comm.).
- 2.10 Waterbird distribution has been monitored as part of the **Irish Wetland Bird Survey (IWEBS)** each winter since 1995/96. The IWEBS scheme aims to carry out monthly counts each winter between September and March in all sites that are important for non-breeding waterbird populations. However, this level of coverage is not always possible to achieve in a volunteer-based scheme. At Donegal Bay, between one to four complete (or nearly complete) counts have been carried out each winter, apart from 2001/02 (when no counts were carried out). The level of coverage has increased in recent years with only one count in most winters prior to 2004/05 and two-four counts in the winters from 2004/05. Most counts have been carried out in the mid-winter period (December-February). The counts are carried out by a coordinated team of six volunteers, normally within a period of 1-2 days. Table 2.1 summarises IWeBS count data from 2006/07 to 2013/14 across each month (from September to February); counts from Atkins 2012/13 monitoring survey, which was undertaken in the months of January to March 2013 are also presented.

**Table 2.1 – Sanderling counts in Donegal Bay from previous studies.**

Season	Source	Sep	Oct	Nov	Dec	Jan	Feb	Mar
2006/07	IWeBS	-	-	52	87	26	0	-
2007/08	IWeBS	-	-	-	48	0	-	-
2008/09	IWeBS	0	107	-	33	42	-	-
2009/10	IWeBS	-	-	-	21	57	-	-
	BWS <sup>1</sup>	-	109	52	271	271	130	-
2010/11	IWeBS	-	-	-	195	205	-	-
2012/13	IWeBS	72	14	-	31	1	254	-
2013/14	IWeBS	-	68	123	5	96	-	-
2012/13	Atkins Monitoring Survey (2013)	-	-	-	-	51	224*	38

\* Note: maximum of three counts: 210, 44 and 224.

<sup>1</sup> BWS; NPWS baseline waterbird survey 2009/2010.

- 2.11 The conservation condition and trend of the non-breeding Sanderling at Donegal Bay is summarised in Table 2.2 (derived from IWeBS data). As can be seen the conservation status of Sanderling in Donegal Bay is *Favourable*; the population has grown by +28 in the 5 year period 2003-2008 and +186.6 in the 12 year period 1994/95 to 2008/09. However, Sanderling is notoriously difficult to count during high-tide IWeBS surveys. Furthermore, for Sanderling, poor coverage in some years of the long-term dataset and a resulting relatively high level of data imputation during the indexing and trend analysis leads to some caution being necessary when examining the trend for this species. Our analysis of the recent IWEBS data shows that there are large month-to-month variations in total numbers recorded on counts and it is likely that many of the counts miss significant

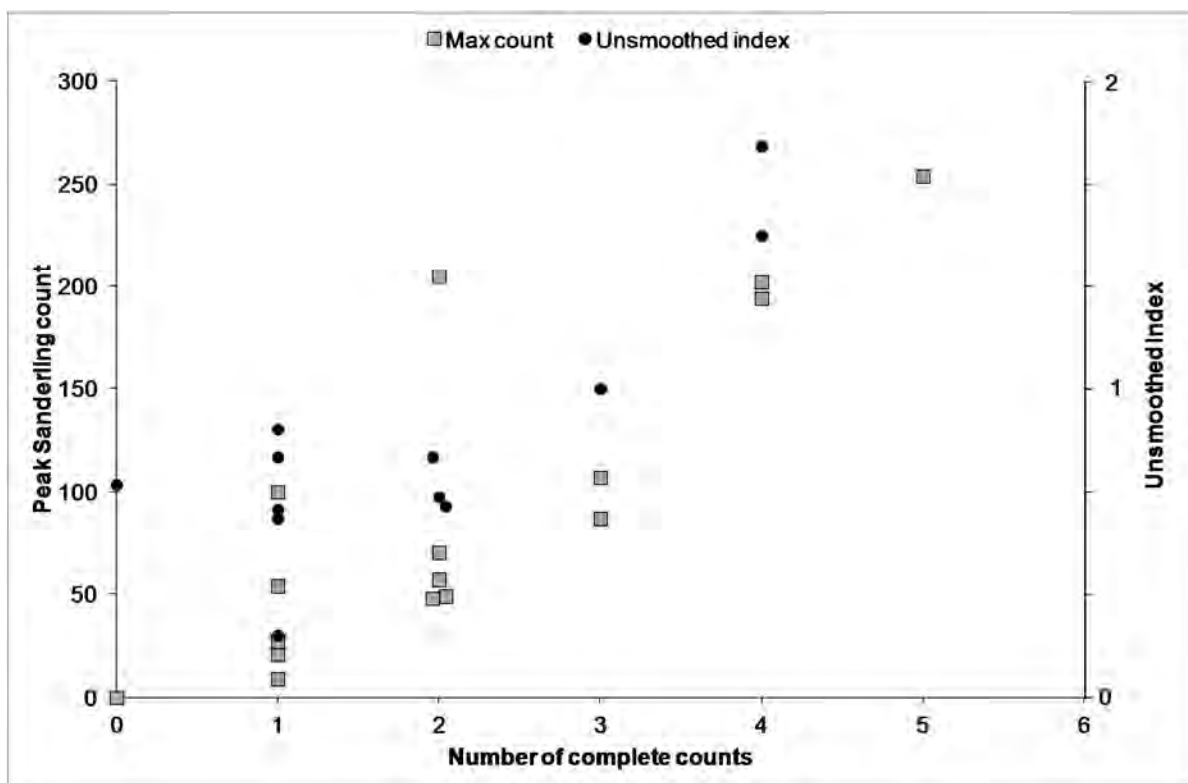
numbers of Sanderling. It is possible that increased coverage in recent winters has biased the trend analysis: as the number of counts increase it is more likely that at least one count will manage to be reasonably accurate (i.e. will not miss significant numbers of Sanderling). In fact, there appears to be a correlation between the number of complete counts<sup>2</sup> and the peak Sanderling count and with the unsmoothed index values<sup>3</sup> (Text Figure 2.1), supporting our interpretation.

**Table 2.2 – Conservation condition and population trends of non-breeding waterbird SCI species at Donegal Bay.**

Special Conservation Interests (SCIs)	Site Conservation Condition	12 year site population trend <sup>1</sup> 12YR <sup>b</sup>	5 year site population trend <sup>2</sup> 5YR	Current all-Ireland Trend <sup>3</sup>	Current international trend <sup>4</sup>
Sanderling	Favourable	+186.6	+28.0	+109.4	Stable

Source: Tables 4.2 and 4.3 in NPWS (2012b)

N/c = not calculated. <sup>1</sup>site population trend analysis, 12 yr. = 1996–2008; <sup>2</sup> site population trend analysis, 5 yr = 2003–2008; <sup>3</sup> all-Ireland trend calculated for period 1994/95 to 2008/09; <sup>4</sup> international trend after Wetland International (2006); <sup>4</sup> trend based on two five year averages.



**Text Figure 2.1 – Relationship between the number of complete counts each winter and Sanderling population estimates (as indicated by the maximum count and the unsmoothed index values) each winter in the IWEBS dataset, 1995/96-2010/11 and 2012/13.**

2.12 Details of the **NPWS baseline waterbird survey (BWS)** methodology and results at Donegal Bay are described in Cummins and Crowe (2010) and NPWS (2012b). Distribution of Sanderling across subsites in Donegal Bay during the 2009/10 NPWS baseline waterbird survey are presented in Table 2.3. While the weather over 2009/10 was very cold Sanderling has been found in the

<sup>2</sup> Where a complete count is defined as including the main subsites that are important for Sanderling (see paragraphs 2.2-2.22).

<sup>3</sup> Unsmoothed index values were read off the graph on page 11 of NPWS (2012); no index values were available for the winters since 2009/10.

Waddensea to be the only wader that does not show differences in numbers between cold and mild winters (from Reneerken *et al.*, 2009); it is likely therefore that the results are not cold-weather influenced as can happen with some waders.

- 2.13 In the NPWS baseline waterbird survey counts, Murvagh was the only subsite that held Sanderling on all the counts. NPWS (2012) notes that, within the Murvagh subsite, Sanderling “*appeared to favour foraging within an area on the lower shore in the north of the subsite, the birds positioned in roughly the same area in all four low tide counts, usually accompanied by Dunlin, Bar-tailed Godwits and Oystercatchers amongst other species, with flocks often overlapping with subsites 0A497 and 0A432*” (i.e. Mountcharles and Doorin-Salthill). The Erne Estuary held Sanderling on three of the five counts and the Eddrim Estuary held Sanderling on two of the five counts. No Sanderling were recorded in the Inner Bay subsites (apart from the Eddrim Estuary).

**Table 2.3 – Distribution of Sanderling in the NPWS baseline waterbird survey (BWS) of Donegal Bay, 2009/10.**

Subsite	21 Oct LT	04 Nov LT	02 Dec LT	07 Feb HT	17 Feb LT
Aughrus Pt – Bundoran (Southern Bay)	0	0	35	0	0
Erne Estuary (Southern Bay)	46	0	160	170	0
Eddrim Estuary (Outer Bay)	0	0	2	35	0
Murvagh (Outer Bay)	63	51	74	66	130
Rossnowlagh (Outer Bay)	0	1	0	0	0
<b>Total</b>	<b>109</b>	<b>52</b>	<b>271</b>	<b>271</b>	<b>130</b>

See Figure 2.2 and 2.3 for subsite locations).

- 2.14 As noted, in the Appropriate Assessment we further divided Donegal Bay divided into Inner, Outer and Southern sectors (see Figure 2.4 for zones). In the IWeBS counts, most Sanderling were found to occur within the Outer Bay zone, with significant numbers also occurring, but less frequently in the Southern Bay zone (Table 2.4). Most counts were carried out on rising or falling tides.
- 2.15 The distribution of birds between subsites is not very consistent across IWeBS counts. However, on most counts, the majority of birds were distributed across the subsites in the middle of the Outer bay: i.e. Murvagh (0A479), Rossnowlagh – Inishfad (0A489) and Rossnowlagh (0A464) (see Table 2.4). Sanderling were recorded from the Mountcharles subsite on three counts. There were only two count from the Inner Bay. The distribution of birds within different parts of the Outer Zone is summarised in Table 2.5; again Murvagh to Rossnowlagh emerges as important, though flocks do occur elsewhere such as in Mountcharles.

