Poole Harbour

Breeding Redshank Survey 2014

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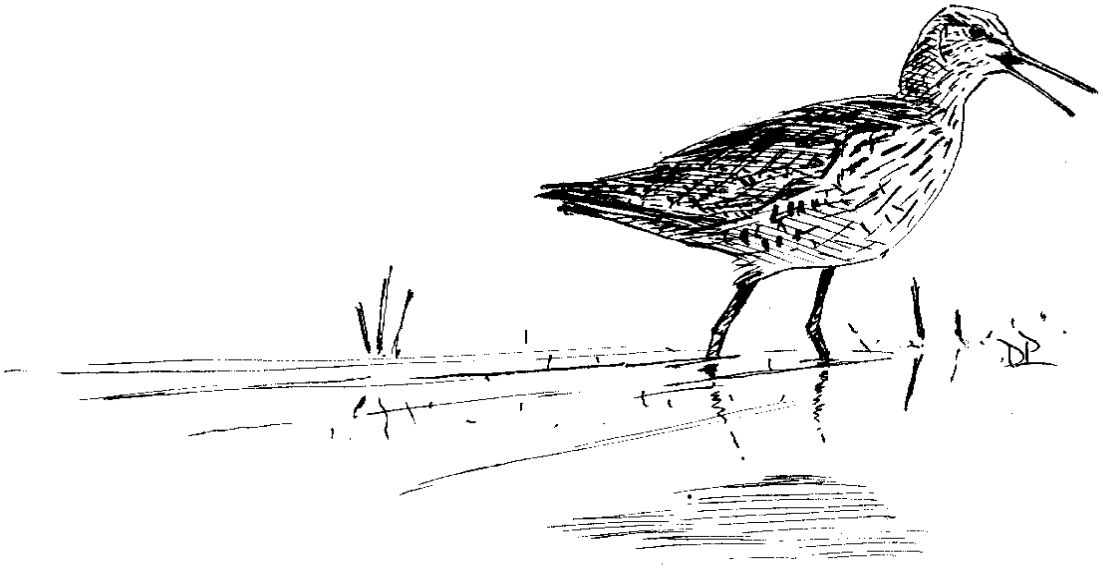


EXECUTIVE SUMMARY

1. The 2014 survey identified a population of between 74 and 147 pairs of breeding redshank in Poole Harbour using different calibration methods. A further eight pairs were located on adjacent wet grassland sites.
2. Although these figures may not be directly comparable to Price (1997) and Cook (2004), it is possible to detect broad changes. The minimum estimate of 74 pairs suggests that the breeding population has at least sustained itself over the past decade, following previous declines. There is some evidence that the population may have increased. If so, this bucks the national trend for saltmarsh breeding redshank.
3. The maximum estimate of 147 pairs uses the national standard methodology (Green 1986). This suggests that Poole Harbour currently supports c.1.2% of the UK saltmarsh breeding population. This estimate provides a new baseline against which the results of future surveys can be evaluated within the UK context.
4. The stability/recovery of the Poole Harbour population may be linked to the recovery of overgrazed saltmarsh, as a result of the Sika deer control programme which began in 2006. There is good evidence for saltmarsh recovery on Arne, where control has been focused, and deer control elsewhere may be having a similar effect.
5. The Poole Harbour breeding redshank population is the largest on the south coast of England. The only other significant south west population occurs on wet grassland on the Somerset Levels, which supported c.39 pairs in 2014 (RSPB unpublished data).
6. A breeding density estimate of 34.7 pairs per km^2 was calculated for Poole Harbour using the standard calibration method (Green 1986). This is significantly higher than density estimates for other parts of southern England, with the exception of East Anglia.
7. There have been no major changes in the distribution of breeding redshank since 2004. Most redshank were located on the southern and western shores of the harbour, with the majority found between Keysworth and Fitzworth Point. The key breeding areas at Wytch Farm and Middlebere seem to have remained remarkably stable since 1997. At Keysworth, the breeding population appears to have made a partial recovery since 2004, possibly due to a reduction in Sika deer. Elsewhere, breeding redshank on Slepe Moor & the Salterns appear to have increased, and the population on Arne seems to have remained stable. The discovery of 10-20 pairs on Long and Round Islands was an important find.
8. 86% of redshank registrations came from saltmarsh in the 16-40 cm height class. This is consistent with the findings of Cook (2004) and studies from other parts of the

UK (e.g. Allport *et al* 1986), which indicate that redshank favour medium-length vegetation for nesting.

9. Low-medium intensity grazing remains an important management tool for breeding redshank on saltmarsh, although timing is critical: recent research indicates that cattle should be kept off saltmarshes which support breeding redshank from April to early July, to avoid high levels of nest trampling (Sharps *et al* 2015). On sites where Sika are now the main or only grazing animals, more work needs to be done to determine sustainable levels of grazing for redshank and for other wildlife.
10. The 2014 survey provides a useful snapshot of the current situation for breeding redshank in the harbour, but more needs to be done to understand population dynamics and to improve management for redshank. Below, we set out recommendations for further work:

- An annual monitoring programme on a sample of core sites and a five-year survey programme across the harbour would provide a better understanding of redshank population size, distribution and trends.
- Understanding more about redshank productivity levels would help us know whether the population is really stable or recovering. It may allow us to quantify some of the effects of predation, tidal inundation and disturbance on recruitment.
- Regular saltmarsh condition surveys for redshank would help us to identify over- and under-grazed saltmarsh sites, and to monitor the progress of recovering sites. This could be linked to:
    a. Regular monitoring of Sika numbers on saltmarsh, which would help us understand more about their pattern of use, and their contribution to sustainable levels of grazing for redshank.
    b. An assessment of the scale and pattern of saltmarsh use by livestock, which would also help us develop a better understanding of sustainable levels of grazing for redshank.
- Greater coordination of wet grassland management planning by conservation partners. This would benefit the harbour redshank population:
    a. By providing breeding opportunities for additional pairs of redshank.
    b. By providing replacement breeding habitat for saltmarsh redshank displaced by rising sea levels.
- A monitoring programme on a sample of saltmarshes would help us better understand the rate of saltmarsh loss to coastal squeeze effects, including erosion and increased inundation. This data could be linked to an active programme of managed realignment to help offset coastal squeeze impacts in the harbour.

1. INTRODUCTION

The British breeding population of redshank *Tringa totanus* is internationally important. At the last estimate, Britain supported almost a fifth of the NW European population (Birdlife International 2004), and almost half the population nested on coastal saltmarsh. Since 1985, the British saltmarsh population has declined by over 50%, a loss of almost a quarter of the total UK breeding population and a 4-6% reduction in the European breeding population (Malpas *et al* 2013a). A national survey of saltmarsh redshank in 2011 found that the population in southern England made up about 8% of the English total, and that this population had shown a significant decline since 1996. Redshank has been placed on the Amber List of Birds of Conservation Concern (Eaton *et al* 2015) and is a Species of European Conservation Concern (Eaton *et al* 2009). In the recently published European Red List of Birds, redshank has been placed on the IUCN Red List Vulnerable category for the 27 EU member states (Birdlife International 2015).

