2015-16 WINTER BIRD CROPS REPORT

durrell

States of Jersey

National Trust 1936 Jersey

2015-16 Winter Bird Crops report

Author: Cristina Sellarés de Pedro

Birds On The Edge

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Photos by Romano da Costa and Cristina Sellarés de Pedro.

Birds On The Edge is a partnership of Durrell Wildlife Conservation Trust, States of Jersey Department of the Environment and the National Trust for Jersey.

SUMMARY

In 2015 a total of 47 fields were planted with crops to feed the birds in winter, 43 of them with mixes especially designed to provide the maximum amount and variety of seeds and grains (known as 'winter bird crops'). The fields were grouped at 12 chosen sites across the Island and covered a total of 33.3ha (163vg). The two largest sites were 7.7ha and comprised 10 and nine fields, and the smallest site was 0.54ha with only one field.

The development of the crops was monitored by taking height measurements and photographs once a month between July 2015 and April 2016. Bird abundance and activity was recorded with visual surveys carried out throughout each site twice per month. The results were compared to data obtained during the previous winters and from an unplanted control site.

In order to maximize the benefits of the crops for the birds, farmers were advised to plant within the timing guidelines provided by the seed producer which is between mid-May and July. Crops sown between May and mid-July reached higher maximum heights in more fields than crops planted after mid-July. There was less variation of maximum heights between fields than previous years, with more values closer to the average mark. This could be due to the planting dates being closer in time as well as closer to the recommended planting times for these crops. The maximum growth achieved by a crop was a 198cm, the highest since the scheme started in 2013, although the average maximum height was similar to the previous winter.

A total of 46,155 records of birds of 54 species were collected over sixteen surveys, of which 40,949 (88.7%) were of target species. A total of 14 target species were recorded at the crops, the most abundant being Chaffinch (50.2%), Linnet (16.6%) and Starling (8.1%). Seven of the ten most abundant species were target species: Chaffinch, Linnet, Starling, Goldfinch, Greenfinch, Meadow Pipit and Reed Bunting. The most successful site had 461.38 birds/ha on average, whilst the least successful attracted 31.87 birds/ha. In comparison, the control site had an average density of 0.06 birds/ha. Net numbers increased by 13,874 compared to 2014-15 (54% increase) and by 33,177 compared to 2013-14 (534% increase), with an increase in overall density of target species birds of 39% (2014-15) and 140% (2013-14).

The increase in bird density at the sites could be a result from improvements on the management of the scheme, the consolidation of the oldest sites or even reflect an increase on the number of birds that survive from one winter to the next.

ACKNOWLEDGEMENTS

Many people have been involved in this project, from the planning stage to planting the winter crops, as well as funding parts of it, offering advice, sharing their experience and even proof-reading this report. My deepest gratitude goes to Charles Alluto, Steven Baudains, Ian Le Brun, David Buxton, Paul Carre, Harriet Clark, Elizabeth Corry, Aaron Le Couteur, Jean Drydale, Mick Dryden, Jon Horn, Glen Kehoe, Matthew Lamy, Richard Le Cornu, Tim Liddiard, Philip Le Maistre, Tony Paintin, Jon Parkes, John Pinel, Doug Richardson, Alexander Richardson, John Vautier, Matthew Vautier and Glyn Young.

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1. INTRODUCTION

1.1 The Birds On The Edge farmland scheme and winter bird crops

The Birds On The Edge partnership (BOTE) is a joint initiative between The National Trust for Jersey, Durrell Wildlife Conservation Trust and the States of Jersey Department of the Environment. BOTE's work aims to restore habitats, especially coastal and farmland, and to stop the decline of locally endangered bird species.

BOTE develops its Habitat Restoration Strategy by surveying parts of Jersey and producing management plans, promoting sustainable practices and habitat restoration. The surveys identify sites of conservation interest, whose habitats have potential to be restored in order to increase their biodiversity. The reports also offer recommendations on techniques to restore and manage those habitats, such as hedge planting and maintenance, enhancement of boundaries, planting of wildlife crops, bracken clearance, scrub management and conservation grazing amongst others.

Jersey holds many declining populations of birds, of which those associated with farmland are showing the steepest declines – birds such as the Skylark, Yellowhammer, Cirl Bunting, Linnet and Reed Bunting amongst others[1]. This trend follows a pattern seen across the UK and Europe[2], believed to be caused by an increase in winter mortality associated with the modernization of farming techniques. The traditional sources of food in winter - spilt cereals, fields left in stubble and fallow grounds – have diminished with the intensification of production and the appearance of more efficient machinery. In Jersey it is believed that similar changes in traditional agriculture have contributed to the changes in winter food availability and subsequent declines of local bird populations.

The lack of winter food has been addressed in various countries with the help of European Union's agri-environment schemes (AESs), which in the UK are fulfilled via the Environmental Stewardship (ES) scheme[3]. The main strategy used to offset the lack of winter food is to plant specialized crops, comprised by energy and nutrient-rich plants such as sunflower, quinoa and millet.

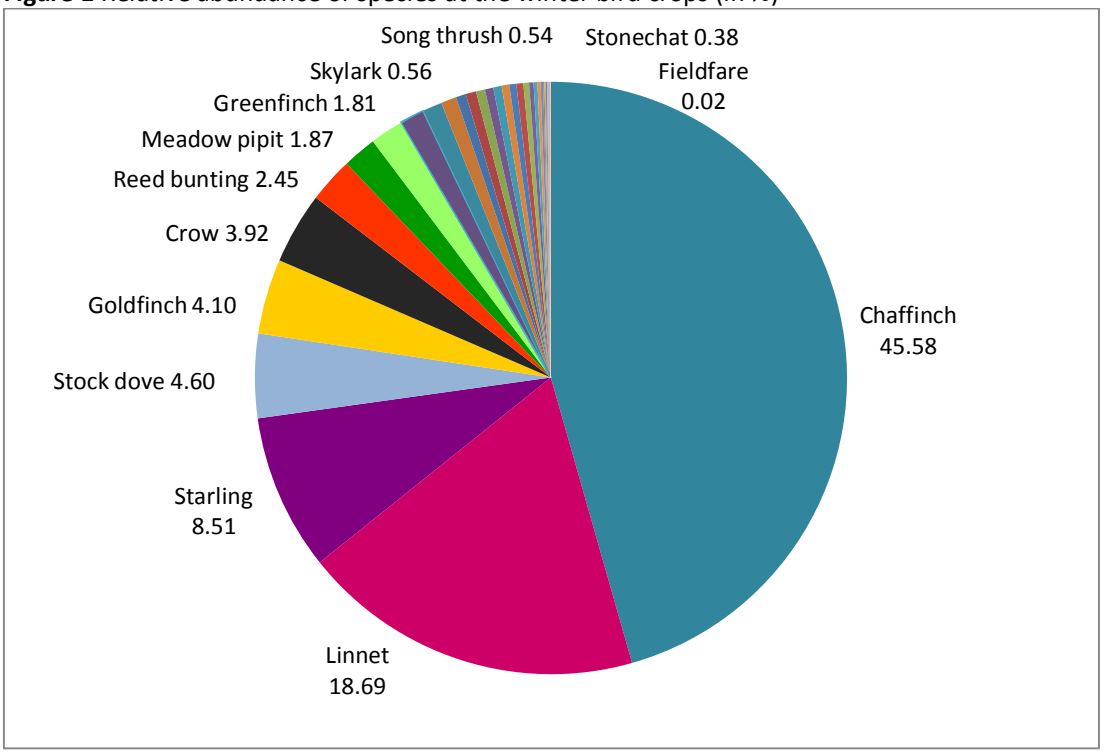
In 2013 BOTE launched a trial farmland scheme[4] in partnership with five local farms, to plant winter bird crops (WBCs) on their land. The seed for the crops was purchased with a private donation and the farmers planted the crops on their fields after the potato harvest, at the end of spring. Aside from providing a source of food in winter for resident and migrant birds, this scheme also aimed to test the development and effectiveness of such crops in attracting birds against factors such as size of site, location and land management. Some additional benefits of the scheme were the establishment of links with the farming community, in a partnership that helped to define how the scheme would expand in future years. The scheme was repeated and expanded in the following winter of 2014-15.

1.2 Results of the 2014-15 winter bird crops

A total of 46 fields were planted with WBCs at ten different sites, with a combined area of 27.49Ha (152.8vg). Measurements were taken during surveys for crop development and bird abundance. The data was analysed and statistical tests were carried out between each site and a control site established in 2013.

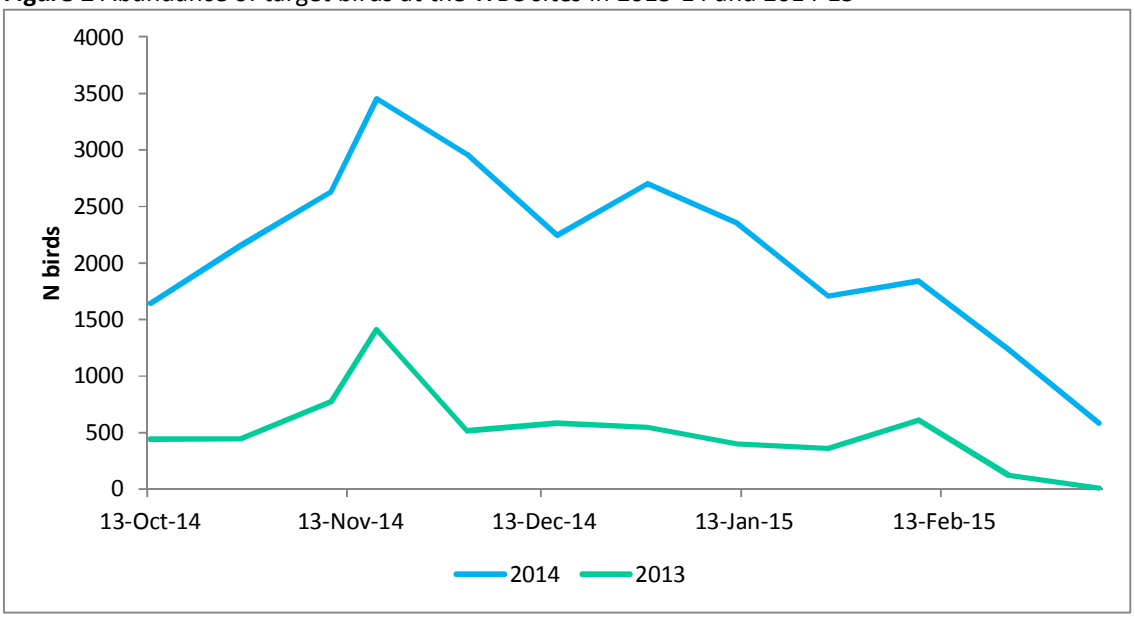
A total of 30,100 bird records were logged during the surveys, of which 25,512 (84.75%) belonged to target species. Seven out of the ten most abundant species were target species, including Chaffinch (45.6%), Linnet (18.7%) and Starling (8.5%)[5].

Figure 1 Relative abundance of species at the winter bird crops (in %)



The presence of birds on the crops peaked between the 1st week of November and the 3rd week of December.

Figure 2 Abundance of target birds at the WBC sites in 2013-14 and 2014-15



The report from the 2014-15 Winter Bird Crop scheme concluded the following[5]:

- *"…The fields are effective in providing food for target species during the winter."*
- *"The density of birds …was higher than the previous winter. One reason for this could be the net increase in area size of winter bird crops, with 137.4% more land planted…".*
- *"It is difficult to draw comparisons between the present sites due to their differences".*
- *"… Sites with a variety of crops, locations and management regimes are advantageous for birds as they increase their options and therefore their adaptability to adverse circumstances".*

1.3 Aims of the 2015-16 WBCs Scheme

The effectiveness of WBCs in Jersey is measured by the numbers of farmland birds present at the sites and feeding from the crops. The development of the crops is also measured in relation to planting dates[*] in order to provide better advice to farmers participating in this scheme.

The research aimed to describe the following:

- Crop growth in relation to planting dates.
- Bird abundance and species using the WBCs.
- Differences in bird abundance between WBCs sites.
- Changes in bird presence at WBCs throughout the winter and especially in relation to crop management (*i.e*. flailing or ploughing).

[*] Kings Crops Seed Business Development Manager Mr Paul Brown (in litt.) "I think these are best planted between mid-May to early June. This will then give you seed right through the winter. Particularly Wildlife Winter Holding Cover that in Jersey could go into the 1st week of July. Wild Songbird Seed is an annual mix and is best sown in Mid May –earlier than WWHC."

1.4 Report outline

The structure of this report is similar to the 2014-15 WBC report. It refers to the clustered fields planted with WBCs as 'sites' and to target species as the birds that the WBCs are aimed at: any farmland related or dependant species that are of conservation concern in UK and Jersey. This year 14 different target species were recorded at the WBC sites during the surveys: Linnet, Skylark, Reed Bunting, Meadow Pipit, Greenfinch, Chaffinch, Goldfinch, Brambling, Bullfinch, House Sparrow, Stonechat, Song Thrush, Fieldfare and Redwing.

The present report is organized in a traditional layout of four blocks: introduction, methods, results and discussion. The Results chapter is split into overall results for crops and birds, and results at each of the 12 sites. The evaluation of each site presents information on the management of the crops and a breakdown of bird species and fluctuations of abundance throughout the winter, as well as a short discussion of its results and conclusions. The final chapter highlights the most relevant conclusions and recommendations.

It is worth noting that four of the six original sites planted in 2013 have been planted every winter since, therefore it would be possible to compare their results in this three-year period. Although the unplanted control site has not been surveyed since the first winter of the scheme (2013-14), its results are still used to be tested against the performance of the WBC sites for 2014-15 and 2015-16.

2. STUDY AREA AND METHODS

2.1 Study area

In 2015 a total of 48 fields with conservation crops at 12 different sites were monitored by BOTE. Of these, 44 fields had been planted with WBCs and the remaining four had barley stubble or a crop of mustard, which were also considered a food resource for farmland birds (Figure 1). The total area covered by BOTE conservation crops was 32.7ha (181.6vg), of which 29.3ha (162.9) were Winter Bird Crops.

The largest site (Sorel) comprised 12 fields and a total area of 7.75ha (43vg), whilst the smallest site (La Rocque) had just one field of 0.54ha (3vg). The field sizes varied between 0.34ha (1.89vg) and 1.76ha (9.78vg), with the average field size being 0.7ha (3.78vg) (Table 1).

Figure 3 Conservation sites with winter bird crops during winter 2015-16

Table 1 List of conservation sites with winter bird crops during winter 2015-16

Site Name	Parish	N Fields	Ha	Vergées	N farmers
Sorel	St John	12	6.01	33.39	2
St Mary	St Mary	2	0.75	4.17	1
Crabbe	St Mary	4	2.92	16.22	2
Câtel	St Mary	2	1.62	9	1
Les Landes	St Ouen	4	3.35	18.61	2
Pond	St Ouen & St Peter	9	7.76	43.11	3
St Brelade	St Brelade	4	2.57	14.28	1
La Coupe	St Martin	3	1.52	8.44	1
Rozel	Trinity	2	0.84	4.67	1
Sandpits	St Brelade	3	2.35	13.06	1
Grouville	Grouville	1	0.72	4	1
La Rocque	Grouville	1	0.54	3	1
TOTALS	**8 parishes**	**48**	**29.33**	**162.94**	**8**

Three different commercial varieties of winter bird crop were planted at the fields, depending on each farmer's preferences on the composition of the seed mixes. The main components were seed-bearing plants such as sunflower, quinoa and mustard, and cereals such as barley and millet (Table 2).

Table 2 Composition of the varieties of WBCs planted in 2014

Wild Songbird Seed (K51)	Wildlife Winter Holding Cover (K53)	Jersey Royal Songbird Mix (KJRSM)
Buckwheat	Buckwheat	Sunflower
Gold of pleasure	Coleor kale	Mustard
Red millet	Mustard	Gold of pleasure
Sandoval quinoa	Phacelia	Red millet
Spring triticale	Sandoval quinoa	White millet
Spring wheat	S&D (perennial chicory)	
Sunflower	Sunflower	
White millet	White millet	

Most of the fields were sown between mid-May and the end of June; however the complete period of planting spanned nine weeks, with the first bird crop planted on 25th May at Les Landes, and the last fields planted on 20th July at Sorel.