**Table 2.4 – Sanderling distribution by zones in IWeBS counts of Donegal Bay, 2006/07-2010/11 and 2012/13 (refer to Figure 2.4 for zones).**

Winter	Month	Southern Bay	Inner Bay	Outer Bay	Total
2006/07	Nov			52	52
	Dec	23		65	87
	Jan	22		3	26
2007/08	Dec	28		20	48
2008/09	Oct			107	107
	Dec	1		32	33
	Jan	25	9	8	42
2009/10	Dec	17		4	21
	Jan			57	57
2010/11	Dec			195	195
	Jan	48		157	205
2012/13	Sep	52		20	72
	Oct			14	14
	Dec			31	31
	Jan			1	1
	Feb			254	254
2013/14	Oct	67		1	68
	Nov		20	103	123
	Dec			5	5
	Jan	33		63	96

**Table 2.5 – Sanderling distribution in the Outer Bay zone in IWeBS counts of Donegal Bay, 2006/07-2010/11 and 2012/13.**

Winter	Month	Doorin Pt. - Salthill Pier	Mountcharles	Murvagh-Rossnowlagh	Donegal Bay total
2006/07	Nov			52	52
	Dec			65	87
	Jan			3	26
2007/08	Dec			20	48
2008/09	Oct			107	107
	Dec	1	<i>31</i>		33
	Jan		8		42
2009/10	Dec			4	21
	Jan			57	57
2010/11	Dec			195	195
	Jan		2	155	205
2012/13	Sep	<b>20</b>			72
	Oct			14	14
	Dec			31	31
	Jan			1	1
	Feb	<b>6</b>		248	254

Murvagh-Rossnowlagh represents the combined count across the Murvagh (0A479), Rossnowlagh-Inishfad (0A480) and Rossnowlagh subsites (0A464). Counts in italics were at high tide, counts in bold were at low tide; all other counts were on rising or falling tides. For Murvagh-Rossnowlagh, where counts were not all carried at the same tidal states in these subsites, the count is classified according to the tidal state in the subsite(s) with the majority of the count.

2.16 The distribution of Sanderling during the Atkins partial census counts in January-March 2013 is shown in Table 2.6. These counts did not cover the Inner Bay, while coverage of some of the more extensive outer sandflats, such as Murvagh, was probably limited. The largest Sanderling flocks were recorded in the Aughrus Pt – Bundoran subsite on the two counts. Looking across both the 2013 trestle watch and census counts, Sanderling occurred in the Eddrim Estuary/Mountcharles area (0A497) on four of the five count days.

**Table 2.6 – Distribution of Sanderling in partial census counts of Donegal Bay, Jan-March 2013.**

	Subsite	11 Jan	29 Jan	03 Feb	12 Feb	25 Feb	12 Mar
Census count	Mountcharles				44		<b>16</b>
	Eddrim Estuary					<b>40</b>	<b>10</b>
	Murvagh		51	84			<b>12</b>
	Rossnowlagh					38	
	Aughrus Pt - Bundoran <sup>4</sup>			126		146	
	Total		51	210	44	224	38
Trestle watch	Eddrim Estuary/ Mountcharles			<b>90</b>	<b>62</b>	<b>63</b>	
Other	Mountcharles	<b>52</b>					

Erne Estuary and Aughrus Pt – Bundoran not covered on 29 Jan 2013; Inner Bay not covered or only partially covered on all counts. Counts in bold were at low tide; all other counts were on rising or falling tides.

IWebS equivalent areas are as follows: - Mountcharles (0A497); Eddrim Estuary (0A429); Murvagh (0A479); Rossnowlagh (0A480 & 0A464) and Aughrus Pt – Bundoran (0A468) (see Figure 2.2 & 2.3).

- 2.17 Overall, while the data indicates that Sanderling distribution across Donegal Bay is highly variable; there does appear to be three core areas; namely Murvagh – Rossnowlagh, Aughrus Pt – Bundoran and Mountcharles / Eddrim. Given the large month-to-month variation in total numbers recorded on counts, and the difficulty of accurately counting a small and highly mobile wader across such a large site, it seems likely that many of the counts miss significant numbers of Sanderling. It seems plausible that there is a total midwinter population of around 200-300 birds, in which case, only counts that record more than 200 are likely to give a good indication of patterns of Sanderling distribution.
- 2.18 Excluding the Eddrim Estuary, Sanderling do not seem to favour the Inner Bay; this is in line with expectations based on biotope and benthic invertebrate data. Therefore, Sanderling distribution does not overlap to any significant extent with any of the Inner Bay applications or licenses for intertidal oyster cultivation.
- 2.19 Available data does suggest that Sanderling do seem to occur with some regularity within the Mountcharles / Eddrim Estuary area. Therefore, Sanderling distribution does overlap with the applications and licenses in the Mountcharles subsite.
- 2.20 In the 2013 census counts and trestle watches, Sanderling were recorded on four of the five survey days, and were also recorded on a separate reconnaissance visit, with a mean count across these six days of 48 birds. These were intensive surveys, with the area continuously watched for a period of over three hours; Sanderling flocks were typically only observed as being present for a short duration, highlighting the difficulty faced when attempting to census this species and determine its spatial distribution in Donegal Bay SPA.
- 2.21 Sanderling were recorded less frequently within the Eddrim Estuary/Mountcharles area in the IWebS and NPWS baseline waterbird survey counts. However, in the IWebS counts, these subsites were mainly counted on rising or high tides. Most of the NPWS baseline waterbird survey counts were low tide counts; one of the low tide counts did, however, exceed 200 (i.e., can be considered

<sup>4</sup> Both counts from Tullan Strand / Bundoran were early morning counts. It is our experience that birds are unlikely to stay in this area long as gets busier with walkers later in morning. On 3<sup>rd</sup> February 2015, the surveyor first picked up 16 Sanderling at 08:00 at Bundoran Bridge; then a larger flock of 126 birds was recorded on strand at 08:30. On 25<sup>th</sup> February 2015 the first birds counted – at 07:20 – associated with roost on beach at Bundoran; these birds commenced foraging before some dispersal from the site occurred.

likely to accurately reflect Sanderling distribution). As noted, from observations through the years, the Beefpark peninsula in the Mountcharles subsite has been described as one of the main areas where Sanderling occur in Donegal Bay (John Cromie, pers. comm.).

- 2.22 In conclusion, along with the neighbouring Murvagh peninsula, historical data emphasises the importance of the Eddrim Estuary/Mountcharles area for Sanderling in Donegal Bay. On the basis of data to 2013 it was estimated that around 25% of the Donegal Bay Sanderling population could regularly occur within the Eddrim Estuary/Mountcharles area.
- 2.23 It is obviously not possible to know whether Sanderling occurred within the area now occupied by trestles, prior to the introduction of the trestles. However, given the pattern of Sanderling distribution within the Mountcharles/Eddrim Estuary area, the similarity in substrate/biotope between the area now occupied by trestles and the area where Sanderling now occur, and the location of the trestle blocks between two areas where Sanderling regularly occur (the Mountcharles/Eddrim Estuary area and the Murvagh sandflats), it was concluded at the time that it is reasonable to assume that Sanderling would have occurred within the area now occupied by trestles, prior to the introduction of the trestles.
- 2.24 BirdWatch also co-ordinate a **Non-Estuarine Waterbird Survey** (Crowe *et al.* 2012) around the Irish coast. Substantial proportions of the overall national populations of a number of species, including Sanderling were found to occur along non-estuarine coasts. In the case of Sanderling 51% of non-estuarine sectors counted included Sanderling in the 2006/07 census, with highest densities / km from west, southeast and east coasts. Summers *et al.* (2002) in a review of site preferences of waders on the Orkneys found that Sanderling preferred wide, sandy shores.
- 2.25 There is an extensive non-estuarine coastline both to the south and west of Donegal. With respect availability of wide sandy beaches close to Donegal Bay SPA; the nearest are as follows. To the west Inver Bay has a large sandy beach / estuary at the head of the bay. To the south a number of wide beaches are also present to the southwest of Bundoran; i.e. Bunduff Strand and Trawlua Strand (either side of Mullaghmore). These are all within ca. 10km of Donegal Bay. The degree of interchange between Donegal & Inver or Tullan Strand / Bundoran and Bunduff Strand / Trawlua Strand is not known; generally, however, Sanderling are viewed as quite site faithful.

## 3. Methods

### Survey area

- 3.1 The study area for the Sanderling census counts in 2014/15 was the intertidal area of the Outer bay and Southern bay zones of Donegal Bay (Figure 3.1).
- 3.2 The study area for the trestle watch surveys in 2014/15 was confined to the subsites within which existing licences or applications for licences to culture oyster are located. These included the Mountcharles subsite (OA497) to the west of Hassan's where the majority of oyster trestles are located. There is a current application to extend this block further to the west (T12/396A), with a second to the northeast (T12/446A) of existing trestles in Mountcharles (Figure 1.1). Oyster trestles occurring to the east of Hassan's in the St. Ernan's Island and Dungally Strand subsites (OA418 and OA424) were not monitored during the trestle watch survey as previous datasets and monitoring has shown that Sanderling distribution does not overlap with applications or licenced intertidal cultivation areas in the inner bay, except the Eddrim estuary subsite.

### Census Counts

- 3.3 Monthly low tide counts of Sanderling throughout the intertidal area of the Outer bay and Southern bay zones of Donegal Bay (Figure 3.1) were undertaken between September 2014 and February 2015, inclusive.
- 3.4 Counts were undertaken using a combination of vantage point and transects to cover the study area. The positions of these vantage points and transects were recorded on aerial photography. Data recorded during surveys included the number of birds in each Sanderling flock, the position of the flocks, their activity i.e. feeding or roosting/other and the habitats used by the birds (original data available on request).
- 3.5 All the 2014/15 censuses started at Bundoran typically on a falling tide and sometimes at dawn to target the roosting site identified in 2013. The Bundoran roost was also visited at dawn on other dates separate to the census to better understand the pattern of roosting and dispersal from this site; survey dates included: -
- 20<sup>th</sup> October 2014;
  - 2<sup>nd</sup> December 2014;
  - 6<sup>th</sup> December 2014;
  - 8<sup>th</sup> December 2014; and
  - 23<sup>rd</sup> January 2015.
- 3.6 From Bundoran the observer moved north through Donegal Bay, systematically walking the transect routes or surveying from the vantages points, generally reaching Murvagh Strand during the period around low tide and then moving around to the Eddrim Estuary, Jack's Quay and Salthill Pier. Initially (i.e. September to November) Murvagh Strand and the sand bar stretching west off the northern end of the dunes was only covered around low tide. However, faced with repeated low sanderling counts for Donegal Bay, the area was covered twice from December onwards, with the first sweep of the area undertaken during low tide and then a second sweep undertaken at the end of the survey



day. The observer would walk the length of Murvagh Strand to try and gauge whether any sanderling were being pushed along the sandbar by the rising tide or if they were moving into the area from other locations.

- 3.7 For the January and February censuses the 0A432 (Doorin Pt.-Salthill) sub-site was not surveyed in full. Due to the consistent lack of birds in this area, a decision was made to drop the Burnfoot to Murles Point (Doorin Point) part of this sub-site to allow for more time surveying the Murvagh / Mountcharles / Eddrim area for sanderling. The decision was justified, as the outer parts of 0A432 do not hold typical sanderling foraging habitats and birds have not been or are very rarely recorded in this area.