The Poole Harbour breeding population was surveyed by Price in 1997 and Cook in 2004. Price found c.85 breeding pairs in 1997, while Cook found c.69 pairs in 2004. Cook suggested that the apparent population decline from 1997 to 2004 might in part have been linked to overgrazing of saltmarsh by Sika deer *Cervus nippon*. The saltmarshes at Keysworth were included in national breeding redshank surveys in 1985 (Allport *et al* 1986), 1996 (Brindley *et al* 1998) and 2011 (Malpas *et al* 2013a).

A repeat survey of Poole Harbour was carried out in 2014 to estimate the number of pairs of breeding redshank on saltmarsh within the harbour.

2. SURVEY METHODOLOGY

Field survey

The aim of the field survey was to:

- Locate and map non-incubating redshank on all suitable areas of saltmarsh within the harbour.
- Estimate vegetation height on saltmarshes holding breeding redshank and evaluate grazing pressure where possible.

The survey method developed by Green (1986) was followed. The instruction sheet used by surveyors is provided in Appendix 1. In summary:

- Three visits were made to each site between 18 April and 31 May. A gap of at least ten days was left between visits.
- The same survey transect was used on all visits, allowing surveyors to get to within c.100 m of all areas of saltmarsh.
- All observed redshank were mapped. The behaviour of each bird was recorded using standard notation.
- Counts were carried out between 08.00 and 17.30, no more than two hours either side of high tide.
- Surveys were carried out in good weather.
- On the second visit average vegetation height and grazing pressure were assessed.
- The number of livestock and deer were recorded on each visit. Evidence of grazing was also recorded (footprints, droppings, poaching, etc).

Estimating the number of pairs of breeding redshank

An estimate of pairs should allow for potential count bias:

- It is possible to underestimate the number of pairs during incubation, when often only one bird of a pair may be visible.
- It is possible to overestimate the number of pairs when adults are with young if each bird in a valid pair is counted as part of a separate pair (see Green 1986).
- Large numbers of spring passage birds may be present with local breeders early in the season and this can also lead to an overestimate of the local breeding population.

Standard estimate

The standard method of estimating pairs was developed by Green (1986), and is widely used. Working on the Lincolnshire Wash, Green found that the mean of the total count of redshank recorded up to 31 May was similar to the peak number of pairs with nests. Any birds behaving as if they had young (e.g. alarm calling) were excluded, as were flocks of more than six birds (to exclude spring passage birds). The number of breeding pairs estimated in 2014 using this method provided a baseline for comparison with other UK sites.

Modified standard estimate

In addition to the estimated total number of redshank recorded, surveyors provided counts of pairs where they felt that behaviour merited it. A separate estimate of pairs was therefore calculated using a modified version of Green (1986). Clearly, this method relies on accurate field identification of pairs by all surveyors. In calculating the number of pairs per site visit, the number of confirmed pairs (Cp) was subtracted from the total number of observed birds (including paired birds) (T), so that the final pair estimate was calculated as T-Cp. For example, where a total of 14 birds was recorded, including 3 pairs, the total number of estimated pairs = 11.

50% standard estimate 2004

One of the objectives of the 2014 survey was to try to assess population changes since 2004. Cook used the O'Brien & Smith (1992) method, which is similar to Green (1986), except that the third visit is carried out in June.

Because of late commissioning of the 2004 survey, most of Cook's field visits were carried out in the latter half of May and early June, precluding an early season count which would normally be necessary for a robust assessment of the breeding population.

Cook's field observations suggested that birds disturbed during these later counts were more likely to be both males and females from territorial pairs, with chicks still on the ground, so he frequently reduced his total counts by 50% to try to avoid pair bias. His site totals therefore may have underestimated the total number of pairs on some sites, but may have reduced the risk of an overestimate of pairs on other sites. Cook's observations from other Poole Harbour surveys suggest that April nesters often suffer nest loss to tidal flooding and predation, whereas May nesters may be more successful.

In line with Cook's broad approach, a very conservative pair estimate from the 2014 data was derived by halving the total redshank count from each site. This method assumes that all birds counted formed part of a visible pair, and risks underestimating the total population.

However, data generated in this way provides a minimum estimate of the number of pairs within the harbour, and allows us to say whether the population is likely to have remained broadly stable or not since 2004.

The Keysworth data series

The Keysworth site has been monitored as part of a regular national population census since the 1980s (Allport *et al* (1986), Brindley *et al (*1998) and Malpas *et al* (2013a)), using the standard estimate method to assess the number of breeding pairs. Although this is a valuable data series, changes in the redshank population at Keysworth may not reflect changes in the harbour as a whole.

Figure 1 – Poole Harbour breeding redshank survey sites in 2014.

1 = Brand's Bay, 2.1 = Newton Bay, 2.2 = Ower N, 2.3 = Ower Bay, 2.4 = Fitzworth N, 3.1 = Fitzworth W, 3.2 = Fitzworth SW, 4.1 = Wytch Farm, 4.2 = Wytch Farm W, 4.3 = Middlebere S, 4.4 = Middlebere, 4.5 = Middlebere W, 5 = Slepe Moor & the Salterns, 6 = Coombe & Grip Heath to Shipstal, 7 = Arne Bay & Patchin's Point, 8 = Swineham, 9 = Keysworth, Buck's Horn & Shag Looe, 10.1 = Wood Bar, 10.2 = Otter Island, 11 = N Lytchett Bay, 12.1 = Holes Bay N, 12.2 = Holes Bay S, 13 = Long Island, 14 = Round Island

3. RESULTS

Estimated number of breeding pairs in 2014

A summary of the estimated number of breeding pairs is provided in Table 1:

- The standard estimate suggests that Poole Harbour supports c.**147 pairs** of saltmarsh breeding redshank, more than double the 2004 estimate of 69 pairs.
- The modified standard estimate suggests that Poole Harbour supports c.**115 pairs** of saltmarsh breeding redshank. This is also significantly more than the 2004 estimate.
- The 50% standard estimate indicates that Poole Harbour supports a minimum of **74 pairs** of saltmarsh breeding redshank. This is similar to the 2004 estimate and includes at least ten pairs from Long and Round Islands which were not surveyed in 2004.

Up to eight pairs of redshank also attempted to nest on wet grassland sites behind the sea wall (Fig. 2), including;

- Two pairs on the Drax Estate at Keysworth
- Four pairs at RSPB French's Farm in north Lytchett Bay
- Two pairs on RSPB Arne Moors

Changes in distribution of breeding redshank

<u>Overall number of estimated pairs</u>

Although 2014 estimates may not be directly comparable to Price (1997) and Cook (2004), it is possible to detect broad changes (Table 2, with site numbers in brackets):

1. **Wytch Farm** (4.1-4.2) **& Middlebere** (4.3-4.4) – numbers appear to have remained stable since 1997 and the area remains one of the two most important for breeding redshank.
2. **Keysworth, Buck's Horn & Shag Looe** (9) – numbers appear to be recovering from a decline in 2004 and the site remains one of the top two sites in the harbour.
3. **Slepe Moor & the Salterns** (5) – data suggests this area is becoming increasingly important, and numbers have shown a continual increase since 1997.
4. **N Lytchett Bay** (11) – numbers seem to have declined significantly since 1997 and there was no sign of recovery in 2014, with numbers remaining similar to 2004.
5. **Arne saltmarshes** (Coombe & Grip Heath to Shipstal (6), Arne Bay and Patchin's Point (7)) – numbers appear to have remained stable since 1997.