2.2 Methods

2.2.1 Crop management and development

Surveys of the crops started earlier than the bird surveys. Between June 2015 and March 2016 all 48 fields were checked monthly (between June-August) and fortnightly from September onwards, to coincide with the bird surveys.

Photographs of each field and height measurements were collected on a monthly basis. The measurements were taken on a randomly selected sunflower found two metres from the edge of the crop. Measurements were collected until the crop had stopped growing vertically and most of the plants had begun to dry out and fold. Information on the management of each field was also gathered, especially regarding the dates of planting, flailing and ploughing. Notes were taken regarding the development of each plant variety in the mix (flowering, seeding, collapsing).

2.2.2 Bird abundance and distribution

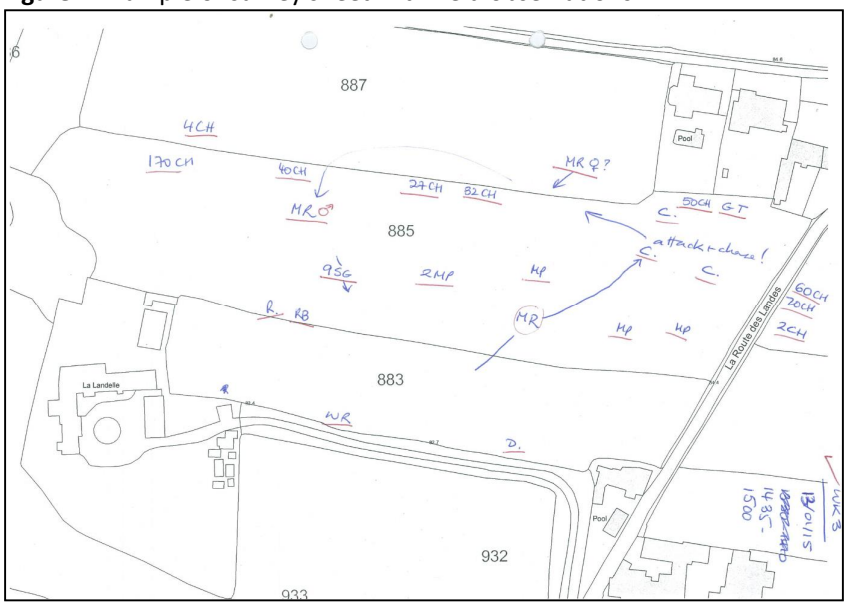
2.2.2.1 Data collection

Each conservation site was treated as a survey unit, adding up the birds counted across all the fields of each site. All sites were surveyed at least 16 times between the second week of September 2015 and the second week of April 2016, at a pace of one survey every other week. Each time, all sites were surveyed within the same week. The order in which the sites were surveyed was random. The surveys started anytime after one hour from sunrise and finished an hour before sunset, although most were completed within one hour after noon at the latest. Surveys had to be carried out on dry days and with good visibility, avoiding periods of rain or strong winds (Force 7 or above).

Each survey aimed to estimate the number of birds at each site. The methodology used was a modified version of the RSPB Volunteer & Farmer Alliance farmland surveys[6] and the BTO's Winter Bird Survey[7], with aspects similar to Wilson's *et al*. on their 1996 study[8]. In order to keep observer error constant the surveys were carried out in the same way each time: each site was walked following an established route that crossed all the fields planted with WBCs, and the observer aimed to see, hear or flush all the birds present. The route was reversed every other survey to avoid observer bias in data recording and to minimize any effects of time of day on the presence and detectability of birds.

The data recorded during the surveys included time and environmental conditions, bird species, abundance, location and activity. The observations were recorded on a map of the area (Image 4) using the abbreviated BTO species and standard activity codes, and later transferred to an Excel spreadsheet (see Appendices for BTO species codes).

Figure 4 Example of survey sheet with field observations



The observer took notes on all individual birds seen or heard. As stated in Wilson *et al.*[8], "this method relies on the observer's experience to assess when the count was complete, but it was considered to give more accuracy than a transect method or scan from the edge of the field because of the clumped distribution of many birds and great variation in the height of vegetation cover between fields. Moreover, it allowed counts of even the smaller passerines to be made." The possibility of double-counting birds that were flushed between fields could not be completely eliminated, but the observer accounted for birds moving between fields and resting in hedges or nearby trees.

The species that were included in the records were all those found on the Working List of the Birds of the Channel Islands[9] and migrants, except for any local species of seabird flying 50m or higher above the survey area.

2.2.2.2 Data analysis

The following data was calculated for each site:

a) The sum of all bird observations as well as the birds of target species.
b) The density of target birds per site: on average, during the peak period, and the maximum recorded.
c) A series of two-tailed T-tests between the data from each site and the 2013 control site.

3. RESULTS: COMBINED

3.1 Crop management and development

3.1.1 Results

There were nine weeks between the planting of the first field and the last. This span translated in some differences in the maximum heights and growth speed attained by the crops.

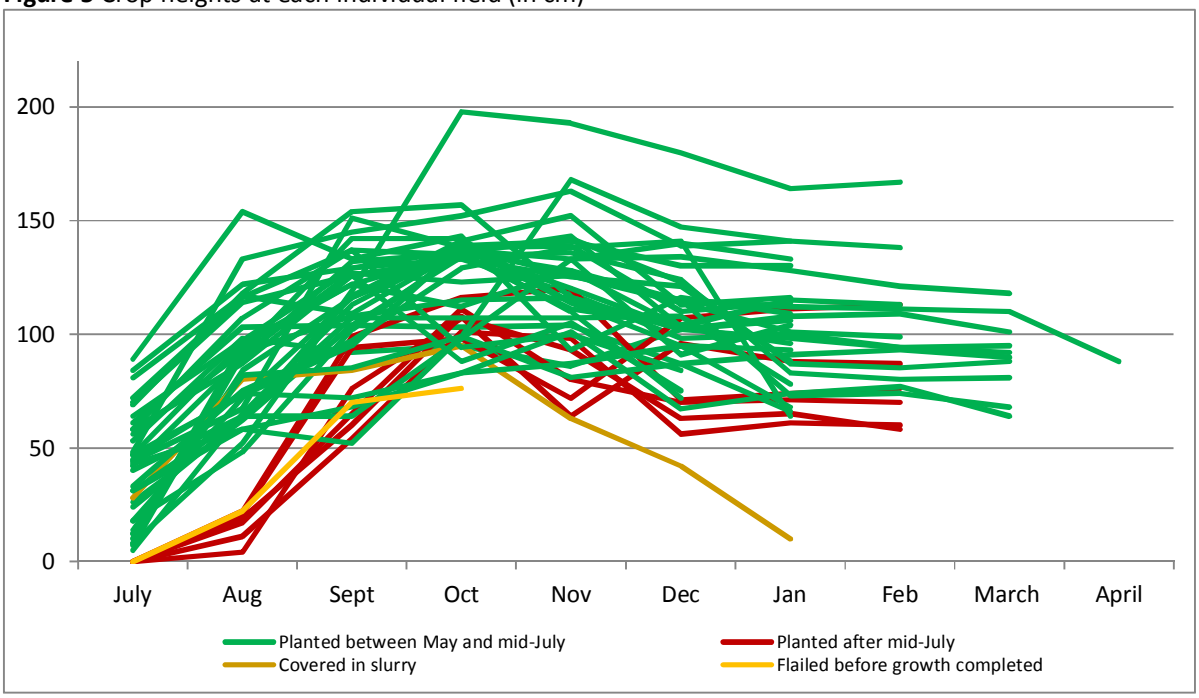
The maximum growth achieved by a crop was 198cm, higher than the winter crops planted in 2013[10] and 2014[5] (180cm) however the average maximum growth was similar to 2014's crops at 129.85cm (132.3cm in 2014-15). The crop with the poorest development reached a maximum height of 95cm, more than twice the 42cm of 2014-15 and almost a four-fold increase from 2013-14.

Figure 5 represents a height sample taken at each field throughout the winter. Two things can be noted from the figure:

a) Crops sowed between May and mid-July reached higher maximum heights in more fields than crops planted after mid-July.

b) Two fields from different sites did not achieve their potential growth due to external factors: one was covered in slurry in early December and the other was flailed in October.

Figure 5 Crop heights at each individual field (in cm)



Photos 1-4 illustrate the differences between a field planted on 4th June and one of the fields planted last, on 20th July.

Photos 1-4 Growth of fields planted at different times

Planted in early June 1 Month after sowing 	Maximum growth 
Planted in late July 1 Month after sowing 	Maximum growth 

3.1.2 Discussion

The majority of this season's crops developed within expectations and reached heights closer to the average the previous years. Whilst average height was similar to the previous year, there was less variation in individual heights, with more crops reaching maximum heights closer to the average maximum than in previous years. As an example, the shortest crop reached a maximum height twice the value of the previous year's shortest crop, placing it much closer to the average mark. A new maximum was reached this year, with the tallest crop of all fields reaching 198cm, making it 18cm taller than the previous year's overall maximum. The decrease in height variation from previous years is also reflected in the general aspect of the fields, even between fields planted first and last.

This increase in uniformity of the crops could be due to the fact that planting dates were closer to each other than in previous years: there was a gap of nine weeks between the first and the last field planted, as opposed to 11 weeks in 2014. During the first two years of this project a great variability in heights and seed development was observed, which was believed to be consequence of the disparity in the times of sowing - crops were planted as early as 25th April and as late as 1st of August. In order to maximize the benefits of the crops for the birds, farmers were advised to plant within the timing guidelines provided by the seed producer which is between mid-May and July.

Apart from the timing of sowing, another factor believed to play a role in the crop's development is the weather at the time of sowing. Based on the farmers' extensive experience, weather patters were accounted for when planning the sowing of the crops. Light rain after sowing would help the crop germinate, whereas dry weather with strong winds might scatter the seeds and hamper germination. This knowledge determined each farmer's final decision on planting dates, which were also kept within, or as close as possible, to the recommended guidelines.

As a side note of interest the crop that featured the tallest growth was found at a new site adjacent to Grouville Marsh. This crop not only provided the tallest sunflowers but also the largest that could be observed amongst all the winter bird crops. This exuberance of characters in the crop could be due to the particular soil at this site, its surroundings, east-facing aspect, weather at the time of sowing, the sowing date, or an optimal combination of various of these. As this field will be planted again for the next winter, the monitoring of its management and development might provide an insight to this matter.

3.1.3 Conclusions

- The crops that were sown between May and mid-July reached higher maximum heights in more fields than crops planted after mid-July.
- There was less variation of maximum heights between fields than previous years, with more values closer to the average mark. This could be due to the planting dates being closer in time as well as closer to the recommended planting times for these crops.

3.2 Bird abundance and distribution

3.2.1 Results

Species abundance

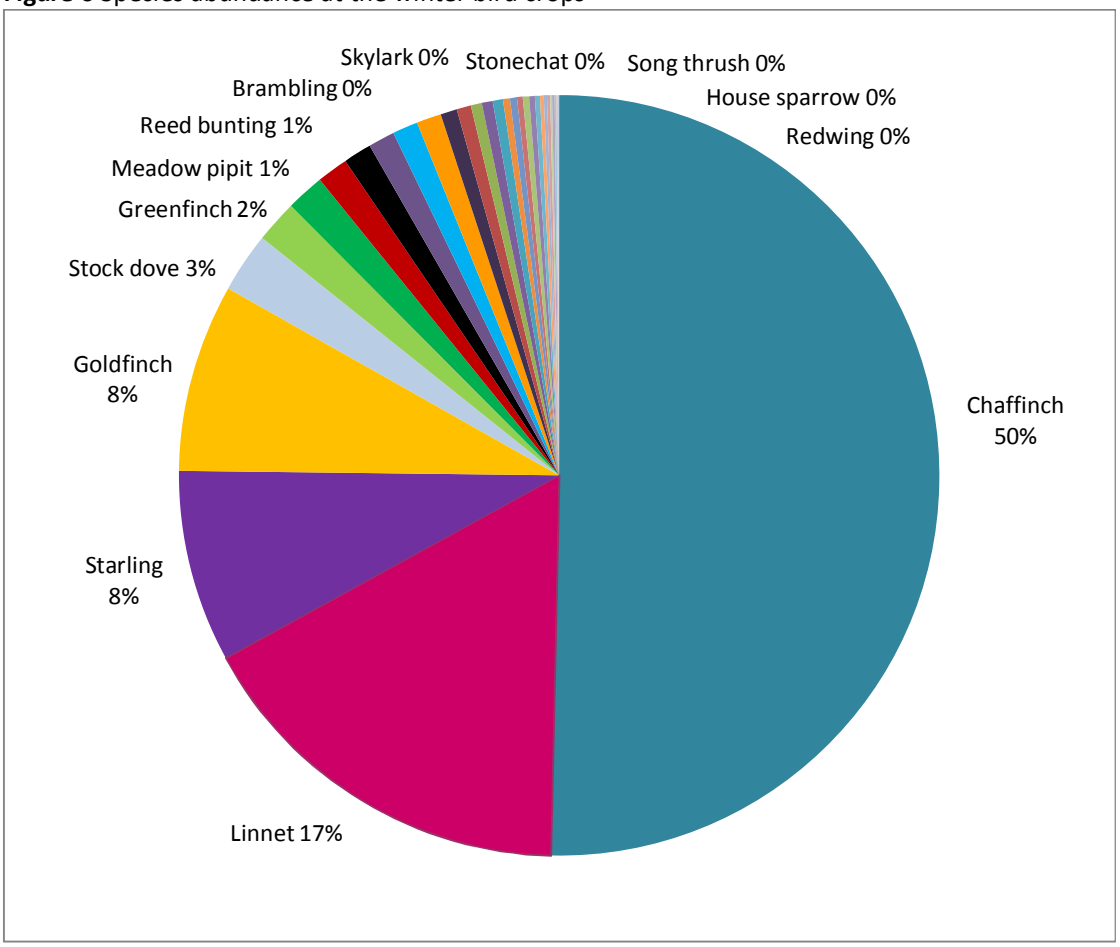
A total of 46,155 records of birds of 54 species were collected over the course of the sixteen surveys, of which 40,949 (88.72%) were of target species. A total of 14 target species were recorded at the winter bird crops.

The most abundant species recorded was Chaffinch (50.2%) followed by Linnet (16.6%) and Starling (8.1%). Seven out of the most abundant species were target species: Chaffinch, Linnet, Starling, Goldfinch, Greenfinch, Meadow pipit and Reed bunting (Table 3).

Table 3 Most abundant species at the WBC sites
(Target species in bold)

Ranking	Species	N (total)	% of total
1	**Chaffinch**	**23168**	**50.20**
2	**Linnet**	**7683**	**16.65**
3	**Starling**	**3759**	**8.14**
4	**Goldfinch**	**3674**	**7.96**
5	Stock Dove	1171	2.54
6	**Greenfinch**	**837**	**1.81**
7	Crow	750	1.62
8	**Meadow Pipit**	**609**	**1.32**
9	Dunnock	549	1.19
10	**Reed Bunting**	**524**	**1.14**
Other target species present			
18	**Brambling**	**140**	**0.30**
19	**Skylark**	**131**	**0.28**
21	**Song Thrush**	**116**	**0.25**
22	**Stonechat**	**115**	**0.25**
23	**Redwing**	**92**	**0.20**
24	**House Sparrow**	**75**	**0.16**
30	**Fieldfare**	**26**	**0.06**

Figure 6 Species abundance at the winter bird crops



Species distribution

The 12 sites attracted a variety of species in various degrees of abundance. La Rocque was the most successful site for target species, attracting 461.38 birds per hectare on average, whilst Câtel was the least successful and only attracted 31.87 birds/ha on average. In comparison, the control site on 2013, which was not planted with WBCs, had an average density of 0.06 birds/ha.