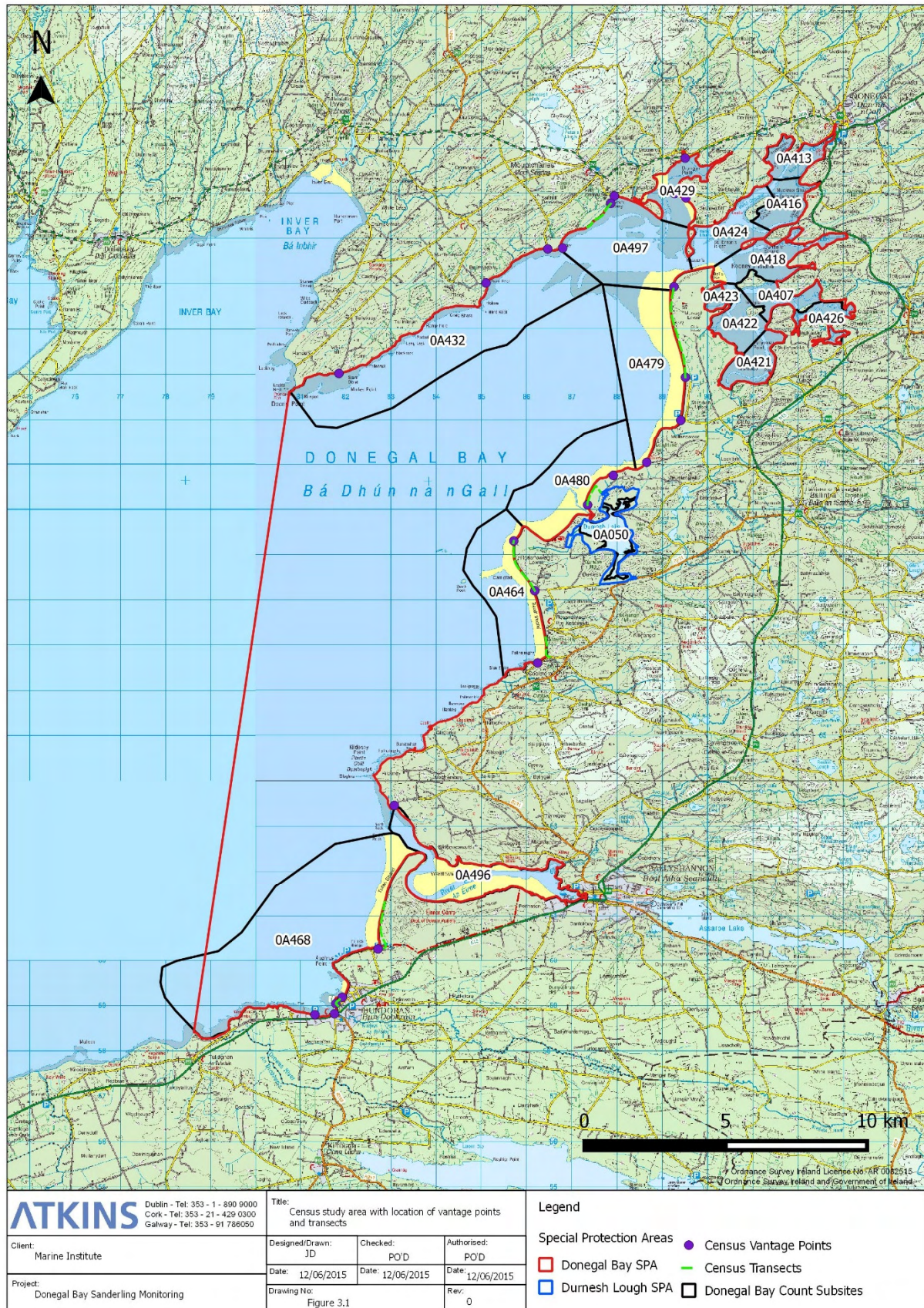


Figure 3.1 – Census study area with location of vantage points and transects.



## Trestle watches

- 3.9 The monitoring was undertaken from a vantage point on Hassan's (Figure 3.2). This is a small peninsula that separates the Mountcharles and St. Ernan's Island subsites. The northernmost of the two small hills on this peninsula provided a good vantage point for surveying the oyster trestle areas and adjoining application areas across a full low tide period, i.e. from the time that the trestles became exposed on the receding tide to the time that the trestles were fully covered on the flooding tide.
- 3.10 During the monitoring period, the surveyor scanned subsites 0A429 (Eddrim Estuary) and 0A497 (Mountcharles) and the visible areas of other subsites at 10 minute intervals. Any Sanderling detected were recorded. For each detection, the surveyor recorded the following information: -
- the location of the bird(s);
  - the subsite in which they occur;
  - the habitat in which they occur;
  - the time of the initial detection;
  - the time of the final detection;
  - the number of birds; and
  - their activity (feeding or roosting/other).
- 3.11 The habitat classes used in the monitoring were either; mud/sandflat within the oyster trestles; mud/sandflat outside of the oyster trestles or mixed sediment. Birds in lanes between trestle blocks were recorded within the appropriate 'within oyster trestles' category. The mixed sediment habitat is the habitat that occurs along shoreline areas.
- 3.12 The position of the tideline in subsites 0A429 and 0A497 was sketched at 30 minute intervals.
- 3.13 Records were kept of the timing and intensity of husbandry activity within the trestle blocks. Additional information on other activities such as recreational use and boat activity were also noted along with weather conditions and any other observations.
- 3.14 Census and trestle watch counts were undertaken by one counter using a 8 x 40 binoculars and spotting scope with 25 to 60 x zoom.

## Limitations to this study

- 3.15 During the trestles watches changing weather conditions over the course of a survey day resulted in sub-optimal visibility over more distant parts of the study area at times. Deterioration in visibility due to a passing shower or glare was accounted for while surveying and data collected during periods of compromised visibility were excluded from the data set.
- 3.16 During sanderling censuses of Donegal Bay the potential for Sanderling movement within the bay over a survey day was not fully accounted for. There is a risk that single surveyor moving through a large site like Donegal Bay could be picking up the same birds as they shift to different foraging and roosting locations within the study area. During the course of this study two core Sanderling foraging areas have emerged, one at Murvagh Strand/Eddrim Estuary and the other on Tullan

Strand to the north of Bundoran. While there was probably interchange of birds between these areas, it was felt that on census days when flocks were recorded in both areas, these were different birds. To exclude this uncertainty, the two core sanderling foraging areas would have to be counted simultaneously to conclusively determine that the both location were occupied by different flocks.

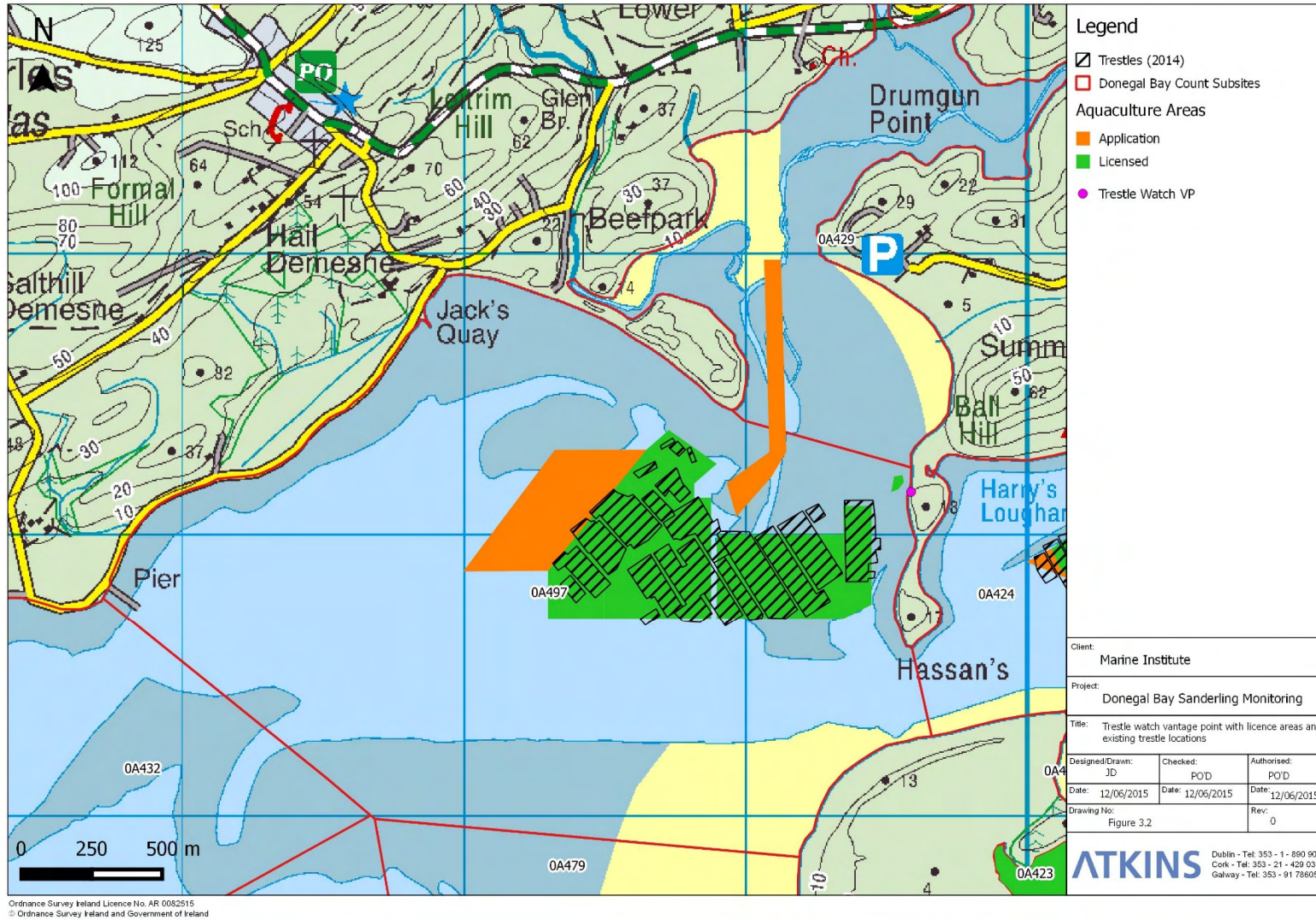


Figure 3.2 – Trestle watch vantage point with licence areas and existing trestle locations.

## 4. Results

### Low tide census counts

#### Count dates, timings and weather conditions

- 4.1 A total of six census counts were undertaken in Donegal Bay SPA from September 2014 to February 2015. The count dates, timings, tide times and weather conditions for surveys are shown in Table 4.1.