6. **Long** (13) **& Round Islands** (14) – these were not surveyed in 1997 or 2004. The estimated total of 10-20 pairs in 2014 may partly explain the net increase in Poole Harbour since 2004.

Breeding density estimates

Using GIS and recent aerial photographs c.346 ha of saltmarsh was available for breeding redshank in Poole Harbour in 2014 (Appendix 3). This figure excludes:

- Areas of what is now reedbed (Buck's Horn, East Holton) and intertidal mud (large parts of Holes Bay and the centre of Brands Bay).
- Up to 20 ha of inaccessible but low lying saltmarsh in central Holes Bay were not surveyed and are also excluded.
- Areas of saltmarsh on Green and Furzey Islands. Aerial surveys indicated that there is little suitable habitat for breeding redshank.
- The saltmarsh islands off Fitzworth Point which supported only small remnants of saltmarsh, and which were almost certainly too frequently inundated to attract nesting redshank.
- Otter Island - this was not surveyed in 2014 but was visited during a Natural England habitat survey and was thought to be suitable for redshank.

Most suitable sites were located on the western and southern shores of the harbour.

This figure of 346 ha compares to 228 ha surveyed by Price (1997) and 424 ha identified by Edwards (2004) and used by Cook (2004). For the purposes of redshank density estimates, we have used Edwards 2004 figure as the most recently verified figure for saltmarsh area, although clearly density estimates would be higher using the figure derived from recent aerial photographs and GIS, and so these estimates are included in brackets.

Breeding density estimates for 2014 were as follows:

- The figure of 147 pairs derived from the standard estimate allows Poole Harbour density data to be compared to other British saltmarsh sites. This gives an estimated breeding redshank density in the harbour of **34.7 pairs per km^2** (42.5).

- These figures are significantly higher than the 2011 observed mean density estimate for southern England of 18.16 pairs per per km^2 (range 8.10 - 30.43) calculated by Malpas *et al* (2013a).
- Previous density estimates from Keysworth have been as follows (using the standard estimate of Green (1986)):

- Allport *et al* (1986) noted that Keysworth had one of the highest breeding redshank densities in the country in 1985, with 19-20 pairs on 20.8 ha, giving a breeding density of c.0.94 pairs per ha (95 pairs per km^2).
- Brindley *et al* (1998) estimated that Keysworth supported 28-29 pairs in 1996 on the same area of saltmarsh, with an increased breeding density of c.1.38 pairs per ha (138 pairs per km^2).
- Malpas *et al* (2013a) estimated 12 pairs over 26.7 ha in the national survey in 2011, giving a lower breeding density of c.0.45 pairs per ha (45 pairs per km^2).
- The 2014 estimate suggests 13-14 pairs over 26.7 ha, giving a breeding density of c.0.5 pairs per ha, similar to Malpas *et al* 2013a.
- These density estimates are all considerably higher than for the harbour as a whole, although Malpas' figure for 2013 is similar to the figure derived from the recent GIS/aerial photograph estimate.

Breeding redshank and sward height

Eighty-six percent of redshank registrations in 2014 occurred on saltmarsh in the 16-40 cm height class (Table 3 and Fig. 3.2). This is a similar proportion to 2004 (Fig. 3.1).

Breeding redshank and grazing index

Seventy-four percent of all redshank registrations occurred on sites where the grazing index was assessed as either 'no grazing' or 'light grazing' (scores of 0-1 in Table 3). This figure broadly reflects the association with medium-height vegetation.

Evidence of grazing

Surveyors collected some evidence of grazing by deer, geese and domestic livestock. This data is included in Table 3. Although not quantifiable, the evidence suggests that there is still widespread use of the saltmarshes by grazing animals, notably deer.

Figure 2 – Indicative map showing distribution of breeding redshank in Poole Harbour in 2014.

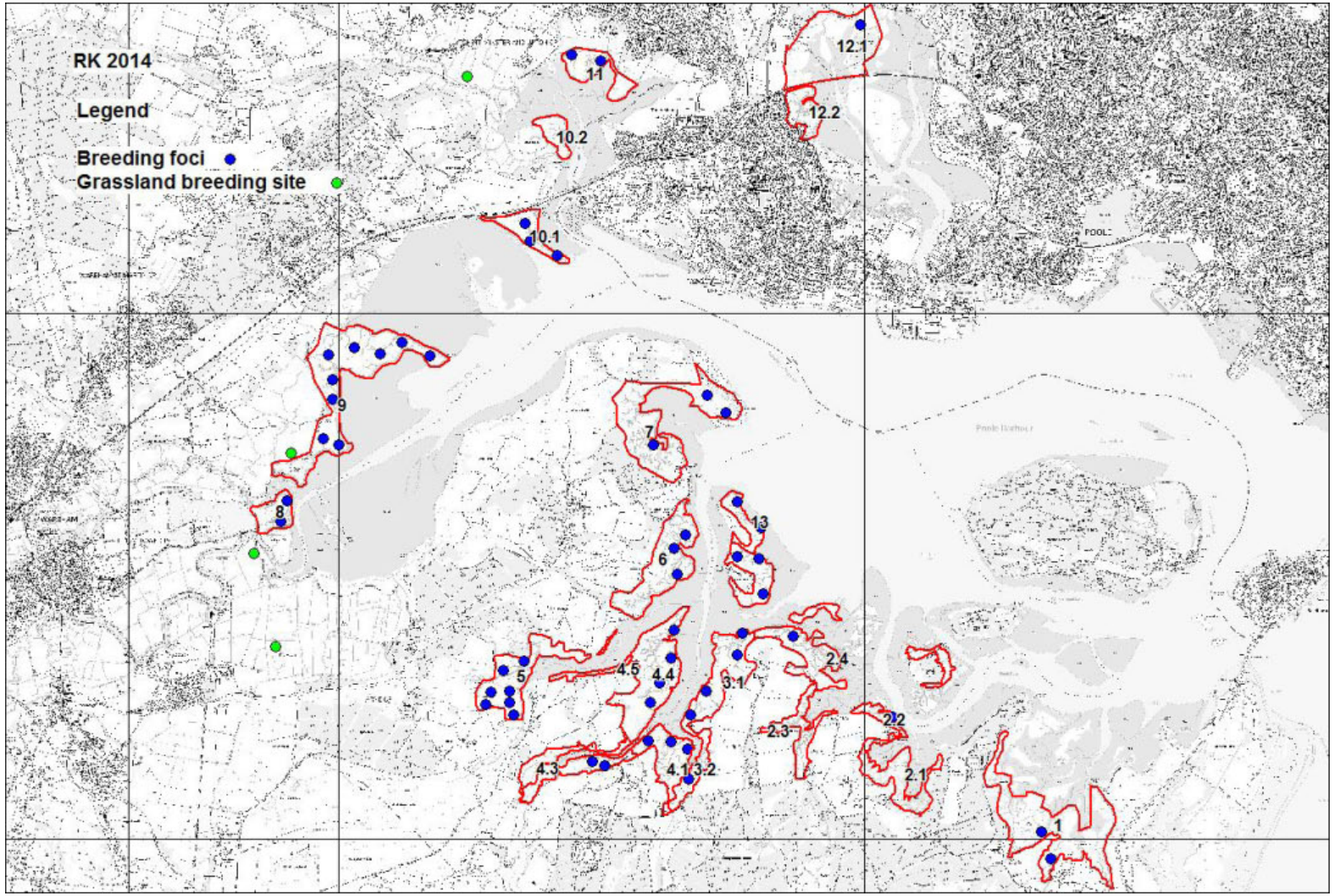


Table 1 – Estimated number of pairs of redshank in Poole Harbour 2014 based on three methods of estimation.