Table 4 Density of target species at the WBC sites (highest to lowest)

Rank	Site	Average Density at site (X/ha) before ploughing	Total N birds of Target Sp recorded	N Target Species
1	La Rocque	461.38	3509	13
2	Rozel	207.2	1361	6
3	Crabbe	146.38	5191	13
4	St Mary	123.90	1208	8
5	St Brelade	123.49	5936	11
6	Les Landes	118.03	3899	7
7	La Coupe	109.46	1405	9
8	Sorel	91.8	9988	13
9	Sandpits	69.6	1488	6
10	Pond	54.29	5989	13
11	Grouville	40.18	405	8
12	Câtel	31.87	570	7

A series of two-tailed T-tests (paired) were performed to compare the mean of each site against the control cluster from 2013. Each test compared total numbers of target species on each of the 12 original surveys from 2013 (with the survey dates as close as possible), with the assumption that the variance of each sample was equal to that of the control sample (Table 5).

Table 5 Results of T-tests between each site and the 2013 control

Ranking	Site	*p*-value
1	Les Landes	7.56E-06
2	Sorel	1.83E-05
3	La Rocque	0.000136
4	Pond	0.000392
5	Crabbe	0.000654
6	St Brelade	0.00096
7	Rozel	0.004989
8	Catel	0.006982
9	Sandpits	0.007301
10	La Coupe	0.018113
11	St Mary	0.036012
12	Grouville	0.047289

With a confidence level of 95% (p-value < 0.05), the results indicate a statistically significant difference between all sites and the control site. Values from Les Landes, Sorel and La Rocque appear to be most further away to the control site, whilst Grouville and St Mary were the closest, although still within the confidence intervals of a statistically significant difference.

Alongside their abundance, the distribution of birds also changed throughout the winter. Numbers at most sites were at their highest for a period of 2-4 weeks, within a period between mid November and late January. Some sites also showed a second spike, albeit of smaller numbers, towards the end of winter (February and March).

Figures 7 and 8 represent changes in abundance across the different sites, as well as changes in distribution as crops were flailed and ploughed to prepare the fields for the potato season.

Figure 7 Distribution of target species at all the sites over the winter 2015-16

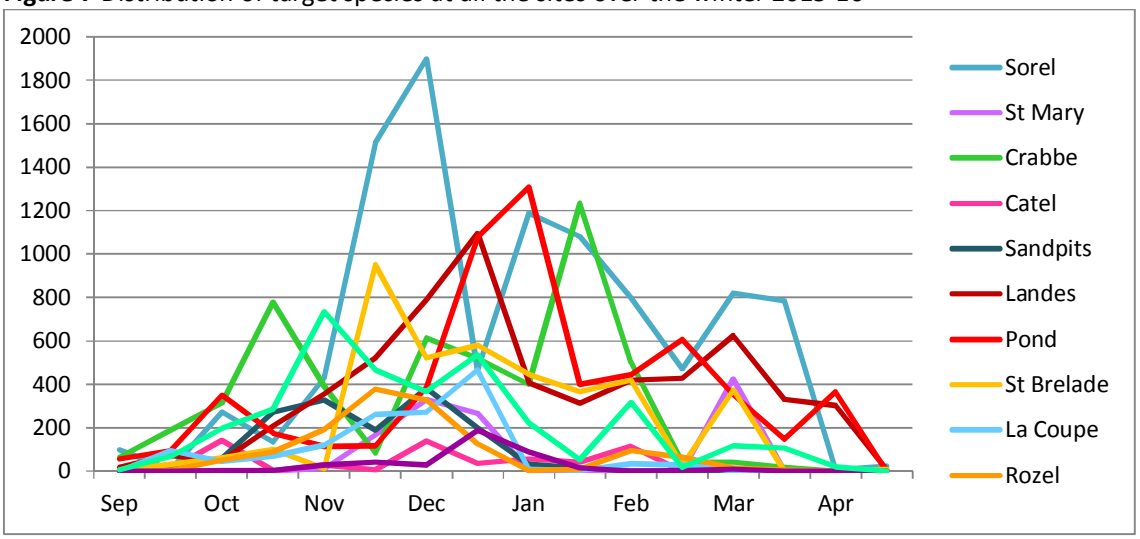
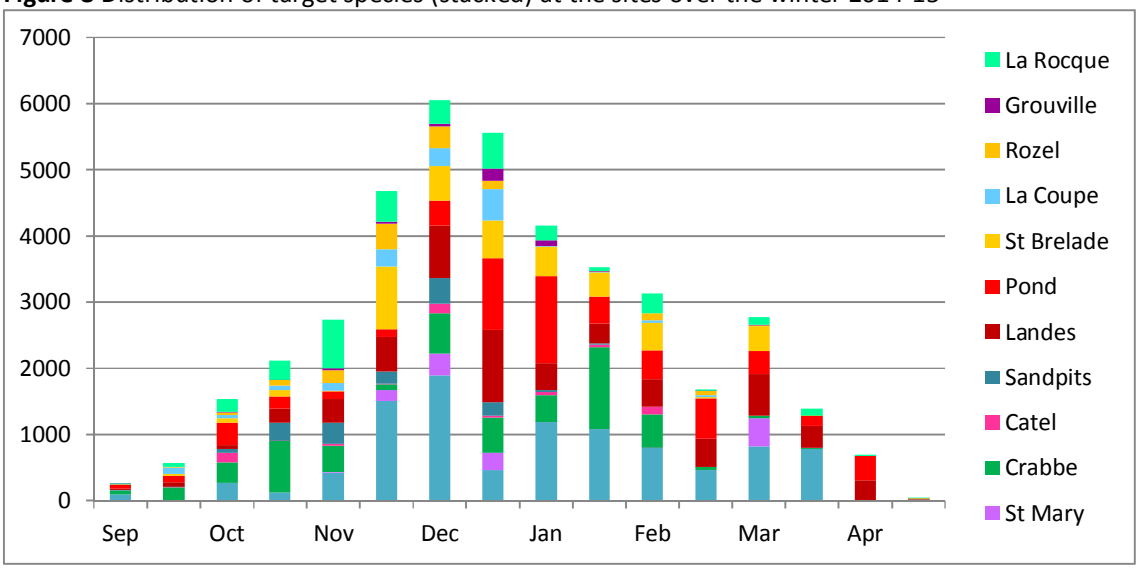


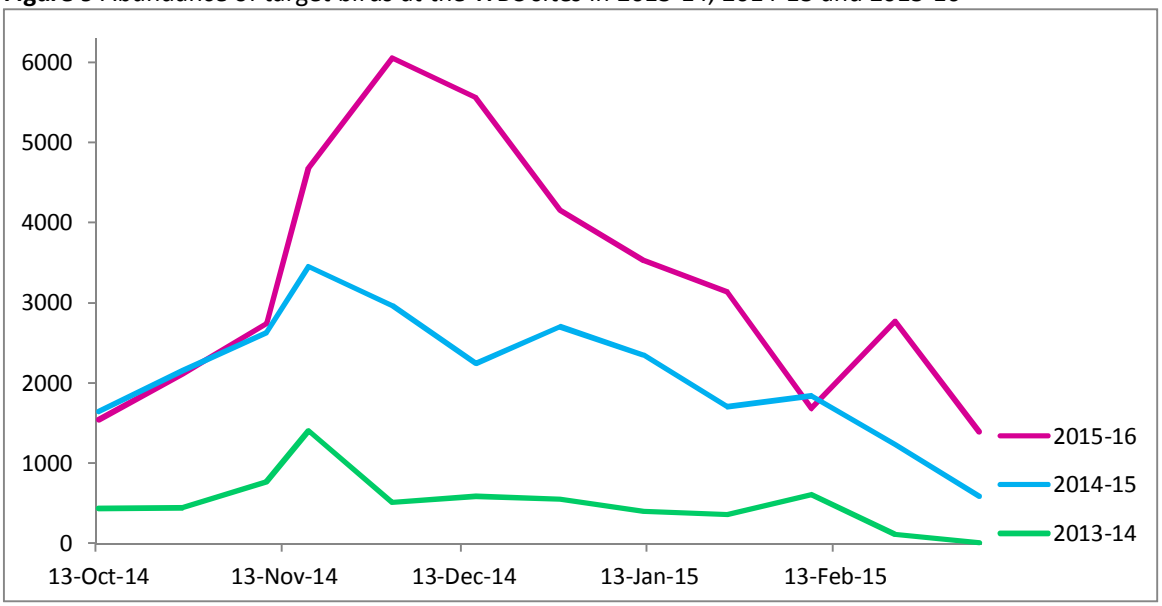
Figure 8 Distribution of target species (stacked) at the sites over the winter 2014-15



In relation to the previous two winters, net numbers of birds increased by 13,874 compared to 2014-15 (54% increase) and by 33,177 compared to 2013-14 (534% increase), with an increase in overall density of target species birds of 39% and 140% (against 2014-15 and 2013-14 respectively). These comparisons apply only to density of birds target species as averaged for the same 12 surveys each year.

The abundance trend over the 2015-16 winter was similar to the two previous years, albeit with higher numbers of birds (Figure 9). The added numbers of birds from target species shows the same peaks of abundance emerging mid-November with numbers after December and reaching their lowest towards the end of February. Birds in the winter of 2015-16 showed a small increase in numbers towards the end of February, two weeks later than increases noted in the two previous winters.

Figure 9 Abundance of target birds at the WBC sites in 2013-14, 2014-15 and 2015-16



3.2.2 Discussion

Species abundance

A large percentage of total bird observations belonged to target species (88.7%), and to this positive result it can be added the fact that within the ten most abundant species seven of them were target species too. To the top three most abundant birds, Chaffinch, Linnet and Starling, which are the same as the previous winter, another species joins them in fourth place: the Goldfinch, which was observed in large numbers across the Island during the summer and autumn of 2014. The other target species in the most abundant ten are greenfinch, meadow pipit and reed bunting.

The three non-target species that made it onto the top ten are stock dove, crow and dunnock.

The net increase of 54% of target birds from the previous winter could be attributed to the increase in planted area, which was up by 3.2Ha in total. If this was the only reason for the increase in bird numbers the densities would stay similar; however there was an increase of 39% more birds per hectare in relation to the previous winter. This suggests other factors might have a role on the increase in bird numbers.

In previous years it has been suggested that an increase in birds could reflect a good breeding season for some species and that an increase in net area planted with WBCs can sustain proportionally larger numbers of birds.

Other factors contributing to the increase in numbers are proposed below:

a) Improved management of the scheme: after three years planning and examining results of crops, growth, farmers work and birds utilization, the scheme is continually adapting by feeding information into next year's crops. Some of the ways this feedback steers the scheme is by example when increasing the planted area at successful sites, removing fields from sites with less success, trialling fields at new sites, and trialling a variety of crop mixes.

b) The antiquity of some sites, with three being planted over the last three winters and one (La Rocque) been planted for over 10 years by initiative of the farmer.

c) Bird numbers on the increase. If the winter bird crops were having a positive effect on farmland birds by reducing their winter mortality, their breeding populations might stop decreasing or even start increasing, which would translate in a steady increase of numbers at the winter crops.

This results were obtained from data from the 12 surveys that were common across the three winters, and bird density was averaged throughout, including from the surveys after the fields had been ploughed. If data only from before ploughing could be analysed for all sites over the past three winters, the comparison of densities might even be more revealing.

Species distribution

A new site which was added to this year's scheme, La Rocque, had the highest density of birds amongst all the sites, followed by Rozel and Crabbé, which was last winter's most successful. The success of La Rocque, with only one field, is most likely due to the fact that is has been planted with WBCs for the past six years at least, on a conservation project led by the farm that rents it. Only this current year it was included in the BOTE winter bird food and monitoring scheme. This explanation could also support the idea that replanting productive sites every winter might cement their success and lead to increases in numbers in the long-term.

La Rocque's high density of birds was probably due to a great crop which developed many seeds at the optimal time, as well as the fact that only one out of two planted fields was considered for data analysis. The second field was flailed too early in the season to be of any benefit for the birds, - this happened the previous winter as well, but unlike the previous winter's analysis, its area was not accounted for this time for density purposes.

Two well-established sites, Crabbé and St Mary, had similar densities than the two following sites, Les Landes and St Brelade, which are on their second year of planting. Crabbé had a new field added to the site and St Mary was shifted with two new fields replacing two original fields. Les Landes again was a site that remained effective late in the season and attracted many birds that might have been displaced from ploughed sites.

The largest site, Sorel, has never shown the highest density of birds, and was found on the 8th position out of the 12 sites. Sorel has great potential for bird conservation in the long term, but in 2015 still lacked mature hedgerows and buffer strips.

All sites were statistically different from the control site monitored in 2013, when comparing data from the 12 surveys that were replicated each winter. The sites showing largest difference with the control site were not the sites with the highest densities: Les Landes and Sorel.

Grouville, a new site which, with only one field, provided the largest and tallest sunflowers, was not used by as many birds as it was hoped, falling second to last in the density score and last in the t-test score against the control site.

When adding the birds from all the sites at each survey, a pattern emerged of spikes and decreases in abundance, similar to that of previous years. This pattern might be reflecting seasonal movements of birds, first arriving to the Island and later leaving during the spring migration. Although a graph constructed to present density comparisons between the years would offer a more balanced view, the graph comparing totals still shows the general patterns through the winters.

Drawing conclusions on each site's success based on comparisons with the other sites was difficult, mainly due to the wide variety in sizes, locations, management regimes, crops planted, types and quality of boundaries, number of fields, size and shape of fields, and overall position and shape of site, as some sites feature fields clustered together whilst others are composed by fields that are apart from each other.

3.2.3 Conclusions

- The WBCs provide a food source for farmland birds during the winter. This is inferred by the large numbers of birds of target species observed feeding at the crops, with eventual declines in numbers - sometimes dramatic – when the crops were ploughed.

- The density of birds at the crops this winter was higher than the previous winter, and much higher than two winters before, at the start of the scheme. This could be due to a net increase in planted area, as well as an improvement on crop management by the farmers involved, the prioritisation of successful sites and the birds learning to exploit the scheme. This might involve the birds getting to the crops earlier or quicker as they might remember the locations of the sites.

- The increase in bird density may also be a result of bird numbers increasing in the populations that use the crops. The purpose of the WBCs is to reduce winter mortality, therefore if more birds would survive the winter it would follow that populations would start to recover in their breeding grounds. It is far too early to say whether the WBCs are having a positive effect on the species and populations that use them; a study on their migration, survival and breeding success might be needed to find that out.

- Aside from differences in crop quality, it is difficult to determine what makes one site more successful than another, due to the wide ranges of sizes, shapes, locations and managements. Present recommendations for each site are necessarily based on their performance over a two or three year-period at most, and have a large trial-and-error component.

- In order to provide food for the longest period of time, it is recommended to plant a selection of different types of conservation crops, and with different management regimes. This would create a staggered disappearance of the crops when they are ploughed, thus allowing birds to relocate to sites that would be still standing. From a commercial point of view, a large number of fields available at each site would allow each farm to rotate fields with WBCs within a site.

4. RESULTS: PER SITE

4.1 SOREL

4.1.1 Description

This site is located in the north coast of Jersey, between Sorel Point and Devil's Hole, in the parish of St John. Most of its fields belong to the National Trust for Jersey (NTJ) and have been planted with winter bird crops since 2011, thanks to an agreement with the main tenant, a farm that grows early potatoes. This area was proposed formally by BOTE as a winter bird crop site by in 2013[11] and since then a variety of habitat management has been carried out, mainly to restore hedges and field boundaries.

In 2013 a total of eight fields were planted with WBCs. The crops achieved positive results[10] and it was recommended that the site should be planted with the crops again. In the same winter a supplementary feeding operation was carried out at the site, with 20-40kg of bird food being put down twice a week between Jan and April 2014[12]. In 2014 twelve fields covering 7.46ha (41.5vg) were planted with WBCs, making it the largest site of WBCs for the second year running. Some crops did not develop to their full potential and this was attributed to the planting date. Some fields were also partially flailed or had wide margins flailed around them early in the winter, but despite these setbacks, the site performed well overall[5]. Supplementary feeding was carried out between January and March 2015 at a rate of 40kg of food per week.