**Table 4.1 – Sanderling census count dates and associated details in Donegal Bay in 2014/15.**

Date	Start Time	End Time	HW	LW	Wind	Wind Dir.	Rain	Visibility	Cloud (%)	Temp (°C)
26/09/2014	10:39	16:46	-	13:42	F4	W	None	Good	50	15
25/10/2014	11:57	17:09	-	13:20	F4	SW	None	Good	90	13
22/11/2014	08:16	14:40	-	11:27	F3	SW	Showers	Good	90	9
09/12/2014	08:37	16:43	07:13	13:18	F6	W	None	Good to Moderate (Sea mist & low light)	100	10
23/01/2015	07:50	17:25	07:34	13:42	F3	WSW	Showers	Moderate (Low light)	100	6
04/02/2015	09:02	16:32	06:05	12:07	F3	NNW	None	Good	50	6

Note: Wind speed – Beaufort.

### 2014/15 Census – Number of Sanderling

- 4.2 The overall total Sanderling recorded for each census survey in Donegal Bay SPA are shown in Table 4.2.

**Table 4.2 – Numbers and distribution of Sanderling recorded in each subsite during monitoring within Donegal Bay SPA in 2014/15.**

Subsite	Number	26/09/14	25/10/14	22/11/14	09/12/14	23/01/15	04/02/15
NW of Durnesh Lake	0A480	9*	-	-	-	-	-
Bundoran and Tullan Strand	0A468	-	-	-	77	15	56
Murvagh Strand	0A479	25	5	37	55	40	-
Mountcharles/Eddrim Estuary	0A497/ 0A429	-	-	-	-	-	47
<b>Total</b>		<b>25<sup>1</sup></b>	<b>5</b>	<b>37<sup>2</sup></b>	<b>132</b>	<b>45</b>	<b>103</b>

\* Denotes that this Sanderling flock were observed briefly settling at this location before flying out of sight soon after and were possibly part of the flock observed in Murvagh Strand.

<sup>1</sup> There may have been a maximum count of 31 birds (risk of double counting); <sup>2</sup> There may have been a maximum count of 43 birds (risk of double counting);

- 4.3 The distribution of Sanderling flocks recorded for each census survey in Donegal Bay SPA are shown in Figure 4.1. The peak number of Sanderling recorded in Donegal Bay during low tide

census counts in 2014/15 was 132 birds recorded in the December 2014 count. 77 of these birds were recorded in the Bundoran/Tullan Strand section of Aughrus Point-Bundoran subsite (0A468) and 55 at Murvagh Strand (0A479). Another high count of 103 birds was made during the February count. In the latter case this included 47 birds at Mountcharles / Eddrim Estuary (0A497 / 0A429).

- 4.4 This peak count for the 2014/15 monitoring census is 41% lower than that recorded during the 2013 census monitoring (224 birds on 25<sup>th</sup> February 2013; see Table 2.1). It appears that this count of 224 was not an exceptionally high count however, as another count of 210 Sanderling was recorded on the 3<sup>rd</sup> February 2013.
- 4.5 The peak count of Sanderling during the NPWS baseline waterbird survey in Donegal Bay, undertaken in 2009/10, was 271 birds; recorded for both the 2<sup>nd</sup> December 2009 low tide count and the 7<sup>th</sup> February 2010 high tide count.

### 2014/15 Census – Distribution of Sanderling

- 4.6 The distribution of flocks recorded during the 2014/2015 census surveys suggests that two subsites are of particular importance to Sanderling in Donegal Bay, namely the Aughrus Pt – Bundoran subsite (0A468<sup>5</sup>) and the Murvagh Strand subsite (0A479). Sanderling were recorded in 50% and 83% of occasions from these subsites, respectively. Sanderling were also recorded on one occasion in the Rossnowlagh – Inishfad subsite (0A480) and the Mountcharles subsite (0A497). Sanderling are consistently recorded in the Murvagh Strand subsite (0A479); i.e. 100% of occasions during the NPWS baseline waterbird surveys, 50% of occasions during 2013 Atkins monitoring surveys; and is in line with observations by the local IWeBS coordinator (John Cromie, pers. comm.).
- 4.7 The NPWS baseline waterbird survey only recorded Sanderling occurring in Aughrus Pt – Bundoran for one low tide count in December 2009. The 2013 Atkins monitoring surveys recorded Sanderling in Aughrus Pt – Bundoran on two occasions, in relatively large flocks of 126 and 146. Field observations from this study suggest that the importance of the Aughrus Pt – Bundoran subsite may be overlooked in other datasets as the Sanderling can leave the roost at this location early in the morning and so may not be recorded if surveys take place later in the day (M. Trewby, pers comm).
- 4.8 During the census counts for the current study (2014/2015) Sanderling were only recorded on one occasion in the Mountcharles subsite; i.e. during the February count; when a flock of 46 Sanderling were observed foraging on the sandbank south of Beefpark dunes before later flying into Eddrim Estuary. The results from this study are comparable to those from the Atkins 2013 monitoring census where again only one flock of 44 Sanderling were observed in the Mountcharles subsite, foraging southeast of Jacks' Quay on the 12<sup>th</sup> February 2013. However, to determine the use of the subsite by Sanderling and the importance of the habitats to them, it is necessary to investigate the results of the trestle watch counts. This will be discussed in more detail below.

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<sup>5</sup> Though strictly speaking Bundoran to Tullan Strand is the key area for Sanderling within this site.

## Trestle watches

### Count dates, timings and weather conditions

- 4.10 A total of five trestle watch counts were undertaken in Donegal Bay SPA from September 2014 to February 2015. The count dates, timings, tide times and weather conditions for surveys are shown in Table 4.3. A trestle watch was not completed in October due to adverse weather (high winds) which it was feared may have been causing low counts.

**Table 4.3 – Sanderling trestle watch dates and associated details in Donegal Bay in 2014/15.**

Date	Start Time	End Time	LW	Wind	Wind Dir.	Rain	Visibility	Cloud (%)	Temp (°C)
29/09/2014	12:45	18:45	15:39	F1	SSE to S	None	Good	95 to 100	16 to 19
23/11/2014	09:00	15:00	12:01	F0 to 3	N to W	Light drizzle	Good	50 to 100	3 to 8
08/12/2014	09:40	15:40	12:40	F3 to 4	WNW	None	Good	30 to 70	7
22/01/2015	09:50	16:10	12:59	F0 to 1	SSE to S	None	Good	5 to 100	1 to 4
05/02/2015	09:30	15:40	12:37	F0 to 2	WNW	None	Good	60 to 100	4 to 7

- 4.11 In contrast to the census counts, Sanderling were recorded within the Mountcharles (0A497) subsite on four of the five trestle watch surveys. No Sanderling were recorded within this subsite on the 29th September 2014. Table 4.4 presents the maximum flock numbers recorded within the Mountcharles subsite during the trestle watch.



**Table 4.4 – Total counts for Sanderling within Donegal Bay SPA in 2014/15 during the trestle watch surveys.**

Month	Date	Duration of trestle watch (hr:min)	Max. SS flock count	Notes
September	29/09/2014	6:00	0	No Sanderling recorded within Mountcharles subsite during trestle watch.
October	-		-	No trestle watch survey for October.
November	23/11/2014	6:00	38	Sanderling flocks observed off Jack's Quay and around the 'old' Eddrim channel, immediately north of the application aquaculture area. Flock pushed up on rising tide and at one stage (12:42 to 13:09) was foraging on a thin sand bar that stretches north out of the licensed area of trestles. The flock was pushed into the aquaculture application area briefly and as the tide inundated this sand bar the flock moved north to exposed sands off between the 'old' and 'new' Eddrim channels. Then possibly relocated to the northern end of Murvagh Strand as the sand flats were covered by the tide
December	08/12/2014	6:00	79	Sanderling flocks initially located south of Jack's Quay and moved along the coastline in the direction of Salthill Pier with some birds moving further south to forage along the margins of the 'old' Eddrim channel, west of the application aquaculture area.
January*	22/01/2015	6:20	44 but possibly up to 79	Flock of 22 Sanderling first observed flying over trestle area, into Eddrim Estuary and out over the Beefpark dunes to settle south of Jack's Quay. Additional numbers of Sanderling observed here so probable that Sanderling were already present in this area when observations commenced. Maximum count of 74 as the Sanderling flocks moved west along the coastline. These flocks split and flew south onto the sandbar between the 'old' and new Eddrim channel. Sanderling flocks foraged southwest of the existing trestles, inside both the licenced and application areas. Small Sanderling flock recorded along small intertidal channel within trestle area. These flocks move southwest along northern side of new Eddrim channel before relocating to the sand flats south of Jack's Quay and continued to forage along the rising tide line. Some of the Sanderling flew to the sand flat south of Beefpark dunes and from here flew south out of the subsite, possibly to the north end of Murvagh Strand.
February	05/02/2015	6:10	22	Flock of 20 Sanderling were initially briefly observed on the sandbank between the 'old' and new Eddrim channel, within the application aquaculture area. This flock then moved to the northern side of the 'old' Eddrim channel and continued to forage in this area until they were lost from view at 11:40. At 14:11, a small flock of 5 Sanderling were again briefly observed on the sandflat south of Beefpark dunes. A passing shower obscured the flock from the observer and once the visibility had improved the SS flock were no longer present. Note that flocks (c. 200) of unidentified small waders were observed on the northern end of Murvagh Strand during this trestle watch.

\* Note: Sanderling flock (5) recorded in Inner Eddrim estuary before trestle watch survey was commenced. Flew into inner estuary out of sight before trestle watch survey began.