2004 site no.	Site no.	Site	Standard estimate of pairs (Green 1986)					Modified standard estimate of pairs					50% Standard estimate of pairs				
			Visit 1	Visit 2	Visit 3	V1-V2 mean	V1-V3 mean	Visit 1	Visit 2	Visit 3	V1-V2 mean	V1-V3 mean	Visit 1	Visit 2	Visit 3	V1-V2 mean	V1-V3 mean
1	1	Brand's Bay	**8**	8	6	8.0	7.3	7	7	5	7.0	6.3	4.0	4.0	3.0	4.0	3.7
2	2.1	Newton Bay	**0**	0	0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.2	Ower N	**0**	0	1	0.0	0.3	0	0	1	0.0	0.3	0.0	0.0	0.5	0.0	0.2
2	2.3	Ower Bay	**0**	0	0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2.4	Fitzworth N	**1**	1	1	1.0	1.0	1	1	1	1.0	1.0	0.5	0.5	0.5	0.5	0.5
3	3.1	Fitzworth W	**18**	8	8	13.0	11.3	18	6	6	12.0	10.0	9.0	4.0	4.0	6.5	5.7
3	3.2	Fitzworth SW	**1**	1	1	1.0	1.0	1	1	1	1.0	1.0	0.5	0.5	0.5	0.5	0.5
4	4.1-3	Wytch Farm to Middlebere S	12	14	14	13.0	13.3	9	9	8	9.0	8.7	6.0	7.0	7.0	6.5	6.7
4	4.4	Middlebere	**11**	14	10	12.5	11.7	11	13	7	12.0	10.3	5.5	7.0	5.0	6.3	5.8
-	4.5	Middlebere W	**0**	0	0	0.0	0.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	5	Slepe Moor & the Salterns	**17**	20	19	18.5	18.7	12	13	18	12.5	14.3	8.5	10.0	9.5	9.3	9.3
6	6	Coombe & Grip Heath to Shipstal	**2**	9	2	5.5	4.3	1	5	1	3.0	2.3	1.0	4.5	1.0	2.8	2.2
7	7	Arne Bay & Patchin's Point	**8**	7	8	7.5	7.7	5	4	5	4.5	4.7	4.0	3.5	4.0	3.8	3.8
8	8	Swineham	**8**	10	2	9.0	6.7	8	9	1	8.5	6.0	4.0	5.0	1.0	4.5	3.3
9	9	Keysworth, Buck's Horn & Shag Looe	23	26	30	24.5	26.3	16	17	21	16.5	18.0	11.5	13.0	15.0	12.3	13.2
10	10.1-2	Wood Bar & Otter Island	**3**	8	12	5.5	7.7	3	8	10	5.5	7.0	1.5	4.0	6.0	2.8	3.8
11	11	N Lytchett Bay	**10**	2	4	6.0	5.3	10	1	2	5.5	4.3	5.0	1.0	2.0	3.0	2.7
12	12.1-2	Holes Bay N & S	0	2	2	1.0	1.3	0	1	1	0.5	0.7	0.0	1.0	1.0	0.5	0.7
-	13	Long Island	**11**	10	17	10.5	12.7	9	8	12	8.5	9.7	5.5	5.0	8.5	5.3	6.3
-	14	Round Island	**11**	9	9	10.0	9.7	9	6	7	7.5	7.3	5.5	4.5	4.5	5.0	4.8
		TOTALS	144	149	146	**146.5**	146.3	120	109	107	**114.5**	111.9	72.0	74.5	73.0	**73.6**	73.2

Table 2 - Estimated number of breeding redshank by survey site in Poole Harbour in 1997, 2004 and 2014 with broad population changes during 1997-2014 and 2004-2014.

	Site	1997 pairs	2004 pairs	Standard estimate 2014	Modified standard estimate 2014	50% Standard estimate 2014	Indicative change 1997-2014	Indicative change 2004-14
1	Brand's Bay	4	4	8	7	4	Stable or increase	Stable or increase
2	Newton Bay to Fitzworth N	0	4	1	1	0.5	No change	Decrease
3	Fitzworth W	5	5	14	13	7.0	Increase	Increase
4	Wytch Farm to Middlebere S	16	17	25.5	21	12.8	Probable increase	Probable increase
5	Slepe Moor & the Salterns	7	9	18.5	12.5	9.3	Increase	Stable or increase
6	Coombe & Grip Heath to Shipstal	3	5	5.5	3	2.8	Stable or increase	Stable or decrease
7	Arne Bay & Patchin's Point	4	4	7.5	4.5	3.8	Stable or increase	Stable or increase
8	Swineham	3	3	9	8.5	4.5	Increase	Stable or increase
9	Keysworth, Buck's Horn & Shag Looe	18	9	24.5	16.5	12.3	?	Stable or increase
10	Wood Bar & Otter Island	6	3	5.5	5.5	2.8	Slight decrease?	Stable or increase
11	N Lytchett Bay	13	5	6.0	5.5	3.0	Decrease	?
12	Holes Bay N & S	2	1	1	0.5	0.5	Decrease	?
	Total	81	69	126	99.5	63.3		
13	Long Island	-	-	10.5	8.5	5.3		
14	Round Island	-	-	10.0	7.5	5.0		
	Total 2014			146.5	114.5	73.6	Slight decrease?	Increase

Table 3 – Redshank pair location in Poole Harbour in 2014 categorised by vegetation class with a site grazing index and field notes on habitat and grazing for each site.

Site no.	Site	Pair distribution by vegetation height class using V1-V2 mean from standard estimate			Grazing Index	Notes
		Low	Medium	Tall		
1	Brand's Bay		8.0		1	Tall 30m from shore, otherwise medium. Light deer grazing, slots throughout. Cattle adjacent.
2.1	Newton Bay	0.0			0	*Spartina* dominated <15 cm.
2.2	Ower N		0.0		0	*Spartina* dominated.
2.3	Ower Bay			0.0	0	Sea purslane<15 cm plus Sea club rush >40 cm.
2.4	Fitzworth N		1.0		1	Sea purslane and *Puccinellia maritima* 15-40 cm. Cattle on edge of saltmarsh.
3.1	Fitzworth W		13.0		1	Grazing pressure very low where birds breeding.
3.2	Fitzworth SW		1.0		2	Mosaic, deer with cattle grazing in areas.
4.1	Wytch Farm		13.0		0	Mosaic, light deer grazing plus geese.
4.2	Wytch Farm W		0.0		2	Heavily cattle grazed from Visit 2 onwards, deer present.
4.3	Middlebere S			0.0	0	Reedbed for most part, unsuitable.
4.4	Middlebere		12.5		1	Previous cattle grazing at edge, light deer grazing plus geese grazing.
4.5	Middlebere W			0.0		Reedbed, habitat unsuitable.
5	Slepe Moor & the Salterns		10.0	8.5	1	Mosaic with pools, lots of deer signs.
6	Coombe & Grip Heath to Shipstal		5.5		1	Lots of deer signs.
7	Arne Bay & Patchin's Point		7.5		2	Mosaic with pools, light deer grazing at lower limits but mostly heavily deer grazed.
8	Swineham		9.0		1	Mosaic, light deer grazing.
9.1	Keysworth & Shag Looe		16.5		1	Large varied height areas, deer.
	Buck's Horn		8.0		2	Vegetation 20 cm, deer grazing.
10.1	East Holton / Wood Bar	5.5			1	Average 15 cm mosaic, deer grazing.
11	N Lytchett Bay		6.0		1	Light deer grazing.
12	Holes Bay	1.0			1	Deer grazed short with tall reed at edges.
13	Long Island		10.5		1	Geese grazing.
14	Round Island		10.0		1	Geese grazing.