4.1.2 Crops

In 2015 ten fields, covering a total of 6.01ha (33.4vg) were planted with WBCs, while two other fields were left in barley stubble, adding 1.74ha of conservation crop to the site. Four of the fields were planted on 1st June, whilst the rest were planted seven weeks later, between 17-20th July.

Figure 10 Fields planted with WBCs at Sorel in 2015 (map removed)

Photos 5-6 A field planted on the 1st June in development (left) and drying out (right)

Photos 7-8 A field planted on the 20th July in development (left) and drying out (right)

4.1.3 Birds

A total of 11,049 birds were recorded over 16 surveys, carried out between the 2nd week of September 2015 and the 2nd week of April 2016. Of these, 9,988 (90.4%) belonged to target species, with 13 different ones recorded at the site. The five most abundant species were all target species: Linnet, Chaffinch, Starling, Goldfinch and Meadow Pipit, whilst the least abundant were Brambling, Reed Bunting and Fieldfare (Table 6).

Table 6 Abundance of target species (in bold) recorded at Sorel

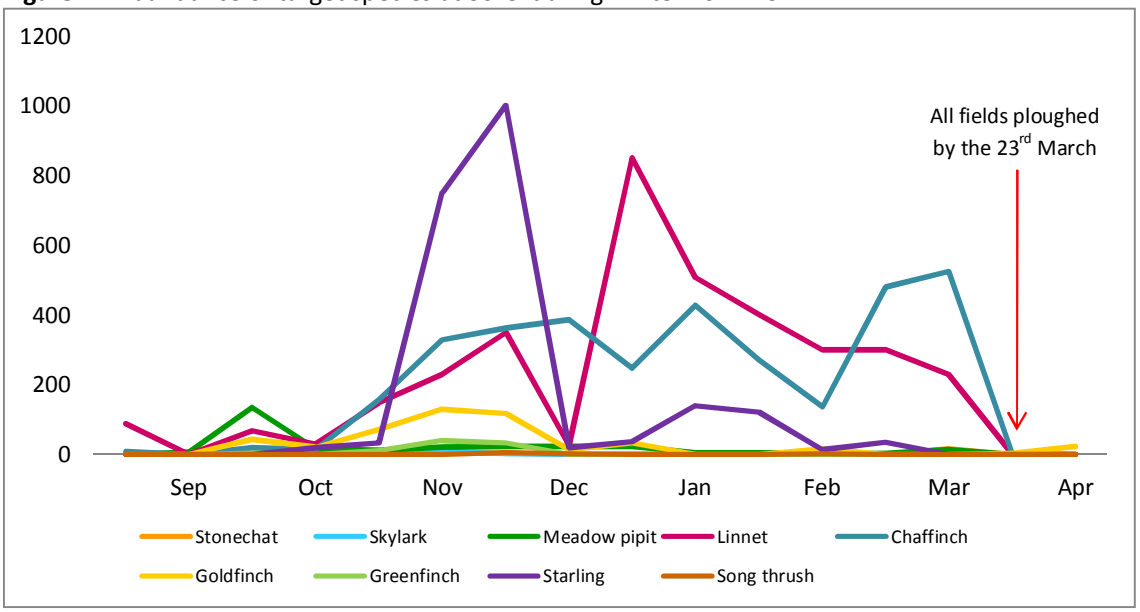
Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Linnet**	3524	*31.9 %*	220.25	850	28.42
2	**Chaffinch**	3362	*30.4 %*	210.13	480	27.11
3	**Starling**	2163	*19.6 %*	135.19	1000	17.44
4	**Goldfinch**	471	*4.3 %*	29.44	130	3.80
5	**Meadow Pipit**	284	*2.6 %*	17.75	135	2.29
6	Crow	208	*1.9 %*	13.00	67	1.68
7	Stock Dove	208	*1.9 %*	13.00	138	1.68
8	Dunnock	116	*1.0 %*	7.25	27	0.94
9	Robin	92	*0.8 %*	5.75	26	0.74
10	Wood Pigeon	86	*0.8 %*	5.38	29	0.69
Other target species present						
11	**Greenfinch**	85	*0.8 %*	5.31	40	0.69
14	**Stonechat**	36	*0.3 %*	2.25	16	0.29
15	**Redwing**	34	*0.3 %*	2.13	34	0.27
18	**Skylark**	17	*0.2 %*	1.06	11	0.14
21	**Song Thrush**	8	*0.1 %*	0.50	5	0.06
25	**Brambling**	2	*0.0 %*	0.13	2	0.02
26	**Reed Bunting**	1	*0.0 %*	0.06	1	0.01
26	**Fieldfare**	1	*0.0 %*	0.06	1	0.01

The density of target species was 91.8 birds/ha on average before most of the fields were ploughed. This figure dropped to 1.8 after ploughing, representing a decrease of 98%. The average density across all surveys was 80.5/ha (*n*=16), which compared to 2014-15 at 40.1/ha (*n*=12) means an increase of just under 50%.

The T-test against the unplanted control site from 2013 produced similar results as the two previous years, indicating a significant difference between birds' presence at the Sorel compared to the control site.

Bird numbers started increasing at the beginning of October, with Linnet and Chaffinch remaining higher than other species. Linnets in particular were found in one or two large flocks that fed and flew together, whereas Chaffinches were found is smaller numbers scattered across various features throughout the site. A large flock of starlings moved in the area for a few weeks and then disappeared all of a sudden. A particular survey in December found very low numbers of various species; it is not known the cause for this but it could be attributed to a random event that caused disturbance shortly before or during the survey, such as the weather or the activities of a predator. The two main representatives of the target species benefitting from the site decreased abruptly as soon as the fields were ploughed between 10th and 23rd March 2016 (Figure 11).

Figure 11 Abundance of target species at Sorel during winter 2014-15



The observations carried out during the surveys revealed that most of the birds were feeding regularly from the same group of fields at the eastern end of the site (fields J16, J20, J20 and J21). There were large mixed flocks feeding regularly at J16, which developed a high number of well-developed sunflowers. The other three fields did not develop as well as J16, but the high numbers of birds could be explained by the good quality of their hedgerows, which are tall and thick – there are none elsewhere in the site. These hedgerows are where

the supplementary food was also placed during the feeding operation, which could also explain the concentration of birds in that area.

Interesting observations revealed local movements of birds within the site which were thought to be a response from changes in weather patters; a particular day with strong easterly winds found high numbers of birds in fields J9 and J14, which are not usually very popular (but are found on the westerly edge of the site) with most Linnets scattered across the site, as opposed to gathered in one large flock as per usual observations.

4.1.4 Discussion

This is a site which never fails to attract the species which this project is aimed for, in particular Linnets, which gather in large flocks when feeding on the crops. The number of target species increased from 11 to a record 13, which was the maximum for any site, five of them taking the spots for the most abundant bird species at the site.

An improved planting schedule, with most fields sown within the recommended dates, produced the best crops to date. This was especially true for the National Trust for Jersey fields, which in previous years had failed to produce mature crops, a problem attributed to their late planting.

The relatively low density of birds at this site, compared to much smaller sites, has been previously attributed to the lack of mature hedgerows in most of the NTJ fields – which were planted four years ago and are still quite short. However, this winter the density has increased by 50%, when the previous year it had not increased but fallen slightly below the first winter's mark.

This positive result might be a response to the quality of the site increasing, with an overall better management of the resources, crops planted on better-placed fields, improvement on the timing of sowing, and perhaps even better weather conditions throughout the summer and autumn. The supplementary feeding operation was also carried out more efficiently, having had two previous years of experience to feedback into the management. The food was placed alongside the boundaries of fields at the eastern edge of the site, which feature tall and thick hedges surrounding the winter bird crops. This feeding operation might account for a portion of the birds' abundance which is attributed to the winter bird crops, and the fact that flocks of finches were feeding directly from the grain suggests that it fulfils its role of providing food during this 'hungry gap'.

4.1.5 Recommendations

- A combination of favourable features such as NTJ available land, set-aside, some hedges of good quality, a large area of planted crops, the majority of WBC fields sharing boundaries and adjacent habitats undergoing restoration (coastal grassland, gorse, heathland and woodland), together with the encouraging results of a 50% increase in bird density, makes this site very suitable for this type of conservation measures, if not the most suitable in the whole of the Island at present. It is, therefore, strongly recommended that the WBC planting scheme is continued and that at least the same fields are planted again next winter.

- In order to allow this site to fulfil its potential, it is recommended that the WBC planting scheme is extended until at least the hedgerows planted in the boundaries of NTJ fields have developed enough height and thickness to allow birds to use them.

- It is also recommended that further enhancement measures are implemented at this site, such as buffer strips, uncultivated headlands, variety in crop rotation, and crops for breeding birds on set aside land.

4.2 ST MARY

4.2.1 Description

This site is located in the north coast of Jersey, between Crabbé and La Mare Vineyard, in the parish of St Mary. It is comprised by three fields managed by two different potato farms. This area was proposed as a WBC site by BOTE in 2013, and the three fields were planted with WBCs in 2013 and again in 2014, both years achieving positive results REF.

4.2.2 Crops

In 2015 one field from the original three was planted again with WBCs early in July, with a new two fields added to the site. The total combined area was 0.75ha (4.17vg).

Figure 12 Fields planted with WBCs at St Mary in 2015 (map removed)

All the crops in the fields of this site developed good heights and mature seeds with a complete representation of the plants in the mixes, offering a large source of good-quality bird food.

Photos 9-11 One of the fields in late July, October and December

All the fields had been ploughed or covered in plastic by 23-26th February 2016.

4.2.3 Birds

A total of 1,318 birds were recorded over the 16 surveys between September 2015 and April 2016, of which 1,208 were of target species (91.6%). The five most abundant species were also target species: Chaffinch (34.2%), Linnet (29.3%), Starling (12%), Goldfinch (12%) and Greenfinch (3.4%). Only three other target species were recorded at the site: Stonechat, Meadow Pipit and Fieldfare (Table 7).

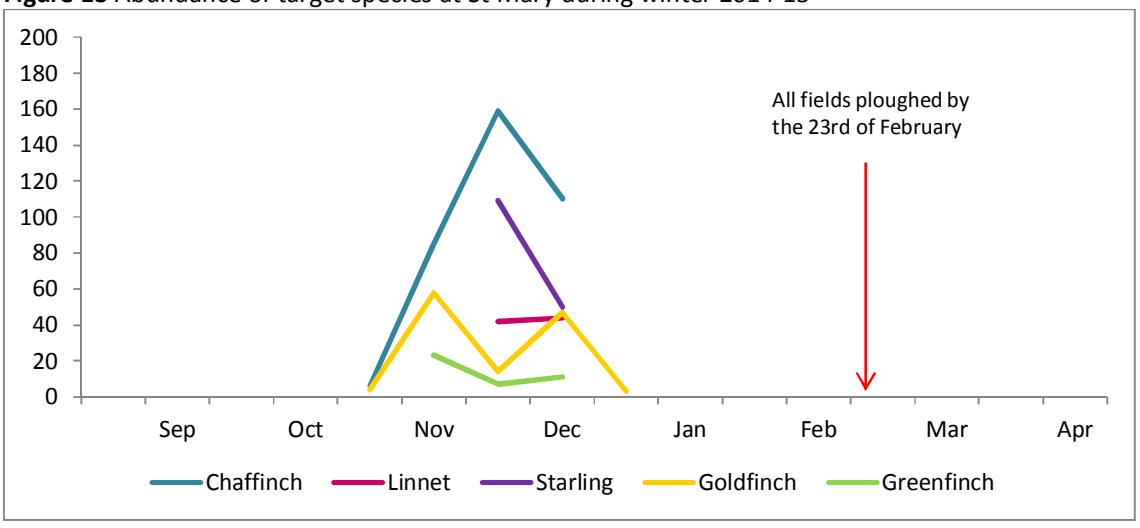
Table 7 Abundance of target species (in bold) recorded at Sorel

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	451	*34.22*	28.19	159	17.51
2	**Linnet**	386	*29.29*	24.13	300	14.98
3	**Starling**	159	*12.06*	9.94	109	6.17
4	**Goldfinch**	158	*11.99*	9.88	58	6.13
5	**Greenfinch**	45	*3.41*	2.81	23	1.75
6	Robin	27	*2.05*	1.69	7	1.05
7	Wren	17	*1.29*	1.06	3	0.66
8	Crow	13	*0.99*	0.81	13	0.50
8	Lapwing	13	*0.99*	0.81	13	0.50
9	Dunnock	12	*0.91*	0.75	2	0.47
10	Stock Dove	7	*0.53*	0.44	7	0.27
Other target species present						
12	**Stonechat**	4	*0.30*	0.25	2	0.16
12	**Meadow Pipit**	4	*0.30*	0.25	3	0.16
15	**Fieldfare**	1	*0.08*	0.06	1	0.04

The number of birds was small and observations revealed that most were coming to feed from the road side of the fields with a few shrubs by the road, the only hedge available. Also, on the other side of the road fallow fields and scruffy farmland where large numbers of birds were seen commuting back and fro.

Birds were also observed flying towards the west where the site of Crabbé (300m away) had four large fields, and is the most successful site overall. Sometimes numbers seemed to increase when they were low at Crabbé, suggesting sites share some of the birds.

Figure 13 Abundance of target species at St Mary during winter 2014-15



The average density of target species was 123.9 birds/ha, before the fields were ploughed. With no birds recorded after the ploughing, the decrease in numbers was absolute (100%). However, it is worth noting that bird numbers at the site had already declined steeply before the fields were ploughed or even flailed. The average density across all surveys was 100.67/ha (*n*=16), which compared to 2014-15 at 153/ha (*n*=12) shows a decrease of 34,2%.

The T-test against the unplanted control site from 2013 produced similar results as the two previous years, indicating a significant difference between birds' presence at St Mary and the control site.

4.2.4 Discussion

Although this site has lost some density of birds compared to the previous year it still stands in fourth place amongst the twelve sites. Despite its lack of hedges around the planted fields, many birds were seen using the shrubs on the other side of the road to perch between feeds, as well as feeding on nearby stubble fields and fallow land.

The continuous success of this small site may reflect the value of its antiquity (it is on its third winter with WBC), as well as its proximity to Crabbé, which is one of the most successful sites. It is in believed that many birds travel between sites, making difficult to analyse the success of either site on its own. The change of two fields previously planted by two new ones might have also increased the feeding opportunities for the birds. One of the fields is found adjacent to the road with suitable shrubs, whilst the other is at a distance, adjacent to the cliff path and framed by thick coastal shrubs.

4.2.5 Recommendations

- This site obtained positive results and it is recommended that is planted again with winter bird crops, either at the same fields or on fields covering a similar area size.
- Due to its proximity to the site of Crabbé it is recommended that both sites are managed and monitored as one. We believe that this would help towards making the data from the surveys more representative of the real numbers of birds using the area.

4.3 CRABBÉ

4.3.1 Description

This site is located in the north coast of Jersey, between Crabbé and the St Mary's Vineyard. It was proposed as a conservation site by BOTE in 2013 and three fields were planted that same year. For the two winters that the site has been planted it has achieved very positive results[4,5]. Supplementary feeding was also carried out in 2014, with 40kg of bird food put down weekly for the last few weeks of winter[12]. At the initiative of a local farmer, and under advice from BOTE, a line of hedgerow was planted during the winter of 2014-15 on the opposite side of the adjacent road.

Fields adjacent to WBC are usually planted with barley and left in stubble or grazed by cows and sheep. This provides a variety of heights and feeding opportunities for types of birds which prefer to feed on shorter crops and sparse vegetation, such as larks and waders.

4.3.2 Crops

In 2015 the same three fields plus a new one, between them and the cliffpath, were planted with WBCs. This was considered a positive addition as Reed Buntings and Stonechats had been observed on the boundaries of this field during previous winters. The total area of WBCs planted in 2015 at this site was 2.92ha (16.22vg). The first field was planted on the first week of June whilst the other three were planted on 30th June.