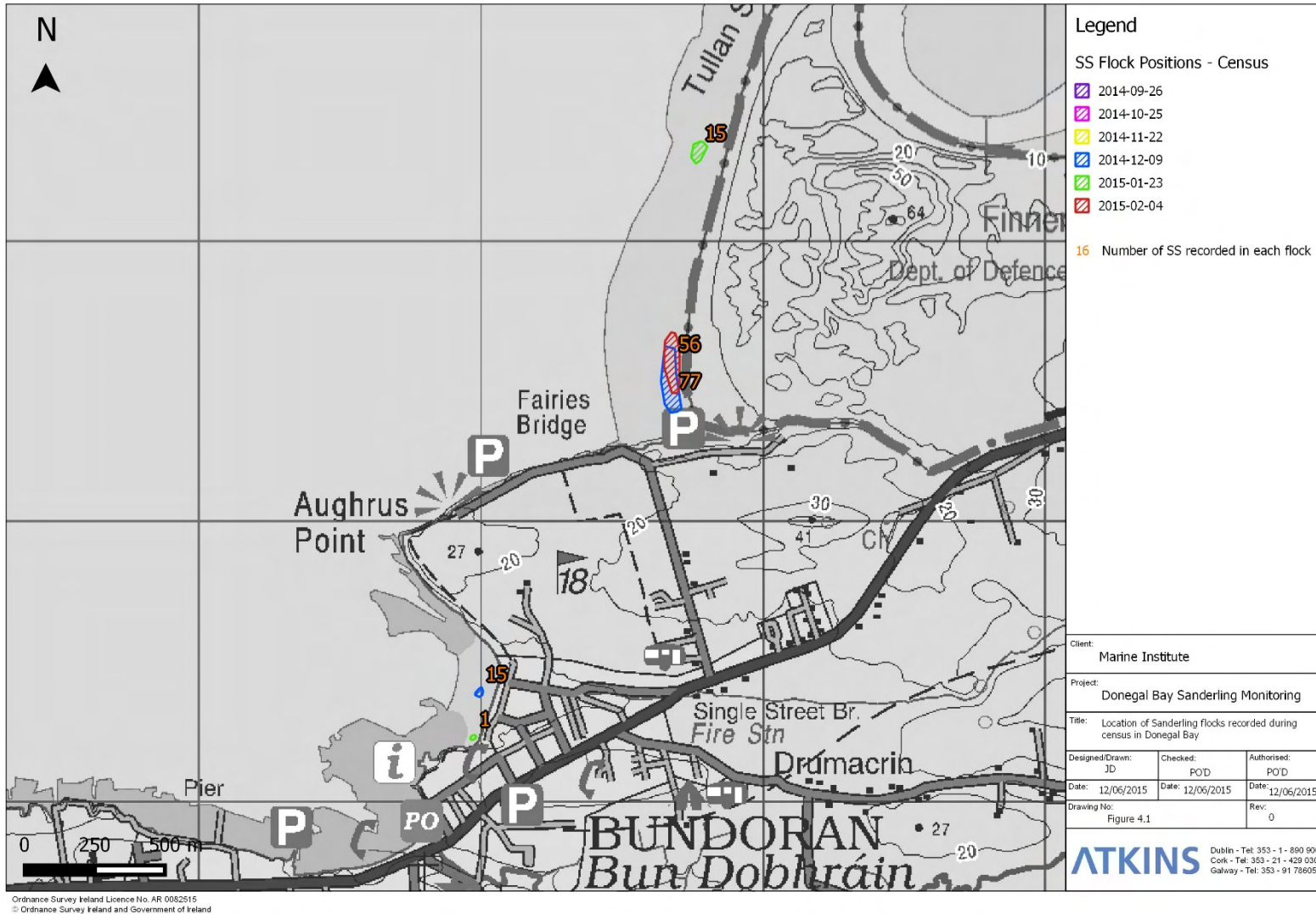


Figure 4.1 – Location of Sanderling flocks recorded during census in Donegal Bay (Aughrus Pt. – Tallan Strand).

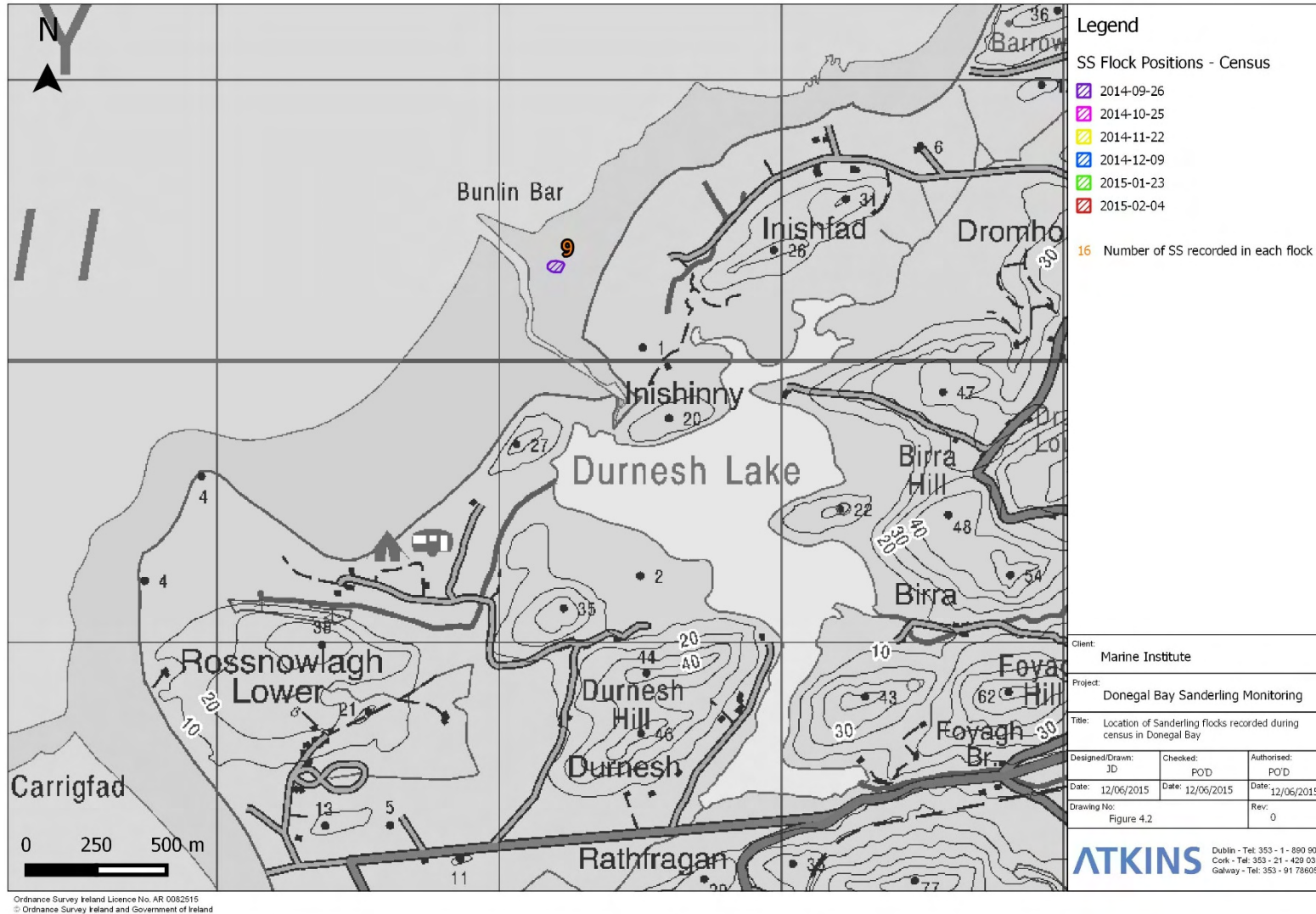


Figure 4.2 – Location of Sanderling flocks recorded during census in Donegal Bay (Rossnowlagh / Inishfad).

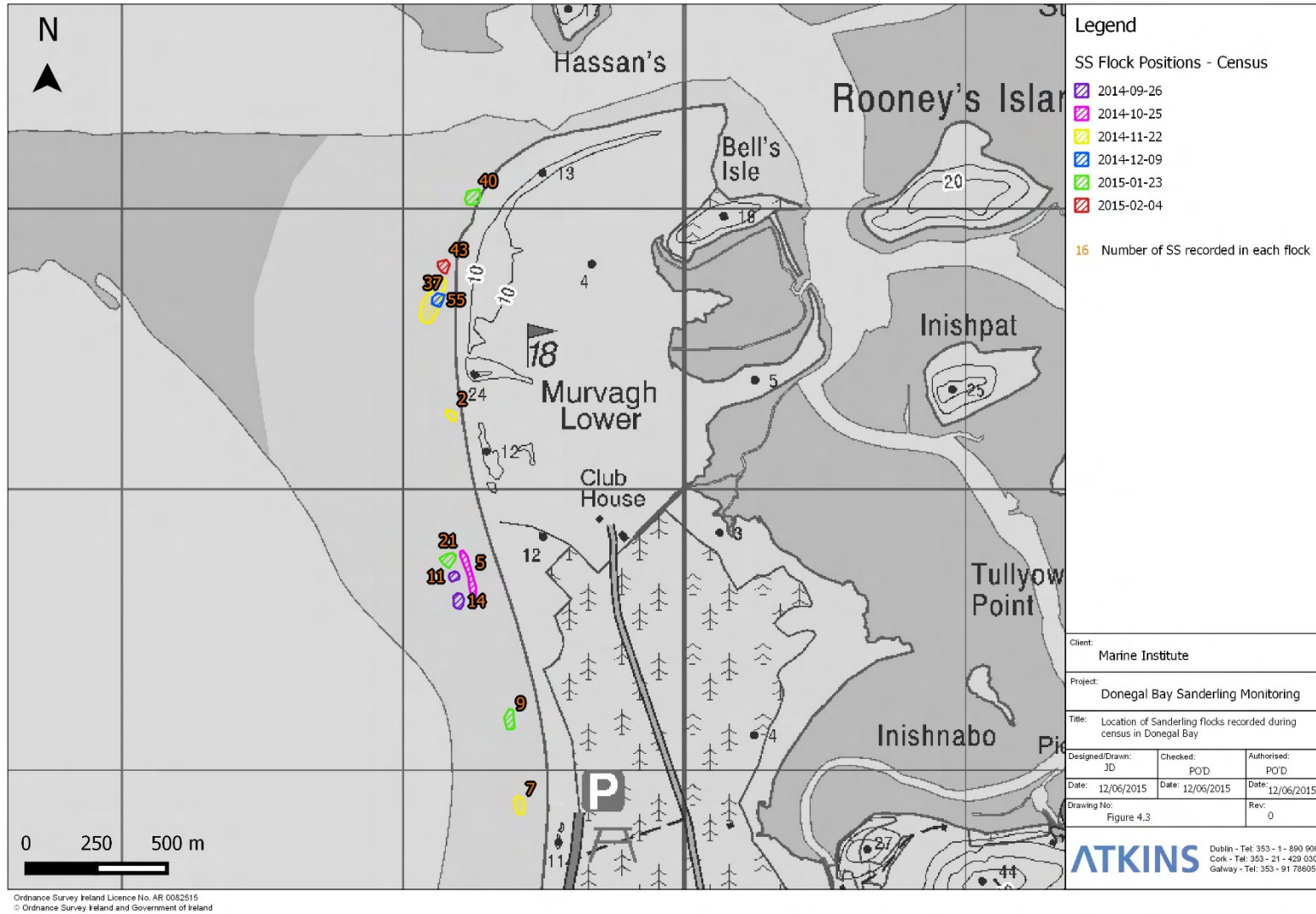


Figure 4.3 – Location of Sanderling flocks recorded during census in Donegal Bay (Murvagh).