Table 4 – Surveyor notes on predation and disturbance.

Site no.	Site	Evidence of predators	Disturbance issues
1	Brand's Bay		
2.1	Newton Bay		Frequent human activity
2.2	Ower N		
2.3	Ower Bay		
2.4	Fitzworth N	Fox cubs present	
3.1	Fitzworth W		
3.2	Fitzworth SW		Cattle
4.1	Wytch Farm		
4.2	Wytch Farm W		Heavy cattle poaching
4.3	Middlebere S		
4.4	Middlebere	Fox frequent, nearby earth. Avian predation of eggs	
4.5	Middlebere W	Fox earth	
5	Slepe Moor& the Salterns	Otter sign at Salterns	
6	Coombe & Grip Heath to Shipstal	Foxes observed, earth on adjacent heath	
7	Arne Bay & Patchin's Point	Foxes observed in area	
8	Swineham	Marsh harriers breeding locally, two nests in 2014	Marsh harriers
9.1	Keysworth & Shag Looe	Otter sign	
	Buck's Horn	Otter sign	
10.1	Wood Bar		
11	N Lytchett Bay		
12	Holes Bay N & S		
13	Long Island		Geese?
14	Round Island		Geese?

Figure 3.1 - Estimated no. pairs of redshank by vegetation height class 2004.

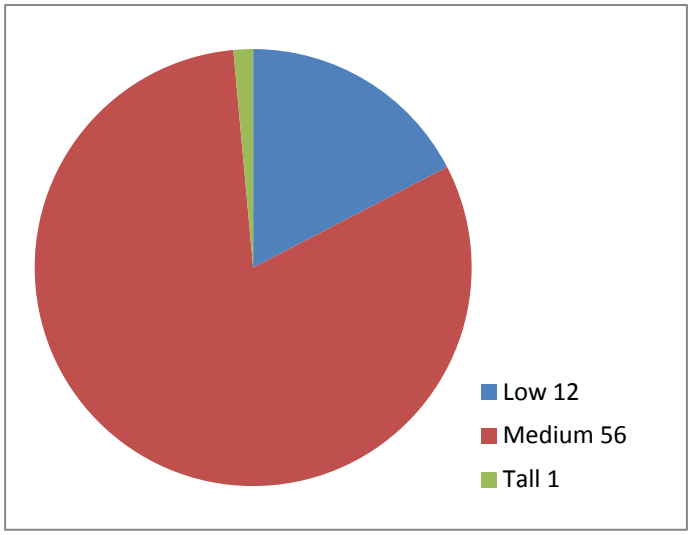
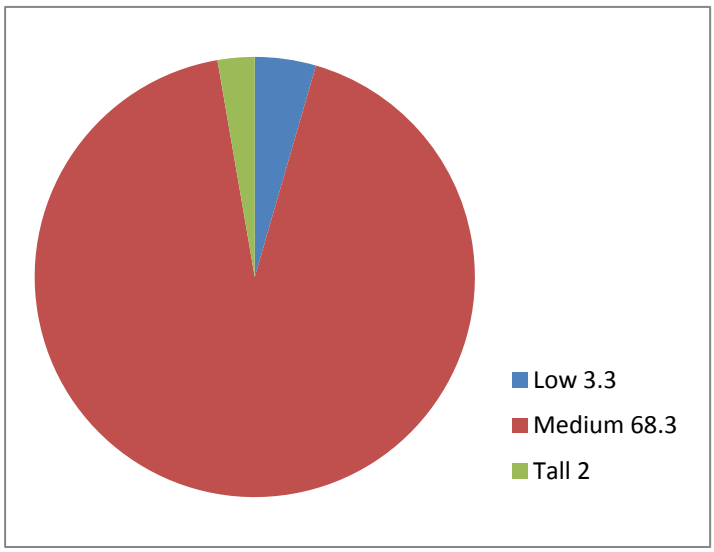


Figure 3.2 - Estimated no. pairs of redshank by vegetation height class 2014.



4. DISCUSSION

2014 population estimate

A reliable estimate of the breeding redshank population depends on accurate interpretation of the survey data. This can be difficult, as Cook (2004) highlighted:

- Spring passage birds will often be present.
- Male redshank do not necessarily defend a territory around the nest.
- Males may display over a wide area, often overlapping with other displaying males.
- Incubating redshank can sit tightly on a nest until an observer gets to within a metre or so (L Mason **pers. comm.**), and may move off before being seen.
- Parents are vocal when they have chicks and will get involved in 'gregarious mobbing', sometimes involving single-sex groups of adult birds.

Feedback from surveyors suggests that the standard estimate figure of 147 pairs is too high. There are no obvious reasons though why the standard estimate should be discounted, given the precautions taken to minimise count bias. At c.20 ha, many Poole Harbour saltmarshes are comparable in size with those surveyed by Green during calibration of the method (Green 1986), so site coverage is likely to have been similar. It has been suggested that Poole Harbour may support a large non-breeding population of redshank during the breeding season, but there seems to be little evidence of this, and other south coast estuaries do not seem to do so.

The standard estimate cannot be dismissed without questioning the method itself, which is not the purpose of this report. It is widely used throughout the UK, and national population estimates derived in this way provide the baseline against which the significance of the Poole Harbour population must be evaluated. Using the figure of 147 breeding pairs, Poole Harbour supports c.1.2% of the British saltmarsh population of breeding redshank, based on a 2011 national saltmarsh estimate of 11,946 pairs (Malpas *et al* 2013a).

Applying the standard estimate method to the Cook's 2004 report data, (i.e. ignoring any pair estimates), the breeding population is estimated at c.84 pairs. This figure is significantly higher than the final total of 69 pairs, although admittedly it removes the element of expert judgement from the assessment, which Cook thought was essential to obtain what he described as a 'conservative reliable estimate' (K Cook **pers. comm.**).

At c.115 pairs, the modified standard estimate approaches Cook's 2004 estimate, although it relies on accurate identification of pairs. Linking birds which apparently showing pair behaviour, especially in V1, is likely to lead to an underestimate of pairs because there is

greater likelihood of falsely pairing birds which are the partners of incubating birds: There is no way of knowing how much more accurate the modified standard estimate is.

The 50% standard estimate may provide Cook's 'conservative reliable estimate' of breeding pairs, providing most passage birds and alarm-calling adults were filtered out from the counts. It follows that pairing all registrations should give a cautious estimate of the breeding population, especially since many of the birds located on V1 and V2 would have had partners elsewhere. If so, then the estimate of c.74 pairs probably represents the very minimum breeding population on the Poole Harbour saltings.