Figure 14 Fields planted with WBCs at Crabbé in 2015 (map removed)

Very like the two previous winters, these fields developed tall and thick crops, a variety of plant species and an abundance of seeds and grains. The crop K53 planted in field My312 developed particularly well, producing very large and tall kale (variety 'Coleor kale') as well as mustard, sunflowers and phacelia. The fact that fields adjacent and nearby were planted with barley or grazed by cows enhanced the feeding opportunities for a wider variety of bird species.

Photos 12-13 Field My312 in August (left) and November (right)

All the fields were flailed and ploughed in February, and were covered in plastic by 23rd of the same month. This winter there was no supplementary feeding operation carried out at this site.

4.3.3 Birds

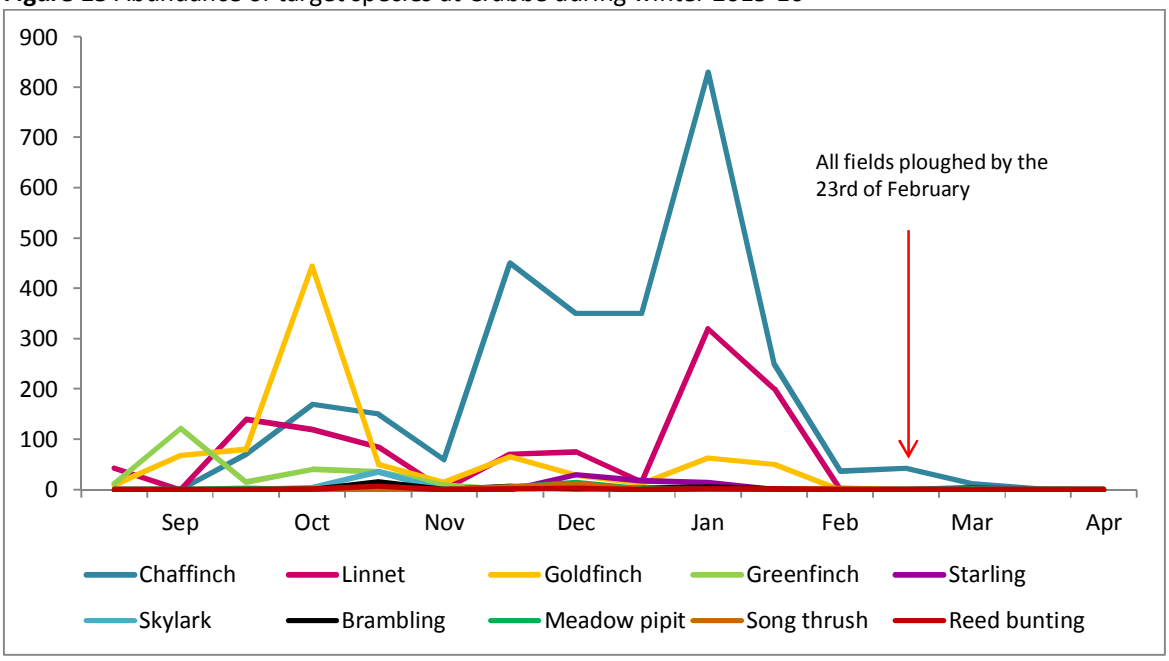
A total of 5,469 birds were recorded in total over the 16 surveys, of which 5,191 were target species (94.9%). The most abundant species was the Chaffinch with just over 50% of the records, followed by Linnet with 19% and Goldfinch with 16% of the totals. Five target species took the five top spots and two more were within the top ten most abundant (Table 8). A total of 13 target species were recorded at the site, which is also the maximum at any site in the history of this project.

Table 8 Abundance of target species (in bold) recorded at Crabbé

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	2773	50.70	173.31	830	59.35
2	**Linnet**	1067	19.51	66.69	320	22.84
3	**Goldfinch**	883	16.15	55.19	445	18.90
4	**Greenfinch**	236	4.32	14.75	122	5.05
5	**Starling**	65	1.19	4.06	29	1.39
6	Robin	45	0.82	2.81	16	0.96
7	**Skylark**	44	0.80	2.75	35	0.94
8	Crow	41	0.75	2.56	18	0.88
9	**Brambling**	34	0.62	2.13	15	0.73
10	Wren	31	0.57	1.94	8	0.66
10	Dunnock	31	0.57	1.94	13	0.66
Other target species present						
11	**Meadow Pipit**	27	0.49	1.69	14	0.58
14	**Song Thrush**	19	0.35	1.19	11	0.41
15	**Reed Bunting**	16	0.29	1.00	7	0.34
16	**Stonechat**	15	0.27	0.94	6	0.32
21	**Fieldfare**	6	0.11	0.38	4	0.13
21	**Redwing**	6	0.11	0.38	6	0.13

This site had the third highest density of all sites, with 146.4 birds/ha, dropping from the 233.5birds/ha of the previous winter, which was the highest density of all sites. The T-test against the unplanted control site from 2013 indicated a statistical difference between it and the control, which has been maintained since 2013.

Figure 15 Abundance of target species at Crabbé during winter 2015-16



Like at other sites, the larger numbers of Chaffinch and Linnet were observed between mid-November and the end of January. There were notable increases of Greenfinch and Goldfinch at certain times, whilst the other target species had a steady representation in low numbers throughout the winter. On a particular survey it was noticed that the numbers were very low in contrast to high numbers of birds at the next site of St Mary, which reinforced the believe that both sites share the same birds due to their proximity (300m in a direct line).

Birds were observed accessing the crops from the shrubs alongside the road and the tall trees between two of the fields. They were found mostly on the three fields by the road, the same ones that have been planted the previous two winters. As these fields became depleted of resources the birds were found more often on the new field at the back, which also has some trees and shrubs on both sides and the back, towards the coastal footpath.

Whilst no migrant raptors such as Merlin or Hen Harrier were seen this year, it was common to find other raptors, probably local breeders such as Kestrel, Common Buzzard and Marsh Harrier, patrolling the area, quartering the conservation fields or flying alongside the hedges.

With a total of 40 species recorded this was the most diverse of all sites. Unlike the previous year, no Serin or Little Bunting were detected, but a Richard's Pipit and an unconfirmed sighting of a Cirl Bunting were the highlights for rarities.

4.3.4 Discussion

Crabbé has been a very successful site from the beginning of the scheme. With a maximum number of target species as well as overall diversity, high density of birds and well-developed crops, this site is believed to be one of the most productive of the scheme. The figures and analysis also confirm the observations of large flocks feeding at the site and the variety of species recorded.

However, this winter saw a decrease of density from the previous year. It is too early to know if this is the beginning of a trend or just an adjustment to the increase of planted area. It is also possible that this is related to the increase in numbers at the site in close proximity, St Mary, which improved dramatically in numbers and density.

Apart from one line of tall trees and a few shrubs in the corners or the new field, this area does not have much in terms of good quality hedges. Despite this, its crops are successful in attracting and feeding large numbers of farmland birds. Other types of birds in the vicinity of this site include Skylark, Lapwing and various raptors – probably found in the area thanks to the variety of land use such as barley stubbles, grazed pastures and fallow fields.

4.3.5 Recommendations

- To continue planting and monitoring this site for the foreseeable future.
- To combine the management and monitoring of this site with St Mary as one single site.
- To restore the boundaries of the fields with newly-planted hedgerows and investigate the possibility of set-aside land that can be left in WBC until the spring.
- To set up a supplementary feeding track or station at the site in a manner that can be easily managed and monitored.

4.4 CÂTEL

4.4.1 Description

This site is located in the north coast of Jersey, between Grève de Lecq and the Crabbé shooting range. A long and narrow parcel of scrub and green waste runs between fields and features bramble, gorse and hawthorn. The fields have no hedges but there is a lone of tall trees on the road adjacent to the shooting range. This area was proposed as a conservation site by BOTE in 2013[4] with three fields being planted with WBCs in 2013 and again in 2014.

Crops at this site consistently failed to develop as well as in other sites, and have never attracted large numbers of birds in a consistent manner. The management of this block of land, under the tenancy of one farm, was usually on the early side of both planting WBC and also removing them early in the winter. In 2014 it was recommended that this site was either planted again or, alternatively, planted with a seed-producing crop of a lesser value but of equal suitability for the farmer.

4.4.2 Crops

In 2015, in agreement with the farmer, a crop of mustard was planted on two fields at the site, covering 1.62ha (9vg). The rest of the site was planted with a grass crop.

Figure 16 Fields planted with mustard at Câtel in 2015 (map removed)

The mustard crop was planted during the third week of May and was left to develop fully and dry out, making the seeds accessible for birds. All the fields were flailed by 8th February and covered by plastic by 26th of the same month.

Photo 14 A mustard field in November 2015

4.4.3 Birds

This winter's records produced 766 observations of which 570 (74.4%) were of target species. Only six target species were recorded at the site, nevertheless they took the three top spots in abundance, with the Linnet accounting for 35% of all the records, Chaffinch the 20% and the Meadow Pipit 14%.

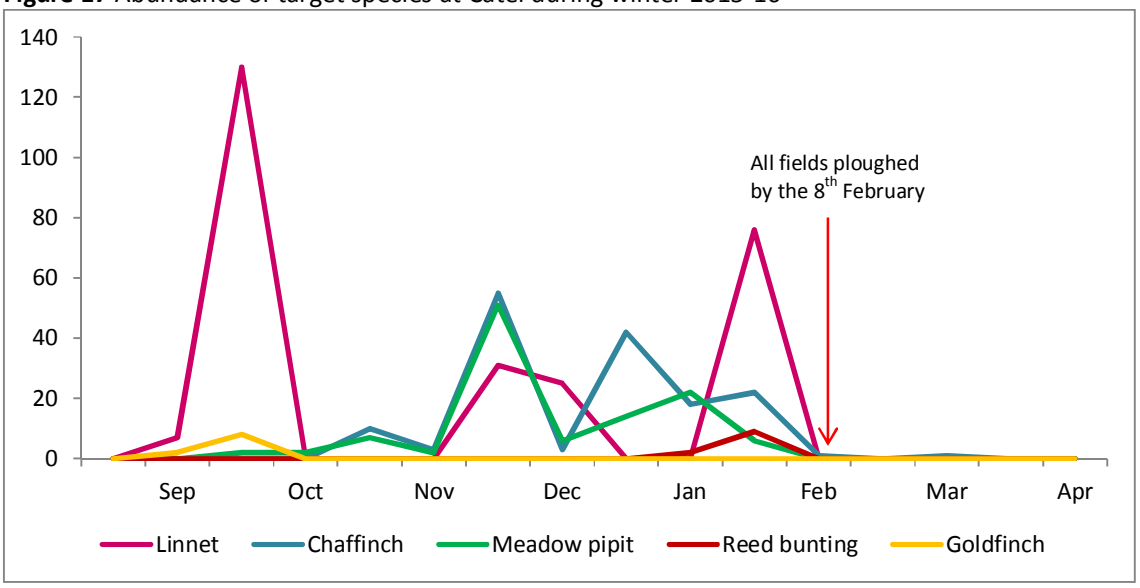
Table 9 Abundance of target species (in bold) recorded at Câtel

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Linnet**	269	35.12	16.81	130	10.38
2	**Chaffinch**	155	20.23	9.69	55	5.98
3	**Meadow Pipit**	112	14.62	7.00	51	4.32
4	Dunnock	31	4.05	1.94	5	1.20
5	Pheasant	30	3.92	1.88	7	1.16
6	Swallow	29	3.79	1.81	26	1.12
7	Jackdaw	23	3.00	1.44	21	0.89
8	Wren	20	2.61	1.25	7	0.77
9	Robin	15	1.96	0.94	5	0.58
10	Crow	14	1.83	0.88	13	0.54
Other target species present						
13	Goldfinch	10	1.31	0.63	8	0.39
14	House Sparrow	8	1.04	0.50	8	0.31
16	Stonechat	5	0.65	0.31	2	0.19

This site's overall density of target species increased from 16.7 birds/ha in 2014-15 to 22/ha (31.8/ha if we count only the birds present before the fields were ploughed). Even with this increase, this was the lowest density at any site in the winter of 2014-15. Like previous years, the results showed a statistical difference between this and the unplanted site in 2013.

The surveys detected small groups of Linnet at different times throughout the winter (Figure 16), mostly using the mustard fields from the bushes and short trees scattered along the road. Chaffinches and Meadow Pipits were seen in lesser numbers but more regularly, the pipits using mostly the main mustard field (My95) and the grass field which is adjacent to it.

Figure 17 Abundance of target species at Câtel during winter 2015-16



Numbers dropped dramatically at the beginning of February, coinciding with the flailing of all the fields in this area - the ones with mustard and the ones with grass.

4.4.4 Discussion

This particular site had a poor record of bird density when compared to others. This fact, together with the earliest removal of the crops of all sites, prompted the decision to plant a mustard crop instead of a tried mix used at the other sites.

For all monitoring purposes this site was surveyed like the others, with the added interest to find out what bird species and numbers attracted the crop of mustard. Despite the lack of a recognised WBC mix, this site still attracted flocks of Linnets and enough numbers or Chaffinch and Meadow Pipit to distinguish it from the unplanted control site. The density of birds increased by 31.7% from the previous year (90.4% if we only take into account the density of birds before it was ploughed), suggesting that the site, if managed correctly and planted with a suitable seed-bearing crop, can cater for some target species in an effective way. This site holds potential value not only for Linnet, Chaffinch and Meadow Pipit, but also

for Skylark, Stonechat and Reed Bunting. These target species, which have been observed in previous years using certain features of the area, could benefit with suitable management of boundaries, buffer strips and overwinter stubble.

4.4.5 Recommendations

- Since the site is attracting increasing numbers of birds each winter, it is recommended that it is planted again and that the monitoring continues. Depending on the management needs of the farm, the crop could be a WBC mix or a mono crop such as mustard, as long as it is seed-bearing and is allowed to dry throughout the winter.
- To expand the planted area to adjacent fields with a similar crop or with barely, to be cut after maturing and left in stubble over the winter.
- To restore some of the boundaries, especially alongside the road, with hedgerows rich in hawthorn, gorse and other sturdy species adapted to windswept coastal locations.

4.6 LANDES

4.6.1 Description

This site is located in the north-west corner of Jersey, near Les Landes SSI (St Ouen). It was proposed for WBCs in 2014 by a farmer already involved in the scheme. Two fields where found suitable, framed by hedges and tall trees at the western end, followed by a small pond, with conifers and broadleaf trees. Adjacent fields are usually grazed or left in stubble, and one particular field is privately planted each winter with dwarf sunflowers. The site is also near one of the three conservation areas proposed by BOTE in the Area 1 Management Plan[11]. A short supplementary feeding operation was carried out that year in response to an increase of birds towards the end of the winter. This was thought to be caused by birds being displaced from other sites that were flailed, as the two fields at Les Landes site are usually flailed late in the potato planting season.

In 2015 two new fields were added to the site by two other farmers, one on the other side of the road opposite the original two fields, and the other one towards the west, adjacent to Les Landes SSI. The combined area of the four fields planted in 2015 was 3.35ha (18.61vg).

4.6.2 Crops

The two original fields were planted during the last week of May whilst the other two were planted on the first week of June. The crops at the three largest fields developed well and produced abundant seeds. The crop planted on the small field, located in the west and adjacent to the SSI, developed mainly red millet and failed to grow other plants in the mix. On top of that, this field was covered in manure at the beginning of December, making it difficult for the birds to access the seeds.

Figure 18 Fields planted with WBCs at Landes in 2015 (map removed)

The new field on the other side of the road was ploughed and covered in plastic by 9th February, whilst the two main fields were left until the end of March.