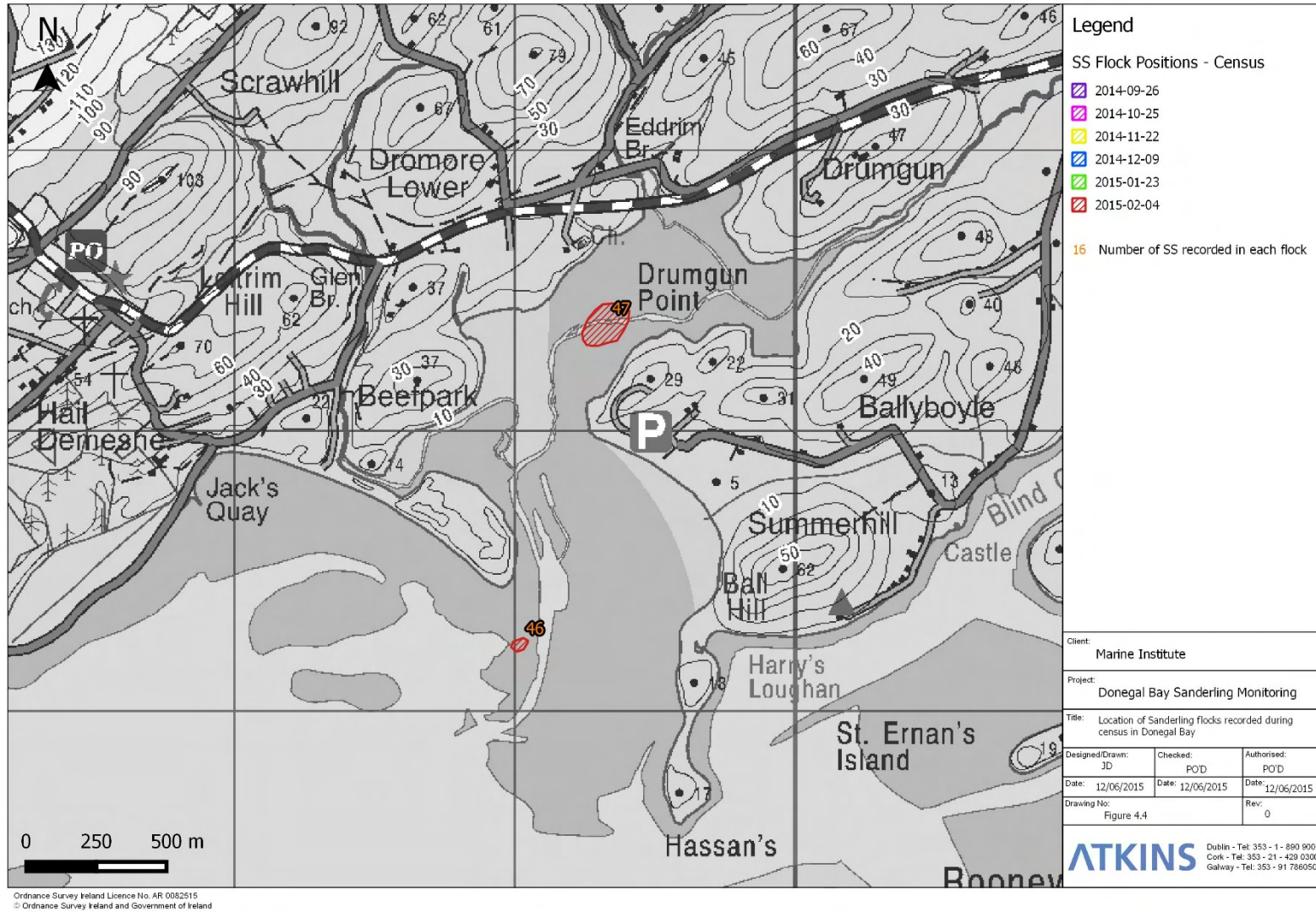


Figure 4.4 – Location of Sanderling flocks recorded during census in Donegal Bay (Eddrim Estuary).

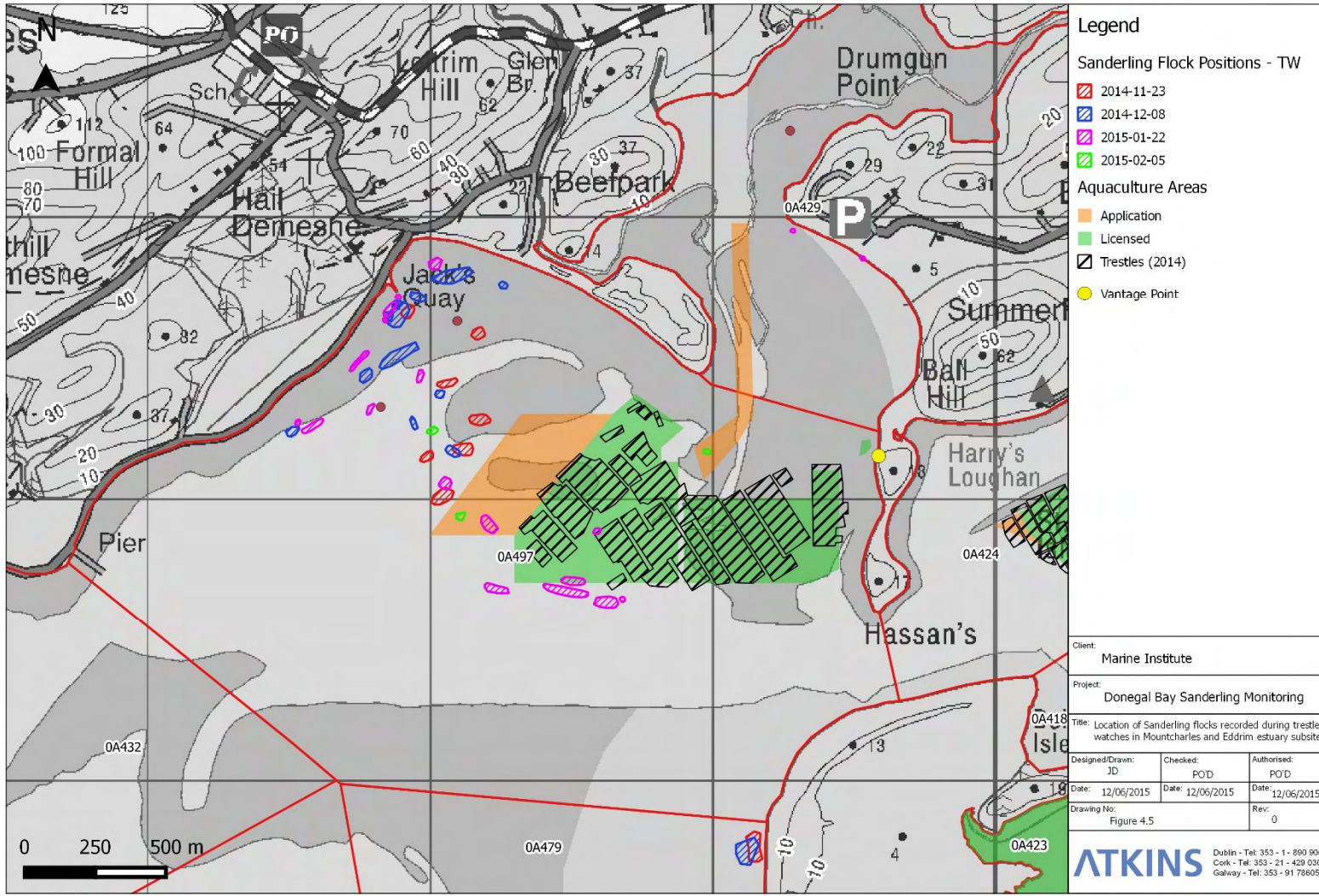


Figure 4.5 – Location of Sanderling flocks recorded during trestle counts in Donegal Bay (Mountcharles).

## 5. Discussion

### Sanderling population in Donegal Bay

- 5.1 The results of the 2014/15 monitoring period combined with the results of previous monitoring (2013) and other available datasets show that there is a large degree of variability in Sanderling counts in Donegal Bay; with a large range in results from each census count from month to month. The 2014/15 census recorded a maximum count of 132 birds using Donegal Bay during the winter months. While in line with IWeBS counts from recent years, it is lower than recent peak counts in the 200's which suggest that overall Donegal Bay probably supports a midwinter population of over 200 and possibly closer to 300 Sanderling.
- 5.2 In line with previous counts, which generally recorded <50 Sanderling in Mountcharles the maximum count during the census was 47 birds (4<sup>th</sup> February 2015). In contrast 79 birds were recorded in Mountcharles in December 2014 during a more comprehensive period of trestle observations; depending on the true numbers of Sanderling in Donegal Bay this could represent 60% (based on 2014/15 maximum count of 132) or between 26% - 39.5% (based on an estimated flock size of 200-300 birds) of Sanderling in Donegal Bay.
- 5.3 It is not possible to determine if this apparent reduction in numbers is due to birds being missed during census surveys or some other factor is influencing the numbers of Sanderling recorded at the site. However, it is probable that the maximum count of 132 is an underestimate of the number of Sanderling using Donegal Bay in 2014/15; either way, Mountcharles / Eddrim Estuary is clearly of importance to Sanderling in Donegal Bay (however, see note below on Bundoran roost).
- 5.4 It is also apparent that Sanderling move between Murvagh (0A479) and the neighbouring area of Mountcharles (0A497).

### Sanderling distribution in Donegal Bay

- 5.5 The results of the census surveys in this monitoring period indicate that two broad areas within Donegal Bay are of particular importance for Sanderling.
- The Southern area is centred in the Bundoran/Tullan Strand part of Aughrus Pt. – Bundoran subsite (0A468).
  - The northern or Outer area is centred on Murvagh Strand (0A479); with birds also recorded southwards into Rossnowlagh-Inishfad (0A480) and Rossnowlagh (0A464). However, as can be seen on Figure 2.2, the extreme north of Murvagh Strand is located within subsite 0A497 Mountcharles rather than subsite 0A479 Murvagh. This and evidence of movement between 0A497 Mountcharles and 0A479 Murvagh suggests that a single flock is likely to be using both areas.
- 5.6 The importance of these two zones was particularly evident in the December 2014 and February 2015 census counts where the Sanderling flocks observed were divided near equally between these two areas. Similar patterns were observed in the Atkins 2013 monitoring data; particularly on the counts for the 3<sup>rd</sup> and 25<sup>th</sup> of February 2013 where large flocks of Sanderling were observed in the Aughrus Pt. – Bundoran subsite and the remaining birds recorded in more northerly subsites. The census counts do record birds using Mountcharles, but to a lesser extent.