There are other reasons for caution in trying to compare the 2004 and 2014 results:

- The 2004 survey started very late (20 May). Some V1 visits were delayed until 27 May (e.g. Slepe Moor and the Salterns). The earliest V2 visits took place on 1 June, with the latest on 8 June.
- Cook would have missed many of the early nesting pairs (apart from re-layers). He would also have encountered many more alarming birds on his second set of visits in June, and this explains in part why he was obliged to adapt the standard estimate.
- Some sites were only surveyed once (e.g. Wytch Farm and Middlebere). The pair estimate at these sites is based on the maximum count rather than the mean count of visits V1 and V2.
- The effects of observer bias are likely to have been different between 2004 and 2014. Cook carried out all visits on his own, whereas a team of volunteer surveyors carried out the 2014 surveys.

Nonetheless, it seems likely, taking the above factors into account, that the Poole Harbour breeding redshank population has remained stable over the past decade, and may have increased, although the evidence for a recovery depends on how far any broad changes are masked by the different 2004 and 2014 calibration methods. Typically, redshank live for about four years: ringing recoveries suggest annual adult survival rates of c.74% and juvenile survival in the first year of c.43% (Insley *et al* 1997). It seems unlikely therefore that many of the birds surveyed by Cook in 2004 would still have been present in 2014. Stability is likely to have come about through high productivity and survival and/or immigration from other breeding areas. Further studies would allow us to know more, but given that breeding redshank are often faithful to their place of birth (e.g. Thompson & Hale 1989), it seems likely that high productivity is the main population driver, and that this is not a sink population.

The Keysworth national monitoring site

The 1985-2014 data series suggests that the breeding population on Keysworth may have halved between 1996 and 2011. The population seems to have remained relatively stable since then, and may even have increased: Cook (2004) estimated a total population for Keysworth and adjacent Buck's Horn of nine pairs is considerably lower than the 2011 estimate by Malpas *et al* (2013a) and 13-14 pairs in 2014 using the standard estimate.

Traditionally, Keysworth has been grazed with cattle, but for the past 10-15 years this has been limited to later summer grazing with low numbers of animals because of the high grazing pressure exerted by Sika (D Randal **pers. comm.**). This raises the question of whether the Keysworth redshank population has responded to reduced access by cattle during the nesting period (see Sharps *et al* 20015, below), or whether other factors are at play, such as reduced grazing pressure from Sika.

It is impossible to say how far the changing fortunes of redshank at Keysworth reflect those in the wider harbour. The confounding issue at Keysworth may have been the localised impacts of cattle, which could have been a major driver of the decline seen until at least 1996.

Breeding redshank distribution

It is not surprising that most 2014 redshank were found on the same sites as those in 2004 (Fig. 2). A combination of factors are likely to have influenced this distribution, including the availability of suitable nesting and feeding habitat, low disturbance levels and reduced edge effects, including predation risk. The core breeding area remained much the same - from Wytch Farm westwards to Middlebere, the Arne peninsula, Swineham and Keysworth – where the number of pairs seems to have been maintained or increased. The discovery of a significant number of breeding redshank on Round and Long Islands, which were not previously surveyed, further boosted the population estimate.

Some negative changes were detected in 2014, most notably the loss of breeding redshank from the saltings in Ower Bay, and on saltings up to and including Fitzworth point. Much of this saltmarsh is narrow and vulnerable to disturbance and predation. The loss of the offshore saltmarsh islands at Fitzworth has been a noticeable change since 2004, although whether this is due to natural changes in harbour hydrodynamics or to sea levels rise is unknown. Deposits of dead *Enteromorpha* were also widespread in some areas, smothering

large areas of saltmarsh vegetation. This may be linked to the effects of diffuse pollution from fertiliser and slurry from the surrounding catchments.

2014 habitat selection

Eighty-six percent of all redshank registrations occurred on saltmarsh in the 16-40 cm height class (Table 3). These findings are consistent with studies elsewhere in the UK, which show that redshank favour dense tussocks for nesting as part of their home range, as well as areas of shorter vegetation with shallow pools for surface feeding. Hence, moderately grazed swards with a diverse vegetation community and structure hold higher redshank densities than ungrazed or lightly grazed areas, and heavily grazed saltmarshes are not favoured by nesting redshanks (Allport *et al* 1986; Norris *et al* 1998).

Livestock grazing patterns on Poole Harbour saltmarshes

There is evidence that some Poole Harbour heathlands are at a much later successional stage than they were in the 1930s (Diaz *et al* 2013). This supports anecdotal evidence of a long term decline in cattle grazing in the area, which may also reflect a decline in livestock grazing on saltmarsh as well (A Diaz **pers. comm.**).

Where livestock grazing has ceased (and in the absence of replacement grazing by Sika), there has been succession to drier vegetation communities on the landward side of some saltmarshes. This is most obvious in Lytchett Bay, where middle saltmarsh has succeeded to reedbed along the western shore.

It is thought that livestock grazing patterns on harbour saltmarshes have changed little over the last decade. If so, it would seem that cattle grazing has not been widespread for some time - signs of cattle grazing were noted on only three survey sites in 2014, compared to 18 sites where signs of deer activity were reported (Table 3). An up to date census would help us better understand the current pattern of saltmarsh use by livestock.

Despite this, some negative effects by livestock on saltmarsh were recorded in 2014, notably at Wytch Lake, where cattle were having a severe impact on the adjacent saltmarsh, and therefore probably on breeding redshank through high levels of disturbance and nest trampling. These problems may be localised, but a more comprehensive assessment would be worth carrying out.

Increased grazing by Sika may have contributed to the decline in cattle grazing on some saltmarshes, e.g. at Keysworth, where deer apparently now leave little forage for cattle

(although see Kevin Cook's comment below about the likely reduction in Sika at Keysworth). This is one of the reasons for the later summer introduction of cattle onto the saltmarsh at this site (D Randal **pers. comm.**).

Though Norris *et al* (1997) found that cattle grazing at about one livestock unit per ha is likely to maintain high breeding redshank densities, a later study by Sharps *et al* (2015) suggested that even light levels of grazing can seriously reduce redshank breeding success due to the combined effects of habitat modification leading to increased predation and the direct effects of nest trampling. Sharps *et al* found that an increase in grazing levels from 0.15 cattle per ha to 0.82 cattle per ha increased nest loss due to trampling from 16% to 98%. It was also shown that nest loss through predation increased from 28% with no grazing to 95% with cattle grazing at 0.55 per ha. Suggested solutions to this dilemma are to partition grazing and redshank nesting, either through a rotational grazing regime or by introducing cattle onto saltmarsh after the end of July when redshank chicks have fledged.

Impacts of Sika deer grazing on Poole Harbour saltmarshes

Sika deer have replaced cattle grazing as the dominant grazer on many harbour saltmarshes. For a time, this may have helped offset the effects of the decline in livestock grazing on some sites, although we have no empirical evidence of this. As the local deer population has grown, deer grazing and trampling has had a significant impact on saltmarsh, reducing the height and cover of *Spartina anglica*, which is preferentially grazed (Diaz *et al* 2005). Many redshank are likely to have been forced to nest closer to the MHW mark, where taller saltmarsh vegetation has persisted (Cook 2004), but where nesting sites are more vulnerable to spring flooding.