Photos 15-16 A field planted in May in development (left) and drying out (right) in July and November

Photos 17-18 The field that did not develop, in September and December

4.6.3 Birds

A total of 6,366 birds were recorded over the course of the winter surveys, of which 5,936 (93.2%) belonged to target species. Eleven target species were recorded at the site, of which seven were amongst the top ten most abundant. Chaffinch, with 70.5% of the records, was by far the most abundant, leaving behind Starling at 9.6% and Linnet with 6%.

Table 10 Abundance of target species (in bold) recorded at Les Landes

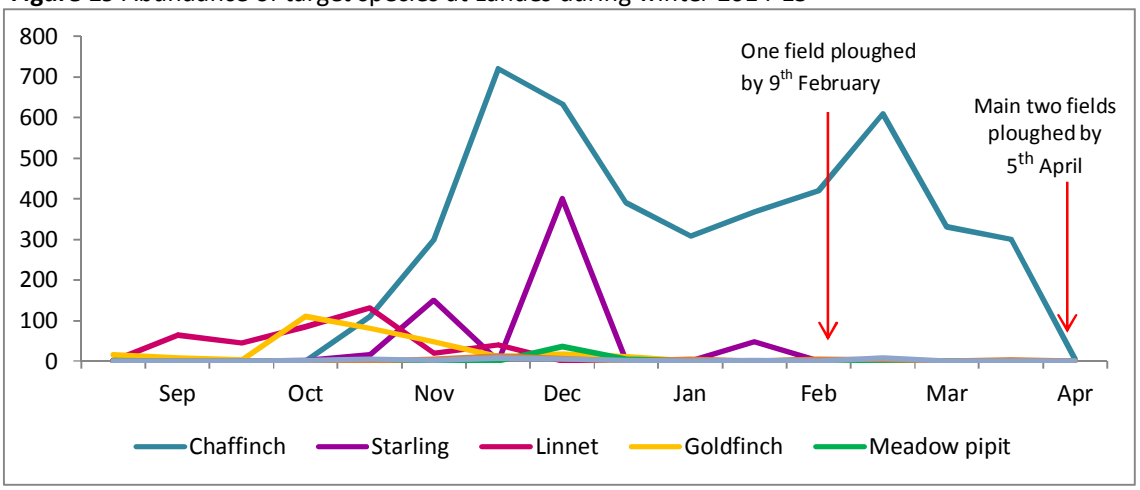
Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	4491	70.55	280.69	720	83.79
2	**Starling**	614	9.64	38.38	400	11.46
3	**Linnet**	383	6.02	23.94	130	7.15
4	**Goldfinch**	305	4.79	19.06	110	5.69
5	Stock Dove	221	3.47	13.81	120	4.12
6	**Meadow Pipit**	46	0.72	2.88	35	0.86
7	Robin	39	0.61	2.44	8	0.73
8	**Brambling**	37	0.58	2.31	12	0.69
9	Wood Pigeon	34	0.53	2.13	15	0.63
10	**Reed Bunting**	28	0.44	1.75	7	0.52
Other target species present						
17	**Redwing**	12	0.19	0.75	12	0.22
18	**Skylark**	11	0.17	0.69	11	0.21
19	**Greenfinch**	7	0.11	0.44	4	0.13
22	**Song Thrush**	2	0.03	0.13	1	0.04

The density of target species was of 118 birds/ha, which dropped by 98.7% to a mere 1.5/ha after the fields were ploughed. For a second year running, the T-test against the control site from 2013 showed a strong difference between them.

The new field on the other side of the original two fields was successful in attracting flocks of birds, at times as many as were observed on the original fields. The birds were observed using the thick hedge between the field and the road as well as a short line of shrubs on one of the boundaries. Many birds were also found using the tall trees on the western end of the two main fields, especially in windy or particularly cold days. The other new field, adjacent to Les Landes SSI, did attract small numbers of birds, mainly of non-target species.

Following a trend similar to the previous winter, the crops at this site maintained high numbers of birds (especially Chaffinch) for much longer than the other sites. Their numbers remained above the 300-strong mark from November until mid-March. A significant decline started soon after the new field was ploughed in early February, but numbers held until the end of March.

Figure 19 Abundance of target species at Landes during winter 2014-15



4.6.4 Discussion

At the time this site was first implemented, the two original fields at this site quickly became a very positive addition to the winter crop scheme, as it attracted almost as many birds as the second best site during the winter of 2014-15.

The addition of two more fields in 2015-16 provided an opportunity to observe whether birds would utilize the new features available, such as the thick hedge by the road between fields, and whether they would travel to the field further away to the west for a more specialised crop of mostly millet. The field by the two original ones developed well and produced suitable seed food – this was expected as the farmer of this field has various years of previous experience with WBCs. The other field, managed by a farmer new to the scheme, developed only millet. It is not known why this happened; it could be the result of the planting method, or of a seed batch of lesser quality than expected.

Flocks of birds were observed feeding at the new field by the other side of the road and using its hedge and shrubs. Bird movements seems to increase between this field and the two original ones, particularly in windy days, suggesting that the new field had increased the birds' choices of feeding grounds in unfavourable weather conditions. The other new field did not attract many birds, probably due to a combination of lack of tall hedges, poor crop development, and that it was covered in manure in early December.

Like the previous winter, Chaffinch was the most abundant species by a wide margin, but this site also attracted other 10 target species, and had a constant number of interesting species such as Brambling and Reed Bunting throughout. Although numbers of these two species are low, their presence at this site is still better than at other sites. Linnets did not constitute a regular visitor; however, small flocks that feed on neighbouring horse paddocks were observed visiting the WBC too.

The two main fields at this site were left standing until quite late again, when compared to other sites, and bird numbers remained high and on occasion increased towards the end of the winter instead of decreasing. This suggests an arrival of birds from other sites that have been flailed or are depleted of resources, as it happens towards the end of February and early March. A small bit of evidence supporting this hypothesis was encountered in the previous winter during a ringing session, when a Reed Bunting previously ringed at another WBC (the Pond) was re-trapped, days after the fields at the Pond had been flailed.

With its many interesting features – thick hedges, tall trees, a pond, stubble and grazed fields in the vicinity – this site is not only suitable for WBCs, but thanks to a late planting of potatoes in its two main fields, it is possibly one of the most important sites on the west of the Island as it can provide birds with a source of food after other sites have been ploughed.

4.6.5 Recommendations

- To plant this site again and for the foreseeable future, especially the three fields that are closer together
- To add new fields in the vicinity if suitable.
- To encourage other farmers participating at this site to leave the WBC standing as late as possible.
- To restore the hedgerows of the two main fields between the road and their western boundaries.

4.7 POND

4.7.1 Description

This site is located in the west coast of Jersey, immediately adjacent to St Ouen's Pond SSI. It was proposed for WBC in 2014 to one of the farmers involved in the scheme, who offered to plant four fields at the site, and was joined by a second farmer with two more fields. In 2015 three fields were cancelled to the request of a landowner and five new fields were added instead, with a new farmer joining the site. The combined total of land planted was 7.76ha.

This site is part of a wider area considered of conservation importance and highlighted by the BOTE Area 2 review [13]. The fields planted with WBCs are necessarily scattered; however, some of them feature thick and tall hedges, proximity to grazed land, nearby watering ponds, and proximity to scrub and reedbeds.

4.7.2 Crops

Most of the fields were planted on the first week of June, expect for two which were planted on the 25th of the same month. Most of the fields produced tall crops and an abundance of seeds from the various plants in the mix.

Figure 20 Fields planted with WBCs at the Pond in 2015 (map removed)

Most fields developed tall crops of sunflowers, millet, quinoa and other plants from the mix. The better crops were found on O1590 and the newly added O1600, as well as the fields closest to the pond: P16A, P17A-B, P18-20, O1631, O1633. The last two fields, although developing tall sunflowers, did thin down very rapidly. It is not know why this was the case, it could be a problem with the growth of the shorter crops, or the presence of small flocks of feral ducks which were observed trampling the undergrowth.

The large field at the northern edge of the site, O1581, did not grow sunflowers for a second year running. It is not known why the sunflowers fail to germinate and develop at this field. The field on the crossroad O1590, adjacent to Le Noir Pré, was left standing later than the rest as the farmer found the soil too wet to be ploughed.

Photos 19-21 A field planted in June in development (left) and drying out (right)

The new field P18-20, the most southerly of all, grew a tall and diverse crop; however, it was trampled by flocks of feral Greylag Geese, who were found resting inside the crop or feeding on the short weeds growing through the crop. In early November, 283 geese were counted in this field, and in December the maximum reached 378. By this time the crop appeared flattened in many areas and wide tracks had been opened through it.

Photos 22-23 Feral Greylag Geese in the vicinity of field P18-20

Photos 24-25 Damage on the crop caused by the feral Greylag Geese

The fields were flailed and ploughed in a staggered way across the site: three fields were ploughed in February, three more in March, and two in April, with one last field, P16A, left standing through to the next planting of WBCs, as it was too wet for the potato crop.

4.7.3 Birds

A total of 7,184 birds were recorded, of which 5,989 (83.3%) belonged to target species. Chaffinch was the most abundant species with more than half the records (52%) followed by Linnet (11.7%) and Starling (7.7%). A record-breaking 13 target species were recorded at the site, with six of them in the top ten most abundant.

Table 11 Abundance of target species (in bold) recorded at Pond

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	3733	51.96	233.31	839	30.07
2	**Goldfinch**	840	11.69	52.50	274	6.77
3	**Starling**	552	7.68	34.50	307	4.45
4	Stock Dove	515	7.17	32.19	218	4.15
5	**Reed Bunting**	431	6.00	26.94	85	3.47
6	Crow	235	3.27	14.69	48	1.89
7	**Linnet**	149	2.07	9.31	56	1.20
8	**Meadow Pipit**	124	1.73	7.75	43	1.00
9	Magpie	105	1.46	6.56	21	0.85
10	Dunnock	63	0.88	3.94	12	0.51
Other target species present						
11	**House Sparrow**	55	0.77	3.44	14	0.44
13	**Stonechat**	48	0.67	3.00	8	0.39
14	**Skylark**	45	0.63	2.81	22	0.36
23	**Greenfinch**	6	0.08	0.38	3	0.05
26	**Song Thrush**	3	0.04	0.19	1	0.02
27	**Brambling**	2	0.03	0.13	2	0.02
28	**Fieldfare**	1	0.01	0.06	1	0.01

The density of target species was the third-lowest across all the sites at 54.3birds/ha, but unlike the other sites, this figure did not suffer a sharp decrease after the fields were ploughed, dropping to 22birds/ha, which is a decrease of 59% (the decrease at the other sites ranged between 74-100%). The T-test against the 2013 control site showed a statistical difference between it and the control.

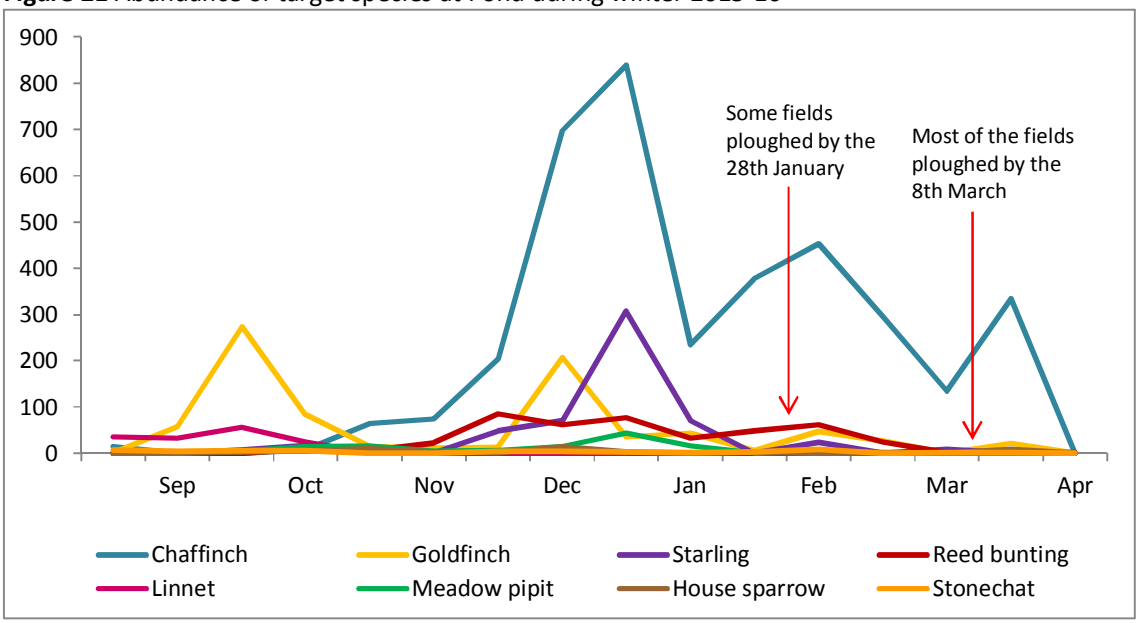
The bird surveys revealed that Chaffinches were found in large numbers throughout the winter, with the largest increase between December and January, whilst Linnet and Reed Bunting numbers fluctuated across the fields. There was also a regular presence of Meadow Pipit, Skylark and Stonechat, as well as interesting sightings of Whinchat, which were probably in migration. In particular, Meadow Pipits and Skylarks preferred the short, open fields of dried mustard immediately adjacent to the WBCs.

The original fields that were replanted had similar success as the previous winter. The field at the crossroads (O1590) attracted House Sparrows from the opposite houses as well as large numbers of Chaffinch and Reed Bunting, which used the thick line of willows which connect the field to grazed pastures and the pond's reedbeds. Large flocks of Goldfinch (*c*. 200 birds) were observed between this field and the new one the other side of Le Noir Pré, which was also very popular with Reed Buntings. Birds were able to use this field until quite late in the season as this field was too wet to be ploughed at the same time as the others. The field at the northernmost end, where sunflowers failed to develop, attracted smaller numbers of birds, mainly Meadow Pipits on the short crop and Goldfinches commuting from the shrubs of La Mielle de Morville, the other side of the road.

The fields behind the pond still attracted Reed Buntings and Linnets, but less than were counted on the previous year. There were interesting peaks of Stonechats in this area, especially found on the tracks and boundaries, and a particular instance in September when Whinchats and wheatears were found there in large numbers, probably migrating through the area. P17A-B did not seem to attract large flocks of Chaffinch but Greenfinch, Goldfinch and Stonechat were regularly found there. A new field added, adjacent to it (P18-20) seemed to attract small flocks of Chaffinches (of up to 190 birds) that used the short hedge on its easterly boundary. Unfortunately this field was used by feral Greylag Geese which flattened large portions of it and opened up wide tracks through it.

Other new fields added to the site this year included O1600, surrounded by thick and tall hedges, which had a constant presence of various species in small flocks, such as 135 Chaffinches and 30 Goldfinches. Lesser numbers were observed at the two new fields, adjacent to each other behind the Pond SSI. Despite chaffinches being able to use the tall trees of a nearby garden and some shrubs on the western boundaries, the crops themselves thinned down very rapidly and birds were never observed in them in large numbers.

Figure 21 Abundance of target species at Pond during winter 2015-16



All species suffered a dramatic decrease once the main four fields, the most productive ones, were flailed on the same day.

4.7.4 Discussion

This site offered the most contrasting range of successes when comparing its components, but it also showed a consistency on crop development and bird response from the previous winter. The old fields that did well on the previous year, namely the one in the crossroad by Le Noir Pré, was again popular with Goldfinch, House Sparrows, Chaffinch and Reed Buntings, and even more so since this field was flailed the latest due to logistic problems. The field by the pond P16A was also good for the Reed Buntings; however, the numbers were smaller than the previous year. The major change in this field was not the crop itself, but the fact that the adjacent field had been planted with grass instead of mustard – Reed Buntings had been regularly observed feeding on the mustard and the weeds of the undergrowth of that field. One field at the most northern part of the site developed a short crop devoid of sunflowers and failed to attract birds in flocks, for a second year running. It is not known why the crop does not develop fully at this field or whether this is the reason behind the low numbers of birds, but since it is a large field in an open area, which attracts Meadow Pipits and Skylarks, it might be worth managing it with a shorter crop such as mustard or barley in order to retain some of its value for such birds.