- 5.7 The extent of interchange between Sanderling flocks in the north and south of the bay is not known; however, observations of flocks, particularly during the trestle watches, clearly indicate that there is some interchange between the northern end of Murvagh Strand and the Mountcharles/Eddrim estuary subsite depending on tide conditions. As a result, the small number of observations from the census surveys of Sanderling underestimate the importance of Mountcharles/Eddrim estuary subsites for this species.
- 5.8 Furthermore, field observations also highlight the potential for some uncertainty as to whether birds also move southwards out of Donegal Bay from roosts near Bundoran / Erne; thus potentially leading to a discrepancy between high tide and low tide counts within the SPA.
- 5.9 A further complication in determining the importance of Donegal Bay for Sanderling is linked to the origin of birds. As noted Sanderling breed in eastern Canada, Greenland and Siberia. In the past it was believed the birds wintering in Britain and Ireland were of Siberian origin; recent ringing records, however, clearly demonstrates that Nearctic birds do travel to Ireland. The degree of mixing of birds from different breeding populations is poorly understood; as is the degree to which birds use Irish estuaries as spring / autumn migration stopovers rather than as over-wintering sites. This raises the possibility of turn-over of birds at a site in spring and autumn such that the estuary actually supports a larger number of birds than counting of unmarked birds would suggest.

### Bundoran Roost

- 5.10 During 2013 a small roosting site used by waders, gulls and Light-bellied Brent Geese was located at Bundoran on the sandy cove south of Aughrus Point and Rougey Strand. During two of the February 2013 censuses the Bundoran area was targeted for surveying between dawn and sunrise; this also coincided with periods close to (within 2 hours of) high tide – either rising (3/02/2013) or falling (25/02/2013). On both of these dates large flocks of sanderling were recorded; 126 and 146 birds, respectively. While the sanderling flocks were foraging, it was presumed that they had roosted in the area. The attraction of the area as a high tide night roost might be related to the street lighting along the promenade which could benefit roosting birds by illuminating approaching predators. Unfortunately, given the time pressure of having to complete a count of Donegal Bay and then conduct a trestle watch there was no time to track the onward dispersal of these birds. However, it is likely that disturbance thresholds in this relatively busy area of Bundoran quickly exceed tolerance levels and birds leave the area. Potential sanderling foraging areas - identified as predominately sandy beaches or estuaries – are available to the NE of this roosting site on Tullan Strand and the Erne Estuary, which are within c. 1 km and c. 2.5 km respectively. The coastline to the southwest of Bundoran is less promising for sanderling, being dominated by low rocky shore with the occasional shingle beach, until Bunduff Strand at Mullaghmore, which is c. 10 km to the south. It seems more probable that birds using this area would therefore remain within the Donegal Bay / Erne area.
- 5.11 Over winter 2014-15, the Bundoran roosting site was targeted on several occasions at dawn during October and December 2014. While other species including Oystercatchers, Ringed Plover and Turnstone were in attendance sanderling were not recorded until a visit on 23<sup>rd</sup> January 2013 when just a single bird was recorded.

### Sanderling distribution in Mountcharles

- 5.12 Previous studies into interactions between shorebirds and intertidal aquaculture trestles suggest that Sanderling strongly avoid oyster trestles (Gittings and O' Donoghue, 2012). This is supported by observations from previous trestle watches at Mountcharles in 2013 where 10 separate observations of flock positions were recorded outside the oyster trestle blocks. In the 2014/15 trestle watch study, the position of Sanderling flocks mapped during the trestle watch survey indicate that



Sanderling were rarely recorded with the existing trestle blocks, with only one record of a flock of c. 8 birds (possibly an underestimation as 20 birds were seen leaving the area soon after) recorded in an open area between the trestle blocks (Figure 4.5).

- 5.13 All other observations in this study indicate that the majority of Sanderling flocks were mainly distributed in an area of intertidal *muddy sand to sand biotope* south of Jack's Quay and along the margins of the 'old' Eddrim channel that runs to the northwest of the licence and application aquaculture areas (Figure 4.5). NPWS biotope mapping is derived from the OSi Discovery Series mapping; the distribution of available intertidal habitat has, however, changed significantly. Thus, for example, flocks of Sanderling noted to the south of the existing Mountcharles trestles (T12/243B & T12/145B) appear on NPWS biotope mapping to be in subtidal habitat, but are in fact availing of a narrow band of suitable intertidal habitat; care must therefore be taken in interpreting their spatial distribution here as evidence of tolerance of trestles as opposed to a need to avail of a narrow band of available habitat within a narrow tidal window. It can't be known for example whether in the absence of trestles Sanderling would continue to forage northwards through T12/243B and T12/145B; but this periodical availability of suitable food resources across the neap and spring tide cycle is likely to strongly influence Sanderling distribution within Donegal Bay.
- 5.14 Sanderling flocks were also observed to use the southern part of licence application T12/396A; the middle section appears from aerial photography to be somewhat deeper and may explain the distribution of flocks to the south and west.
- 5.15 There were no observations of birds from the northern part of T12/396A; nor indeed from areas immediately north of T12/396A and the adjoining block of existing trestles. Sanderling flocks were recorded within the application aquaculture area on two separate trestle watches, namely the January and February 2015 counts with peak numbers of c. 66 (with potentially more birds obscured by large ripples in seabed) and c. 20 birds recorded, respectively. The January flock remained in the application aquaculture area briefly before continuing to forage in the licenced aquaculture area to the southeast. The February flocks were recorded both in the application aquaculture area to the west and to the north. In both cases the flocks foraged briefly in the area before moving outside the application aquaculture area or being obscured from the observers view.
- 5.16 There was a single observation of 46 birds from the extreme southern tip of T12/446A during a census count. Otherwise there was no evidence of significant use of this area by Sanderling.
- 5.17 Due to observed patterns of mobility, it proved difficult to calculate the duration of foraging within specific areas in a robust fashion; this has therefore not been undertaken. The assessment is based on qualitative comments and counts presented.
- 5.18 In summary, in contrast to the census survey, the intensive trestle watch survey recorded Sanderling being present in the Mountcharles subsite on all but one occasion. The majority of Sanderling flock observations were made outside of the aquaculture application and licence areas, mainly in the areas south of Jack's Quay, west along the coastline towards Salthill Pier and on the north and south margins of the 'old' Eddrim channel. However, observations were made of Sanderling flocks utilising the intertidal habitats covered by both the application and existing aquaculture licence areas on a number of occasions. In particular, on the 22<sup>nd</sup> January 2015 showed significant numbers of birds foraging along the northern margin of the new Eddrim channel, southwest of the existing trestles.

## Biotopes / prey availability

### Definition of habitat zones

- 5.19 The intertidal and subtidal habitats in the Donegal Bay SPA have been classified into five biotopes (NPWS, 2011b; see Figure 5.1<sup>6</sup>). The intertidal zone includes areas of estuarine fine sands in the Inner Bay at Drumgun Point, Muckcross Strand, Rosslongan Strand and Inishnabo, and in the upper part of the Erne Estuary. Intertidal muddy sand occupies the majority of the intertidal zone, occurring west of the Murvagh and both north and south of Rooney's Islands, and over most of the Erne Estuary. The intertidal hard substrate biotope occupies the narrow intertidal zones along the northern side of the bay and sections of the southern side of the bay. The entire subtidal habitat within Donegal Bay is classified as the subtidal fine sands biotope.
- 5.20 Note that, some of the areas mapped as the subtidal fine sands biotope can occur within the intertidal zone and thus can be exposed during low tide periods.
- 5.21 Aquafact (2010) mapped such subtidal areas on behalf of the Marine Institute and National Parks & Wildlife Service (refer to Figure 5.1 & 5.2). A review of the biotope mapping and associated species data (see Figure 5.2) clearly illustrates the importance of the Murvagh; offshore waters support a large *Donax* community; individual grab samples supported 3033, 3000 and 1542 *Donax vittatus* / 0.1m<sup>2</sup> grab sample (stations G9, G4 and G5, respectively; refer to Appendix 4 – Species Abundance List of Aquafact, 2010). Further offshore, generally in waters of >5m depth is a *Tellina fabula* community. Sanderling are known to feed directly on *Donax* and tellins as well as on wreck bivalves washed ashore.
- 5.22 The *Donax* community also occurs off Tullan Strand to the north of Bundoran; though numbers of *Donax vittatus* / 0.1m<sup>2</sup> grab sample are not as high as off Murvagh. Interestingly, the greatest number of *Scolelepis squamata*, a polychaete favoured elsewhere in NW Europe, also occurs in samples off Tullan Strand. In a study in Vlieland on the Wadden Sea different size classes of *squamata* were found to occupy different areas of the beach, making them available to Sanderling at different stages of the tide. The largest (>50mm) occurring in the lowest part of the beach were therefore available around low tide. In contrast in Belgium *S. squamata* was restricted to the upper intertidal areas (from Reneerkens et al., 2009). Local site conditions clearly have a strong role to play; as could levels of beach recreational activity if birds were for example limited to targeting *S. squamata* along a narrow tidal window.
- 5.23 The nearest samples to the Mountcharles subsite are mapped as *Macoma balthica* community; followed a little further to the west by a *Tellina fabula* community; the former site is located close to the boundary point between 0A497 (Mountcharles); 0A479 (Murvagh) and 0A432 (Doorin Pt.-Salthill). We're not aware of any intertidal benthic data from the Jack's Quay area which Sanderling are known to favour; though a *Donax* / polychaete community is probable. It's not clear to what degree Sanderling also forage on biofilm; this would most likely occur to a greater degree on the muddy sediments close to Jack's Quay than on the sandier sediments further out.
- 5.24 Forde *et al.* (2015) compared benthic diversity in / and around trestles at a number of sites including Donegal Bay. The nearest samples were collected close to the mouth of Eddrim Estuary in an area not found to generally support Sanderling. Species noted included the large polychaete – *Capitella*; as well low numbers of Thin tellin (*Angulus tenuis*), *Parvicardium scabrum* and shrimp (*Crangon crangon*).

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<sup>6</sup> Note that Figure 2 in NPWS (2011b) includes biotope mapping of the entire Donegal Bay SPA. However, only the biotope mapping for the SAC is included in Figure 5.1, as NPWS have not supplied the biotope mapping for the SPA.