In response, there has been a programme of selective culling of Sika deer on Arne since 2006, reducing numbers from nearly 900 deer in 2004 to about 140 in 2014. Within four years, average vegetation height at Arne Bay, Coombe and Grip has increased from c.5 cm to over 20 cm in 2014 (Diaz unpublished). Redshank densities are closely correlated with moderate grazing pressure, which encourages a diverse vegetation community and structure (Norris *et al* 1997; Norris *et al* 1998), so it seems likely that reduced Sika grazing on Arne has improved nesting conditions. There is now widespread control of Sika around the southern harbour, which will have reduced grazing pressure on other sites (A Diaz **pers. comm.**; J Underhill-Day **pers. comm.**).

It seems likely that the breeding redshank population has responded to changes in grazing pressure brought about by Sika control, at least on some of the core sites: this may help

explain probable increases on Wytch Farm, Middlebere, Slepe Moor and the Salterns, and to some extent on Arne. Cook noted that there was considerably more redshank activity at Keysworth in 2014 than in 2004, which, he suggests, could be linked to a significant reduction in deer grazing activity (K Cook **pers. comm.**).

2014 vegetation data suggests that redshank are finding sufficient medium-height vegetation in which to nest, at least to maintain the current population (Table 3), although the 2004 survey gave similar results. Further detailed monitoring of saltmarsh vegetation, as well as deer activity and redshank numbers, should help confirm whether there has been a genuine response by breeding redshank to reduced grazing by Sika.

Determining optimal grazing levels on saltmarsh for breeding redshank

It is possible to set sustainable grazing levels on saltmarsh using cattle, although as demonstrated by Sharps *et al* (2015), the timing of cattle introduction onto saltmarsh is critical. The presence of Sika deer on saltmarshes used by cattle is an important additional grazing element, and the relationship between Sika density and redshank productivity is not yet understood. This would a useful area of research, not least because Sika are likely to remain an important part of the saltmarsh ecosystem for the foreseeable future. Research should focus on trying to determine optimal foraging densities for Sika on saltmarsh, taking into account their combined impacts on some sites with cattle, on vegetation structure and composition, compaction and redshank nest survival.

Assessing the impacts of predation and disturbance

Table 4 summarises the surveyors' sightings of predators, signs of predators and evidence of human disturbance on survey sites. This was necessarily a time-limited and rather subjective assessment, but it provides some useful information:

- Foxes seem to be widespread along the harbour edge, with several surveyors reporting signs of fox activity, including evidence of at least four fox earths within close proximity to saltmarsh sites.

- Evidence of significant human disturbance seems to have been limited to Newton Bay, although any of the narrower saltmarshes are likely to be vulnerable to disturbance, including unofficial access points by fisherman on Wood Bar Looe.

The recent successful of breeding marsh harriers *Circus aeruginosus* is a good sign that parts of the harbour remain relatively undisturbed.

Ongoing and future threats

There has been ongoing loss of saltmarsh in the harbour since the 1940s, and probably earlier. The decline of saltmarsh within the harbour is linked to a number of factors, including *Spartina anglica* die-back since the 1920s. Total losses of saltmarsh in the harbour were estimated at 245 ha (38%) between 1947-93, with the greatest losses along the south-east shore (Born 2005).

The contribution of sea level rise, leading to increased erosion and inundation of lower marsh, and coastal squeeze, was assessed by Born (2005), who predicted losses of up to 150 ha from the harbour by 2053. This may be higher if sea level rise estimates increase. The Flood & Coastal Erosion Risk Management Strategy covering Poole Harbour (Environment Agency 2014) estimates a loss of up to 234 ha of saltmarsh to sea level rise as a result of flood and coastal erosion risk management alone by 2110. The total loss is likely to be significantly more as losses involving natural shorelines are factored in, including those from most of the southern shore saltmarshes.

The loss of offshore saltmarsh at Fitzworth Point has been discussed above. There is also evidence of losses in Brand's Bay, where older submerged remnants of saltmarsh are still visible on aerial photographs. The occurrence of breeding redshank on Long and Round Islands may be linked to the loss of saltmarsh at Fitzworth Point.

Other factors are also likely to play an important part in the loss of harbour saltings, including undergrazing at less accessible sites, leading to the invasion of reed (*Phragmites australis*) and other species. This has occurred in several places in the harbour, especially in western reaches, where salinities are lower. In contrast, overgrazing by deer has led to the loss of reedbed habitat and its replacement by soft rush *Juncus effusus* (J Underhill-Day **pers. comm.**).

A number of 2014 surveyors noted that some sites were flooded out at the time of visit, including Middlebere, Brand's Bay, Holes Bay and the Grip Heath saltmarsh. As a result survey routes were difficult to establish and follow. Surveyors felt that these saltmarshes were likely to have been too wet to be used by breeding redshank. Whether these

observations indicate increasing sea level rise impacts on the saltings is unclear, but further monitoring of these sites is strongly recommended (see below).

Grip Heath saltmarsh on a spring tide, August 2012. Photo: C moody

Future work - recommendations

We need to know more about the breeding ecology of the Poole Harbour redshank population. We may also need to do more to protect and conserve their saltmarsh breeding sites. This work could be coordinated by the main statutory bodies and major landowners, including the Environment Agency, Natural England, the Poole Harbour Commissioners, RSPB, National Trust and the Poole Harbour Study Group. The following recommendations could form part of Redshank Action Plan for the harbour:

- An annual monitoring programme on a sample of core sites and a five-year survey programme across the harbour would provide a better understanding of redshank population size, distribution and trends.
- Understanding more about redshank productivity levels would help us know whether the population is really stable or recovering. It may allow us to quantify some of the effects of predation, tidal inundation and disturbance on recruitment.

- Regular saltmarsh condition surveys for redshank would help us to identify over- and under-grazed saltmarsh sites, and to monitor the progress of recovering sites. This could be linked to:
    a. Regular monitoring of Sika numbers on saltmarsh, which would help us understand more about their pattern of use, and their contribution to sustainable levels of grazing for redshank.
    b. An assessment of the scale and pattern of saltmarsh use by livestock, which would also help us develop a better understanding of sustainable levels of grazing for redshank.
- Greater coordination of wet grassland management planning by conservation partners. This would benefit the harbour redshank population:
    a. By providing breeding opportunities for additional pairs of redshank.
    b. By providing replacement breeding habitat for saltmarsh redshank displaced by rising sea levels.
- A monitoring programme on a sample of saltmarshes would help us better understand the rate of saltmarsh loss to coastal squeeze effects, including erosion and increased inundation. This data could be linked to an active programme of managed realignment to help offset coastal squeeze impacts in the harbour.

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Appendix 1 – 2014 Survey Instructions

POOLE HARBOUR BREEDING REDSHANK SURVEY 2014

SURVEY INSTRUCTIONS

SURVEY AIMS

The last full survey of breeding redshank in Poole Harbour was carried out in 2004. The aim of the 2014 survey is to get an assessment of the current numbers and distribution of the breeding population. Surveyors are also asked to map vegetation height and grazing pressure where possible. Together, this data may help us to understand more clearly how under- and overgrazing may be having an impact on breeding redshank in Poole Harbour.