The newly added fields grew tall and well-developed crops, with better fortunes near Le Noir Pré and O1600 which is surrounded by thick hedges, and less luck for the ones near the pond, which thinned down quickly mainly due to the trampling of geese and ducks.

The fields surrounding the crops were of some value to other species such as Stonechat, Skylark, Meadow Pipit and even Whinchat and Wheatear, which were found on the shorter crops of mustard, cut grass, and on the boundaries of the fields and tracks.

The bird density declined after WBCs were ploughed, but it was small decline when compared to the other sites. This result is interesting and it could point to the possibility that either the birds are not relying on the crops to fulfil their nutritional needs (implying that the crops do not fulfil these needs), that other habitats in the area can compliment the lack of food after the fields are ploughed, that the birds using the site are local breeders which remain throughout the year, or perhaps a combination of the above.

This is a complex site to monitor and analyse, especially when the results are not as good as at other sites, and it might take longer to find the right placement and management of WBCs in order to fulfil their potential. Despite this prospect, it is believed that the site is worthy the effort, as WBCs would fulfil a very important role in an already complex mosaic of habitats for wildlife: reedbeds, pond, scrape, grazed pastures, other crops, willow copses and others. The crops have already attracted the highest numbers of Reed Buntings of all sites, one of the target species which is hoped will become re-established in Jersey as a breeder. The management of the fields, which involves at present three different farmers, might seem challenging, but it has major advantages in the form of enhanced flexibility of field choice and a staggered flailing and ploughing of the WBCs.

4.7.5 Recommendations

- To continue planting and monitoring winter bird crops at this site for the foreseeable future.
- To plant the fields with less successful crops with a short crop of value for birds such as barley or mustard, which are to be left until the potato season starts. Additionally, to encourage farmers to plant such crops on land not used for WBCs.
- To add new fields to the WBCs scheme and when possible, to prioritise new fields at locations that would connect isolated fields with each other.
- To monitor the detrimental effect of unwanted birds such as pheasants and feral geese and ducks on the development and condition of the WBCs.

4.8 ST BRELADE

4.8.1 Description

This site was planted for the first time in 2014-15 and is the only one in the parish of St Brelade. It originally comprised three adjacent fields with a fourth field added in 2015. The fields are almost completely surrounded by thick hedges and broad-leaf woodland, which slopes down to the road towards La Haule slip.

4.8.2 Crops

The four fields had a combined area of 2.57Ha, and were planted in the first week of June 2015. All the fields, but especially the newly planted one, produced tall crops with abundant seeds. The fields were left standing until the last weekend of February 2016, when they were flailed, ploughed, planted and covered in plastic in rapid succession.

Figure 22 Fields planted with WBCs at St Brelade in 2015 (map removed)

Photos 26-28 The new field, which was planted in June, in development (left) and drying out in July (right) and October (below)

4.8.3 Birds

A total of 4,283 birds were recorded of which 3,899 (91%) belonged to target species. Seven target species were recorded at the site; Chaffinch clearly dominating overall with 79% of all records. Goldfinch and Greenfinch were the second and third most abundant species, albeit very far from the chaffinch, with only 6% and 4.4% respectively.

Table 12 Abundance of target species (in bold) recorded at St Brelade

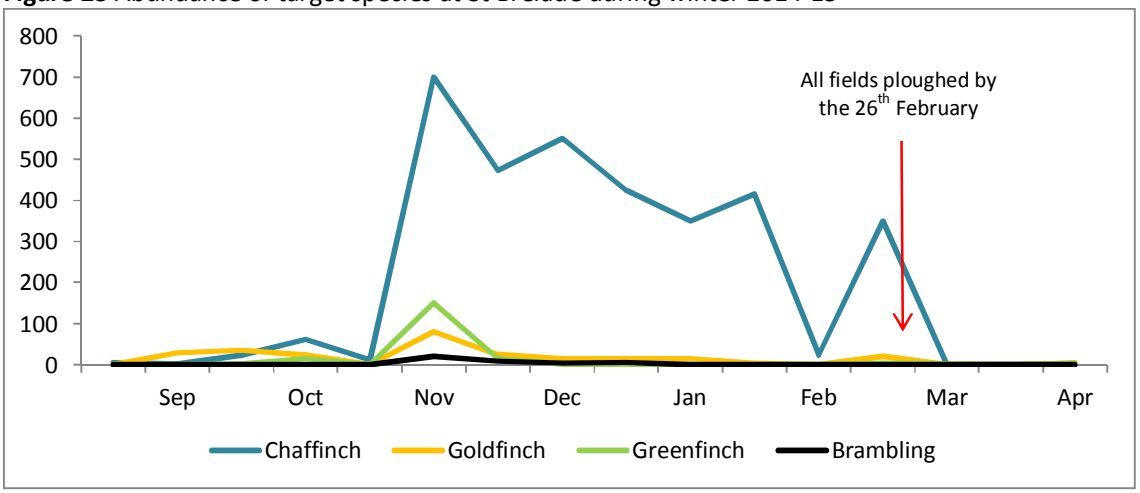
Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	3393	79.22	212.06	700	82.51
2	**Goldfinch**	263	6.14	16.44	80	6.40
3	**Greenfinch**	189	4.41	11.81	150	4.60
4	Great Tit	86	2.01	5.38	25	2.09
5	Robin	79	1.84	4.94	18	1.92
6	Dunnock	64	1.49	4.00	10	1.56
7	Blackbird	45	1.05	2.81	12	1.09
8	**Brambling**	40	0.93	2.50	20	0.97
9	Wren	31	0.72	1.94	7	0.75
10	Wood Pigeon	22	0.51	1.38	4	0.54

Other target species present						
13	Song Thrush	12	0.28	0.75	9	0.29
18	Meadow Pipit	1	0.02	0.06	1	0.02
18	Reed Bunting	1	0.02	0.06	1	0.02

The density of target species at the site was on average 123.5birds/ha, making it the fifth densest site out of the twelve. The T-test against the unplanted control site showed a statistical difference between both.

Over the winter surveys most birds were recorded using the new field B906, which had the best crop of the lot and features thick hedges on two sides. Small flocks were also found using the other fields, especially the flailed margins on the eastern boundaries and the slopes close to the woodland.

Figure 23 Abundance of target species at St Brelade during winter 2014-15



Bird numbers, especially Chaffinches, increased dramatically in November and remained high throughout the winter. Even though all four fields were ploughed on the same weekend in February, a large number of the Chaffinches remained in the area until March. The overall decrease in bird density was less steep than at other sites with at -74.2%.

4.8.4 Discussion

For a second year running this site has attracted large numbers of finches, especially Chaffinch, Greenfinch, Goldfinch and Brambling. Other species such as Linnet and Reed Bunting are notably absent from it, as well as Skylark and Stonechat. This could be due to the lack of related habitats that these species rely on, such as reeds, coastal scrub, gorse, and open grassland, in the vicinity. Despite this shortcoming, the crops do provide winter food for large numbers of finches which are also target species and, therefore, the overall assessment is a positive one.

4.8.5 Recommendations

- To continue planting and monitoring winter bird crops for the foreseeable future.
- To investigate the possibility of attracting other target species by planting short crops in the vicinity, such as barley or prickly potato, which would be left in stubble over winter.

4.9 LA COUPE

4.9.1 Description

This site comprises three fields at the north-east of the Island, and directly above La Coupe bay. It has been running since 2014-15 thanks to the co-operation between the local farmer and the National Trust for Jersey, which owns approximately half of the site. It features thick, tall hedges neighbouring short pastures and is placed in an important migratory route for birds, especially in the autumn.

4.9.2 Crops

The three fields had a combined area of 1.52ha (8.45vg), and were planted on 2nd May 2015. The fields developed a variety of plants with abundant seeds, although with fewer sunflowers than other sites. All the fields were flailed at the end of December 2015.

Figure 24 Fields planted with WBCs at La Coupe in 2015 (map removed)

Photos 29-30 Field developing in July and drying out in October

4.9.3 Birds

A total of 1,839 birds were recorded over the winter surveys, of which 1,405 belonged to target species. The two most abundant of all were Chaffinch, with 46% of the records, and Linnet, with 24.5%. The site attracted up to nine different target species, although most were recorded on much lesser numbers.

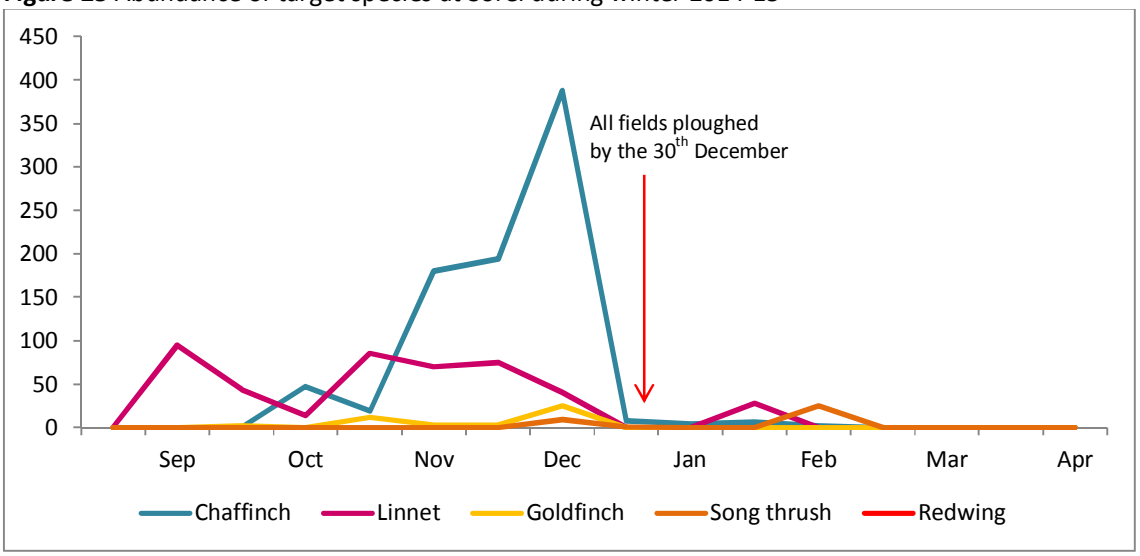
Table 13 Abundance of target species (in bold) recorded at La Coupe

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	Chaffinch	848	46.11	53.00	388	34.87
2	Linnet	451	24.52	28.19	95	18.54
3	Wood Pigeon	83	4.51	5.19	24	3.41
4	Blackbird	55	2.99	3.44	18	2.26
5	Robin	50	2.72	3.13	11	2.06
6	Goldfinch	45	2.45	2.81	25	1.85
7	Dunnock	44	2.39	2.75	13	1.81
8	Wren	43	2.34	2.69	14	1.77
9	Song Thrush	35	1.90	2.19	25	1.44
10	Crow	29	1.58	1.81	12	1.19
Other target species present						
13	Redwing	17	0.92	1.06	8	0.70
17	Skylark	5	0.27	0.31	4	0.21
19	Greenfinch	2	0.11	0.13	2	0.08
20	Meadow Pipit	1	0.05	0.06	1	0.04
20	Brambling	1	0.05	0.06	1	0.04

This site's overall target species density was of 109.5 birds/ha, a marked increase from the 23.8 of the previous winter. Like then, a T-test against the unplanted control site indicated a statistical difference between them.

Bird numbers began to increase between October and November, with a peak of Chaffinches in mid-December. Linnets were present mostly between October and December, and were observed feeding on the red millet from the northern boundaries of the largest field. Other species were recorded at the site in large numbers during single surveys, in what was believed to be a 'fall' of migrants. This was particularly the case of thrushes, such as Song Thrush, of which 25 were recorded in one day, and Blackbird, with a single maximum of 18.

Figure 25 Abundance of target species at Sorel during winter 2014-15



All the species plummeted after the fields were flailed in December, dropping the average density by 94.4%. Even then, some Linnets and Song Thrushes remained in the area and were seen feeding from the flailed crop for a few more weeks - the fields were not ploughed until much later, on the last week of February.

4.9.4 Discussion

For a second year running this site succeeded in providing seed food to a variety of target species, and with the same size, management and crop, increased dramatically the density of birds that were recorded at the crops.

One of the reasons why this site was originally proposed was its location on a migration flyway, as many birds arrive to Jersey during their autumn and spring migrations by the NE corner of the Island. The fact that small 'falls' of migrants passing by has been recorded at the WBCs such as Song Thrush and Blackbird adds weight to the possibility that these crops can be highly valuable to both wintering and migrating birds.

The only shortfall at this site happened when the crops were flailed earlier than it was hoped for, at the end of December. The farmer had the intention to plant the potato crop straight away, but bad weather prevented him from doing so. This allowed some birds,

especially Linnet and Song Thrush, to continue feeding at the flailed crops, presumably from invertebrates and seedy weeds, even without the cover of the crop itself.

4.9.5 Recommendations

- To continue planting and monitoring winter birds crops at this site for the foreseeable future.
- To expand the site by planting more fields near the old ones.
- To maintain a varied crop mixture that includes kale or similar brassicas, aimed to attract invertebrates for various species of thrush.

4.10 ROZEL

4.10.1 Description

This site is found close to the north coast of Jersey, between Bouley Bay and Rozel Harbour, in the parish of Trinity. It joined the scheme in 2014 when the farmer offered a few fields that he used to plant with WBCs in the past. Historical records confirmed that large numbers of finches, especially Greenfinches, were found at his winter crops.

4.10.2 Crops

Three fields were offered for planting in 2015; however, only two were planted due to conflicting schedules at the farm. The two fields had a combined area of 0.84ha (4.67vg). The main field was planted at the beginning of June, whilst the smallest one did not get planted until 10th July.

Both fields developed a variety of plants from the mix and tall sunflowers, especially the large field. Unfortunately, the small field was flailed by November, before a time when the crop was completely mature and of use to birds. This reduced the effective are of crop to the large field of 0.57ha, which was the measurement ultimately used for calculations on bird densities.

Figure 26 Fields planted with WBCs at Rozel in 2015 (map removed)

Photos 31-33 A field developing in July, seeding in October and drying in November

The field was left standing until the end of January, when it was flailed. It was planted in potato a few weeks later, on the third week of March.

4.10.3 Birds

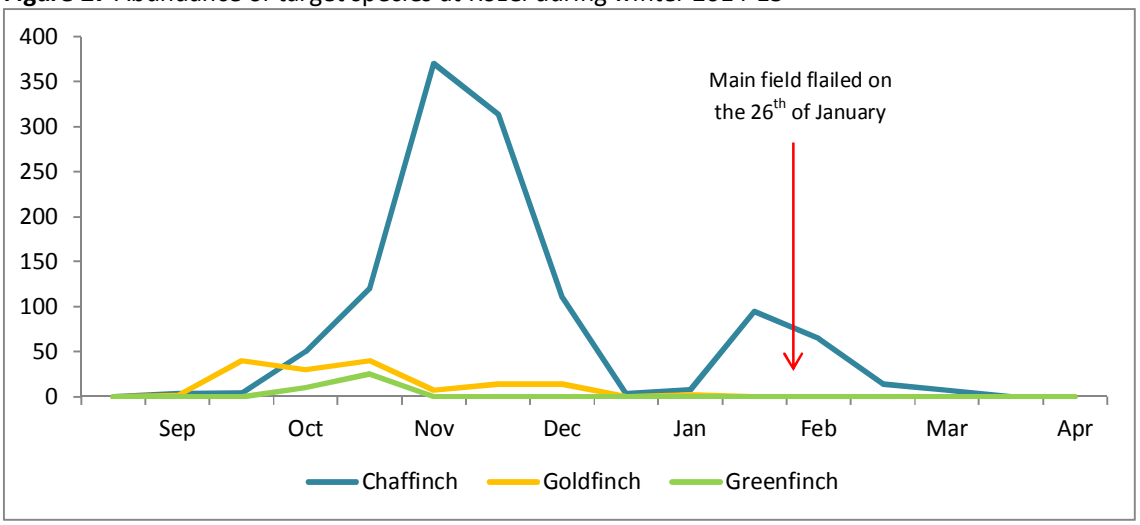
A total of 1,528 birds was recorded throughout the winter surveys, of which 1,361 (89%) belonged to target species. Six target species were recorded at the site, of which two were the most abundant overall: Chaffinch (76%) and Goldfinch (9.7%).