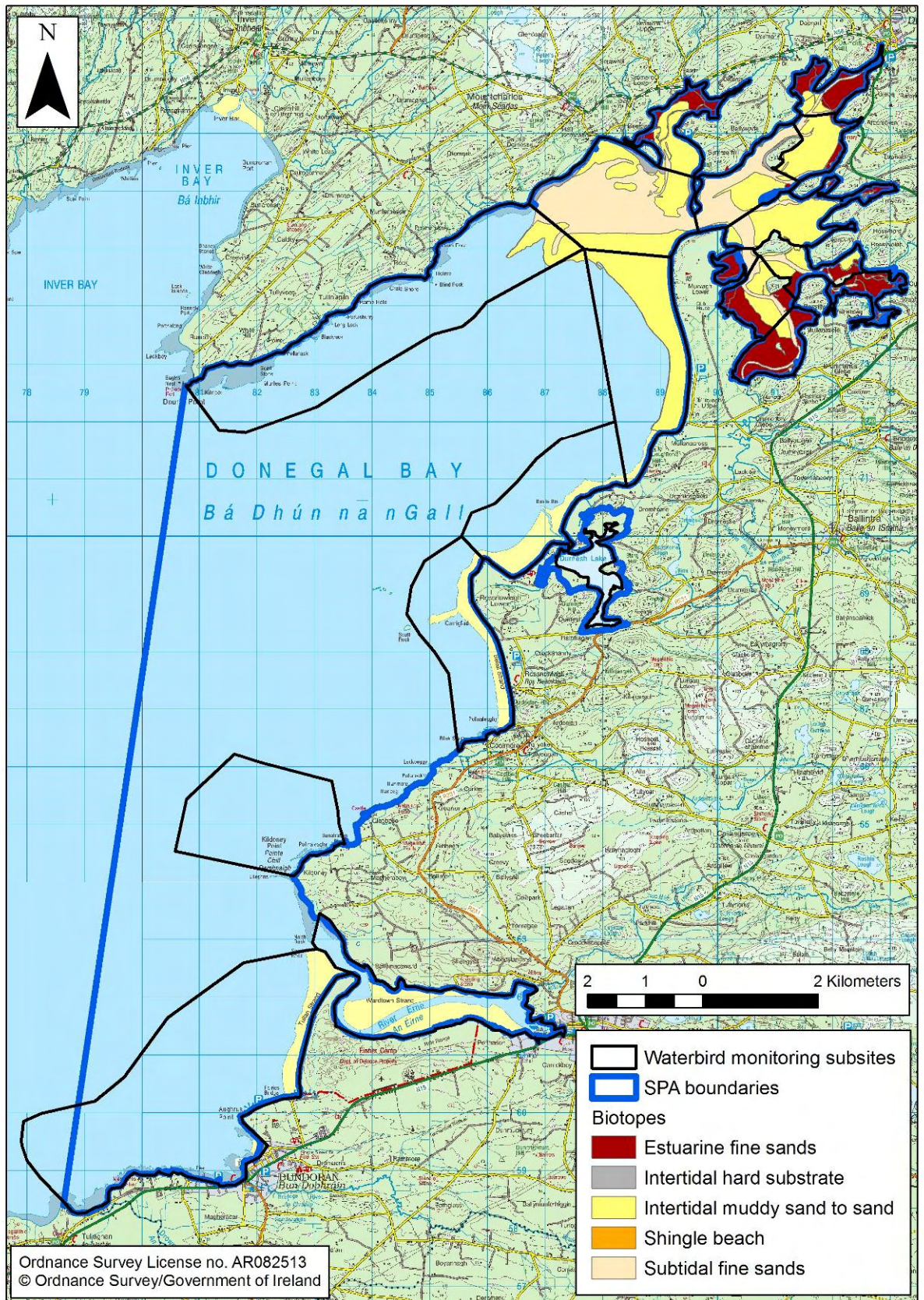


Figure 5.1 – Distribution of biotopes in relation to the waterbird monitoring subsites (Figure 6.1 from the AA).



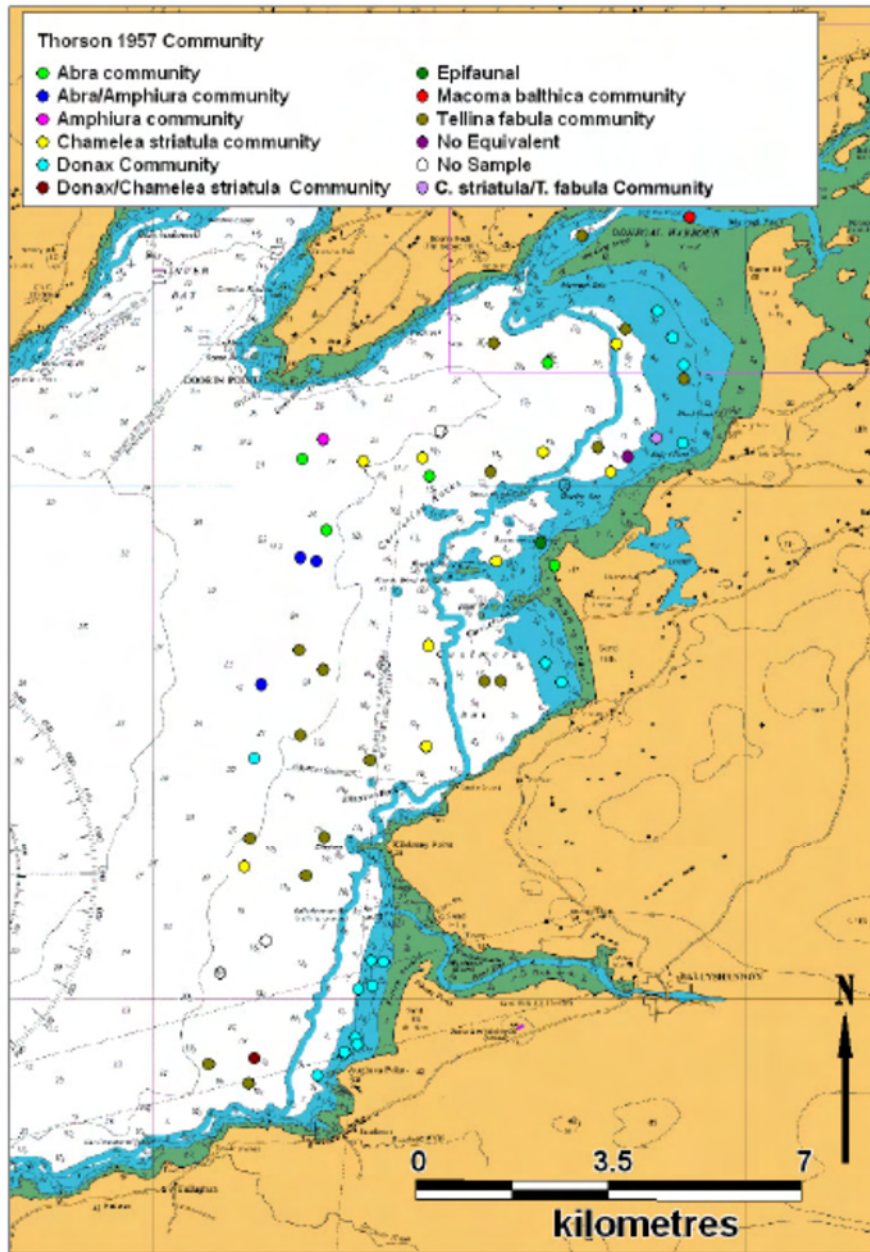


Figure 5.2 – Biotope classifications of Donegal Bay (copy of Figure 3 of Aquafact, 2010).

## 6. Conclusions

6.1 Sanderling numbers appear to be relatively stable in Donegal Bay SPA. However, finding a robust and repeatable means of accurately surveying the true number of Sanderling in Donegal Bay remains a challenge. They are highly mobile within the estuary with flocks also appearing to opportunistically avail of clustered prey resources along the shoreline; for example, along with species such as Turnstone they are known to find a rich food resource in the debris zone between wet (rippled) sand and drier areas of sand (van de Kam 2004). Connors *et al.* (1981) found that birds foraged on the outer beaches (equivalent to e.g. Murvagh) at high and mid-tide levels; with birds then moving into protected sandflats (behind the outer beach) as tide recedes.

6.2 Habitat use, and more importantly timing of habitat use within Donegal Bay, is therefore influenced by a complex mix of tidal cycle; tidal lag patterns; recreational disturbance along beaches; differing patterns of prey availability / density both across the estuary and also over the tidal cycle; as well as birds opportunistically availing of prey resources as they come available (e.g. flies on seaweed banks; bivalves washed onshore etc.). Added to that is uncertainty as to whether birds roosting in Donegal Bay (e.g. at Bundoran) also feed in Donegal Bay or also move out to feed on the adjoining coastline. With this uncertainty in mind and the results clearly indicating use of Mountcharles by a large number of Sanderling, the following conclusions can be drawn.

- It is clear from a review of all data that three areas are noteworthy for Sanderling; namely:
  - The northern end of Murvagh and to a lesser extent southwards through Rosstownlagh-Inishfad to Rosstownlagh;
  - Tullan Strand / Erne Estuary; and
  - Mountcharles / Eddrim Estuary.
- The importance of Murvagh & Tullan Strand emerges in all data sets; in contrast, the value of Mountcharles / Eddrim Estuary is emphasised in the trestle data set (& consultation) rather than in the census observations.
- Care must be taken in interpreting the % of birds in Donegal Bay using Mountcharles / Eddrim Estuary. However, a count in December 2014 of 79 Sanderling south of Jack's Quay is notable and would represent >25% of the Donegal Bay Sanderling (i.e. 35% using 2013 census peak count; 29% using NPWS baseline waterbird survey counts; 59% using the 2014/15 peak count).
- Biotope / species data suggests a strong association with offshore *Donax* communities in Murvagh & to a lesser extent at Tullan Strand (which also supports *Scolecopsis squamata*). The target prey in Mountcharles / Eddrim Estuary is less clear. Use of foraging areas is also likely to be strongly influenced by patterns of habitat availability across the neap / spring tide cycle as well as weather conditions; which can wash up significant amounts of prey to exposed sandy beaches that are opportunistically availed of by Sanderling.
- Apart from a single observation of a flock of 46 birds during a census count there is little evidence that licence block **T12/446A** is used to any significant degree by Sanderling. The benthic species noted by Forde *et al.* (2015) in intertidal samples would seem to support this observed Sanderling distribution. However, the extreme southern end of T12/446A by approaching close to the northern side of existing trestles at Mountcharles encroaches upon the narrow channel left open to the south / east of Beefpark. The impact that this might have

on patterns of water flow and sediment deposition and erosion in the local area should be considered as part of any licencing decision.

- The 2014/2015 monitoring data clearly highlights the importance of an area running south from Jack's Quay towards the southwestern corner of **T12/396A**. Foraging was also recorded on a number of occasions within the southern section of T12/396A; and eastwards along the southern edge of existing trestles. It is probable that existing trestles prevent the movement of these birds further to the north and east – i.e. evidencing patterns of displacement from existing trestles. Recent aerial photography suggests an area of deeper channel has developed through the northern section of T12/396A; this may explain the absence of observations of birds through this area. It should also be determined whether it is practical to place trestles in this area. The placement of trestles in the southern section of T12/396A should be avoided due to the potential for negative impacts on Sanderling. In the absence of further bathymetric data and information on benthic invertebrate diversity we would recommend a precautionary approach to the remaining areas of T12/396A be adopted.
- In assessing these licences, it is also important to consider existing displacement of Sanderling within Mountcharles, as well as recreational pressures on beaches such as Murvagh and Tullan when ensuring suitable foraging habitat is present for Sanderling within Donegal Bay.



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