SURVEY INSTRUCTIONS

Before fieldwork, please familiarise yourself with these instructions, the Redshank Recording Form (attached) and the vegetation height code and grazing index (see below).

Survey sites

Maps are provided for each survey site based on the areas surveyed in 2004. You should complete 1 annotated map showing observed redshank for each site visit, and a single vegetation sub-unit/height/grazing pressure map. Sites should be small enough to allow surveyors to cover their whole patch in a single visit. Surveyors are also provided with an aerial photo of each site, to help identify creeks and identify route selection, for both convenience and safety. Access to your survey site will have been approved by the landowner where necessary, in advance of your visits.

Survey route

Conduct a preliminary visit to each survey site before the first redshank count visit to decide on a standard survey route. This route need not involve walking in straight lines, but should come within 100 m of every part of the survey site and should take advantage of safe crossing points over creeks and soft mud. This route should be used for every survey visit to the site and for carrying out the vegetation sub-unit/vegetation height/grazing pressure assessment.

Record the survey route and start/finish points used on a map of the site.

<u>Redshank counts</u>

Visit each site 3 times between 18th April and 30th May with at least 10 days between visits (e.g. once a fortnight). Carry out counts between 08:00 and 17:30 to make full use of natural light. Unless the tidal conditions of the site are known intimately, counts should be conducted no more than 2 hours either side of low tide for safety reasons and to ensure that the maximum proportion of saltmarsh is accessible. No counts should be made in rain or where the wind is blowing stronger than a light breeze. Sites can be split between observers, but observers should stay within sight of one another.

Record the date, visit number, start and finish times, surveyor's name and basic weather conditions on a copy of the **Redshank Recording Sheet** for each visit.

On each visit, walk the standard survey route as described above, aiming to come within 100 m of all areas of the plot/site. Mark every redshank seen on the map, including behaviour. Use the standard BTO RK code to record redshank.

The standard method of mapping breeding redshank is summarised below:

- Show a solitary redshank by writing "RK"
- Circle redshank symbols if the bird was song-flighting/displaying, e.g. RK
- Show a pair by joining two symbols with a hyphen: RK-RK
- Show birds calling as if they have chicks or birds that are seen with chicks by adding the subscript "y".
- Show a flock (non-breeding birds) by putting the number of birds present before the species symbol, e.g. 6RK.
- Show a scrum of multiple birds behaving as if they have chicks as a flock with the subscript "y"; e.g. 6RKy for 6 adult redshank behaving as if they have chicks.
- If a redshank flew up from a creek or open mud, add the subscript "m". If it came up from a vegetated area add the subscript "v". In many cases, this will not be seen clearly.
- Indicate all movements of birds where possible, especially between study plots, using arrows from the species' symbol. Remain aware of birds flying off a long way ahead or to the side.

After completing counts, summarise data on a copy of the Redshank Recording Sheet straight away. Use arrowed moves from one part of the plot to another to remove double-counted birds from the totals. Give separate totals for sub-areas and a total for the site. Note that categories on the recording sheet are not mutually exclusive: a redshank which was a member of a pair, which flew up from the mud and which was displaying would contribute to the 'Displaying/song-flighting', 'Pairs', and 'Flushed from mud/creeks' totals. If the number of individuals/pairs with young is not obvious (e.g. if a large group of adults all acted as if they had chicks), divide the number of adults in the group by 2 to fill in the 'With broods' total. The 'Largest flock size' total is for flocks of non-breeding or roosting birds which remained together and did not behave as if they had nests or chicks.

Use the comments sections on the Redshank Recording Sheet to make any other observations about the count, e.g. whether additional disturbance was present, any unusual behaviour seen, etc. Map or note obvious footpaths or other signs of human disturbance.

<u>Recording evidence of grazing & vegetation height</u>

On each visit, record the number and type of livestock/grazers present and record signs of grazer presence/activity (footprints, droppings, poaching, etc) on the survey map. Use the codes C = cattle, S = sheep, H = horses, D = deer, G = geese to indicate different grazers where this can be safely identified.

On or around the second visit (24th April – 14th May) use a separate map to record any distinct vegetation sub-units within the site, providing an average vegetation height score for each sub-unit, and a grazing score where possible. Where a sub-unit is distinct but the vegetation is clearly a mosaic, record as 'Mosaic + average height range', otherwise record as 'Uniform + average height'. Where there are no clear sub-units, record as above for the whole site.

Average vegetation height scores should be recorded as follows:

- 'Short' = 0-15 cms
- 'Medium' = 16-40 cms
- 'Tall'= 41+ cms

Where possible, assign one of the following grazing scores to each recognisable sub-unit, or try to give an estimate of grazing pressure across the whole site if this isn't possible:

- Grazing Index = 0 (no grazing)
- Grazing Index = 1 (lightly grazed)
- Grazing Index = 2 (moderately grazed)
- Grazing Index = 3 (heavily grazed)

CHECKLIST

At the end of the survey period for each site you should have produced:

- **3 annotated redshank maps**, one for each survey visit, detailing redshank counts and distribution;
- **3 copies of the Redshank Recording Sheet** detailing the results of bird counts, weather conditions, start and finish times, etc. for each survey visit;
- **1 map showing distinct vegetation sub-units, vegetation height, and sub-unit or whole site grazing score(s)** where this is possible.

RETURN OF SURVEY FORMS

Please send completed survey forms to Toby Branston, RSPB Ryan House, Wareham, Dorset, BH20 4DY at the end of the survey. Last date for return is **31 July 2014**. Thank you.

Appendix 2- 2014 Redshank Recording Sheet

Poole Harbour Breeding Redshank Survey 2014
Redshank Recording Sheet

Site name	
Visit no.	
Surveyor	
Date	
Weather conditions	
Start time	
Finish time	

Activity	**No. of redshank**
Displaying/ song-flighting	
Pairs	
With broods	
Flushed from mud/creeks	
Flushed from vegetation	
Largest flock size	
Total number of redshank	
Comments	

Appendix 3 – estimated area of suitable saltmarsh in Poole Harbour for breeding redshank

Site no.	Site	Area (ha)	Notes
1	Brands Bay	23.57	17.25 + 1.85 + 4.47 ha
2.1	Newton Bay	8.71	
2.2	Ower N	2.59	
2.3	Ower Bay	9.9	
2.4	Fitzworth N	12.7	Inc remnant outer islands 2.12
3.1	Fitzworth W	21.25	
3.2	Fitzworth SW	7.45	
4.1	Wytch Farm	16.2	
4.2	Wytch Farm W	11.03	
4.3	Middlebere S	0	Gone to reedbed
4.4	Middlebere	32.8	
4.5	Middlebere W	0	Not saltmarsh / reedbed
5	Slepe Moor& Salterns	24.26	
6	Grip Heath & Shipstal	23.6	
7	Arne Bay + Patchins Point	34.56	
8	Swineham	8.8	
9.1	Keysworth Shag Looe	47.8	
	Buck's Horn	Inc above	
10.1	East Holton / Wood Bar	6.99	
11	N Lytchett Bay	10.3	
12	Holes Bay	24.53	17.66 + 6.87
13	Long Island	7.05	
14	Round Island	12.39	
		346.48	Total suitable area
	Green island	3.65	Visited but not suitable
	Fitzworth islands	Not measured	Do not exist anymore as habitat