Table 14 Abundance of target species (in bold) recorded at Rozel

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	Chaffinch	1163	76.11	72.69	370	127.52
2	Goldfinch	148	9.69	9.25	40	16.23
3	Dunnock	39	2.55	2.44	7	4.28
4	Greenfinch	35	2.29	2.19	25	3.84
5	Robin	33	2.16	2.06	7	3.62
6	Wren	20	1.31	1.25	6	2.19
7	Blackbird	17	1.11	1.06	2	1.86
8	Great Tit	16	1.05	1.00	4	1.75
9	Wood Pigeon	15	0.98	0.94	7	1.64
10	Meadow Pipit	7	0.46	0.44	7	0.77
10	Blue Tit	7	0.46	0.44	4	0.77
10	Crow	7	0.46	0.44	4	0.77
Other target species present						
11	Brambling	6	0.39	0.38	6	0.66
12	Song Thrush	2	0.13	0.13	2	0.22

The average density of target birds was higher than the previous year at 207.2birds/ha before the field was ploughed, making it the second highest density across all sites. The T-test results indicated that the bird presence at Rozel was significantly different from the unplanted site.

Figure 27 Abundance of target species at Rozel during winter 2014-15



Chaffinch numbers increased dramatically between October and December, but then most birds appeared to have left the area suddendly by the end of December. Some Chaffinches were observed at the site a a few weeks afterwards, in late January and February, coinciding with the field being flailed.

4.10.4 Discussion

This small site showed a consistent presence of certain target species, mainly Chaffinch and Goldfinch, and in a similar way to the other site in the NE, La Coupe, did not record any individuals of other target species such as Linnet, Stonechat or Skylark. This could be down to similar reasons such as the lack of other habitats in the vicinity like open pastures, barley stubbles and coastal grass and scrub, which these species are associated with.

The smallest field was flailed too early in the season, in November. This happened as well the previous winter, but its area was still used when calculating average bird density at the site. This year the data has been adjusted to only account for the area of the large field, as it provided the only crop that was standing at the time of its intended purpose, and it was believed that it would provide a better representation of the site's productivity. The density analysis revealed the second highest density out of the 12 sites planted that winter.

Despite the field being flailed early in the season, there was a gap of eight weeks between the field being flailed and it being planted with the potato crop. Small groups of Chaffinches utilized this gap to feed on the short vegetation, probably in the insects and weeds growing through.

It would have been preferable to have the other large field planted but it was not possible. If it is planted the following winter it will be interesting to see how its addition affects the abundance and diversity data.

4.10.5 Recommendations

- To continue planting and monitoring this site.
- To increase the planting area to cover the two other fields offered by the farmer.
- To encourage a flailing date as late as possible, and not earlier than January.

4.11 SANDPITS

4.11.1 Description

This is the first of three new sites added in 2015-16. It was offered by a farmer who already plants fields for the scheme in St Ouen's Bay. The fields were believed to be of potential value to birds due to their location, which is adjacent to the commercial sandpits quarry, marram grasslands and the Blanches Banques SSI, where Linnet, Meadow Pipit, Skylark and Stonechat breed each year. It also has an area of tall shrubs and willows and a line of conifers on the western edge, as well as a wildlife-sympathetic land owner. The sandpits itself is a valuable habitat for breeding Little Grebe, Marsh Harrier, Tufted Duck and Oystercatcher, as well as holding the only colony of Sand Martin in the Channel Islands. Large numbers of Barn Swallows, House Martins, Swifts and of course Sand Martins descend upon the waters to feed on the small insects above the vegetation, and it was hoped that they could find this type of food on the new conservation crops.

4.11.2 Crops

Three fields were offered for planting in 2015 which occupied a total of 2.35ha (13.1vg). The fields were planted on the first week of June and developed a tall crop, albeit with less visible sunflowers than at other sites.

Figure 28 Fields planted with WBC at the Sandpits in 2015 (map removed)

Photos 34-36 A field developing in July, seeding in October and drying in November

All the fields were flailed by 13th January and were planted and covered in plastic by the 28th of the same month.

4.11.3 Birds

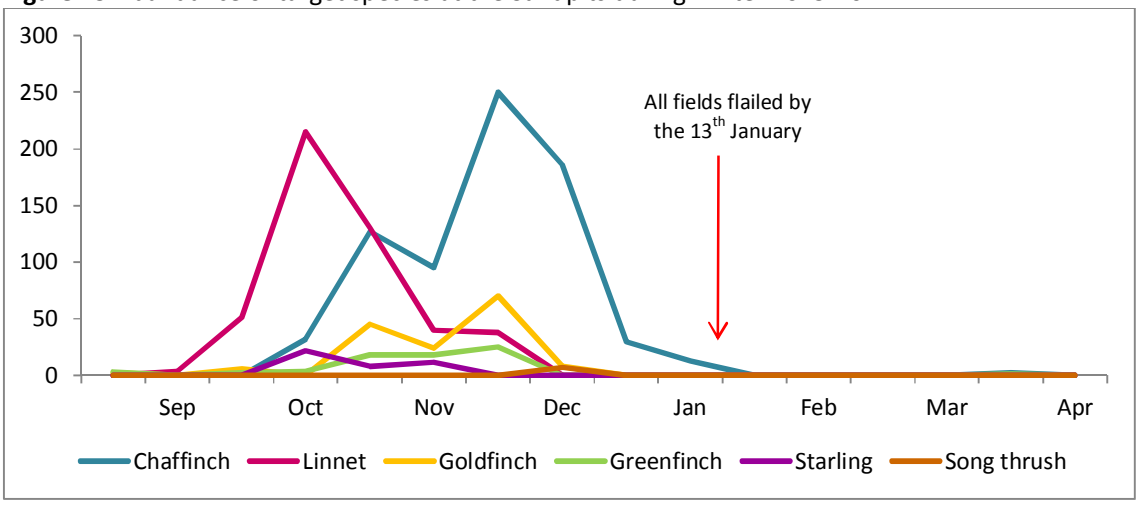
A total of 1,957 birds were recorded at this site during the winter surveys, of which 1,488 (76%) belonged to target species. Six target species were recorded at the site, of which two were the most abundant overall: Chaffinch (36%) and Linnet (10.6%).

Table 15 Abundance of target species (in bold) recorded at the Sandpits

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	**Chaffinch**	703	35.92	43.94	250	18.70
2	**Linnet**	208	10.63	13.00	215	5.53
3	Stock Dove	158	8.07	9.88	85	4.20
4	**Goldfinch**	147	7.51	9.19	70	3.91
5	Wood Pigeon	55	2.81	3.44	18	1.46
6	**Greenfinch**	62	3.17	3.88	25	1.65
7	Dunnock	49	2.50	3.06	17	1.30
8	**Starling**	20	1.02	1.25	22	0.53
9	Magpie	34	1.74	2.13	7	0.90
10	Crow	26	1.33	1.63	14	0.69
Other target species present						
14	**Song Thrush**	7	0.36	0.44	7	0.19

The average density of target birds was 69.6birds/ha before the fields were ploughed, but it decreased to 0.97 afterwards (a drop of 98.6%). The T-test results suggested a statistical difference between birds' presence at this site against birds at the unplanted site.

Figure 29 Abundance of target species at the Sandpits during winter 2015-16



Linnet numbers peaked in October, almost two months before Chaffinch numbers were at their maximum. When Chaffinches started to decline at the site, the birds were not found in flocks but rather scattered across the boundaries and throughout the crop. Numbers of all species suffered a steep decline in January and did not recover after the fields were flailed.

4.11.4 Discussion

This new site was a positive addition to the 2015-16 scheme, attracting a large flock of Linnets which used the crops during a period of at least two months. The number of Linnets in fact as almost as high as the Chaffinches, which usually dominate other sites by a large margin. Goldfinch, Greenfinch and Starling were also observed at the crops, giving this site an overall positive result. The only shortfall perhaps was that the fields were flailed relatively early compared to other sites. It would be interesting to collect data from the site in a year when the fields were left standing for longer, until such time as February or even March.

4.11.5 Recommendations

- To continue planting winter bird crops and monitoring birds at this site.
- To increase the planting area to the other side of the conifer trees.
- To encourage a flailing date as late as possible, and not earlier than January.

4.12 GROUVILLE

4.12.1 Description

Winter bird crops were proposed to the farmer as this site was believed to be of high potential value for many bird species, mainly because of its location adjacent to the Grouville Marsh SSI and the NTJ's Nature Reserve Les Maltières. The SSI comprises a variety of habitats of great importance to birds and other wildlife, such as reeds, willow copse and grazed pastures, but it is also adjacent to the Grouville Common and adjacent golf course, which holds the only known breeding population of the UK and Jersey red-listed Cirl Bunting.

4.12.2 Crops

Two fields were offered for planting; however, only one was eventually planted due to a later than expected date for the potato harvest. The planted field was located west of the SSI and is framed by a newly-planted orchard to the north, a hedgerow to the south, Les Maltières to the east and the Rue des Maltières to the west. The field is 0.72ha (4vg) and was planted on 1st July 2015.

Figure 30 Field planted with WBCs at Grouville in 2015 (map removed)

The crop at this field grew to be record-breaking, with the tallest and largest sunflowers found at any of the fields planted for that winter. Other components of the mix developed well too providing a uniformly dense and tall crop across the field.

Photos 37-40 The field in August, September, October and November

The crop stayed tall and upright throughout the winter and was left standing until the third week of March, when it was flailed. The field was covered in plastic (for potato management) by the first week of April.

4.12.3 Birds

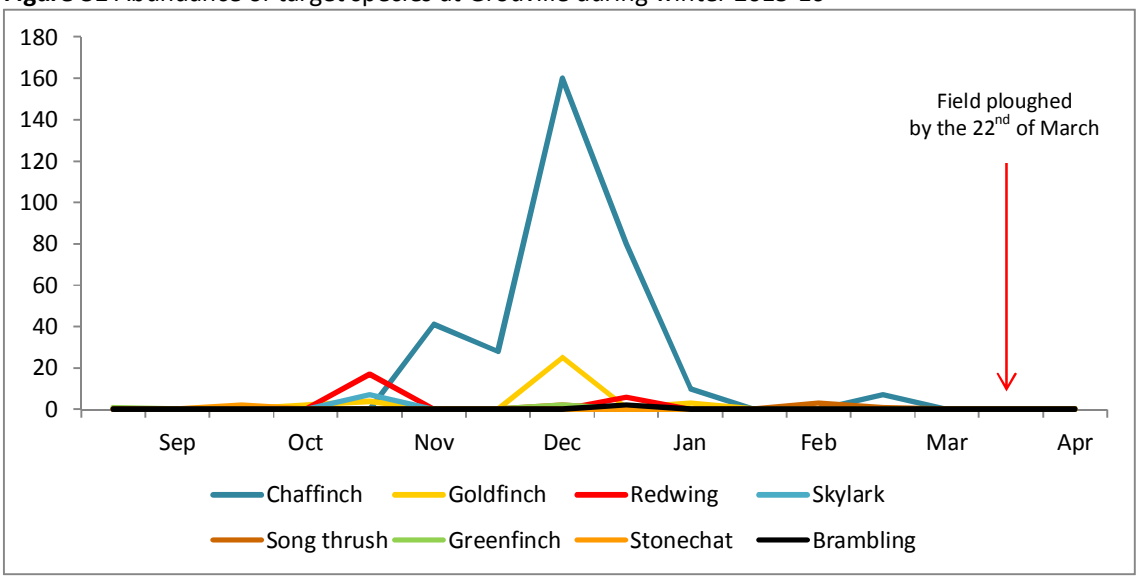
A total of 581 birds were recorded at this field during the winter surveys, of which 405 (69.7%) belonged to target species. As many as eight target species were recorded at the site, with Chaffinch being the most abundant of all the others put together (56.1%). No other species, target or not, was close to that percentage.

Table 16 Abundance of target species (in bold) recorded at Grouville

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	Chaffinch	326	56.11	20.38	160	28.30
2	Dunnock	42	7.23	2.63	8	3.65
3	Goldfinch	35	6.02	2.19	25	3.04
4	Robin	28	4.82	1.75	7	2.43
5	Great Tit	24	4.13	1.50	6	2.08
6	Redwing	23	3.96	1.44	17	2.00
7	Blackbird	18	3.10	1.13	3	1.56
8	Crow	13	2.24	0.81	7	1.13
9	Wren	8	1.38	0.50	2	0.69
10	Skylark	7	1.20	0.44	7	0.61
10	Chiffchaff	7	1.20	0.44	3	0.61
10	Wood Pigeon	7	1.20	0.44	4	0.61
Other target species present						
11	Song Thrush	6	1.03	0.38	3	0.52
13	Greenfinch	4	0.69	0.25	2	0.35
15	Stonechat	2	0.34	0.13	2	0.17
15	Brambling	2	0.34	0.13	2	0.17

This site featured an interesting variety of species, albeit in small numbers, and was one of the two sites in Jersey where Cetti's Warblers were recorded Stonechats, which usually were found on the boundaries of the grazed pastures to the south end of the SSI, were observed at the crop and feeding from insects amongst the sunflowers.

Figure 31 Abundance of target species at Grouville during winter 2015-16



Bird abundance did not seem to follow a clear pattern as the numbers recorded were very small. Chaffinch was the only species which formed flocks on occassions, with the largest group of 160 individuals (approximately) found at the site in mid-December.

With an average density of only 40.2birds/ha, this was the second to last site on the comparison score. After the crop was flailed it dropped to 0, as surveys carried out afterwards failed to find any birds on the field.

4.12.4 Discussion

The field at this site attracted an interesting range of target species, albeit in small numbers. This was probably a result of these birds being in the vicinity, as the area features various important bird habitats. One species which was not recorded was the Linnet, not usually found in the SSI – the closest breeding pairs are, like the Cirl Buntings, at the golf course. Despite the low density at the crop, this site is adjacent to the SSI and NTJ land, and, therefore, it would be premature to make assumptions on future success without trying it out for a period of 3-5 years at least; especially if other fields can be planted in addition.

It would have been preferable to have the other large field planted as it is much closer to the golf course. If it were to be planted the following winter it would be interesting to see how its addition affects the abundance and diversity of the site.

4.12.5 Recommendations

- To continue planting and monitoring this site.
- To plant more fields within or near the SSI and close to the Cirl Bunting breeding areas.
- To maintain the flailing date as late as the previous winter, or later if possible.

4.13 LA ROCQUE

4.13.1 Description

This site was included in the BOTE farmland scheme in 2015 although its single field had been planted with WBC by the farmer for many previous years. Ornithological and ringing records indicated that large flocks of various farmland species had been present at the crop in previous winters. It was considered a priority to extend BOTE's standard monitoring at this site in order to evaluate the field's success and to investigate potential benefits of additional conservation measures.

Situated along La Rue du Pont near La Rocque Harbour, this field is framed by other commercial crops and hedgerows of various thickness and sizes, from a thick and long one on the north-facing side to a sparse one with only a few tall shrubs and a water ditch which separates it from a wet meadow used as a horse paddock.

4.13.2 Crops

The planted area was 0.54ha (3vg) and did not cover all the land available at this field. A crop of grass and then mustard was planted on the other half of the field, in order to keep the bird crop separated from the nearest house.

Figure 32 Field planted with a WBC at La Rocque on 2015 (map removed)

The field was planted on 1st July 2015. It developed a dense crop with tall sunflowers, kale and various other components. The mustard planted in the other half of the field did not grow as tall as the crop as it had been planted much later and after the grass crop.

Photos 41-43 The field in August, October and November

The whole field was flailed by the third week of March 2016 and was covered in plastic by 7th April.

4.13.3 Birds

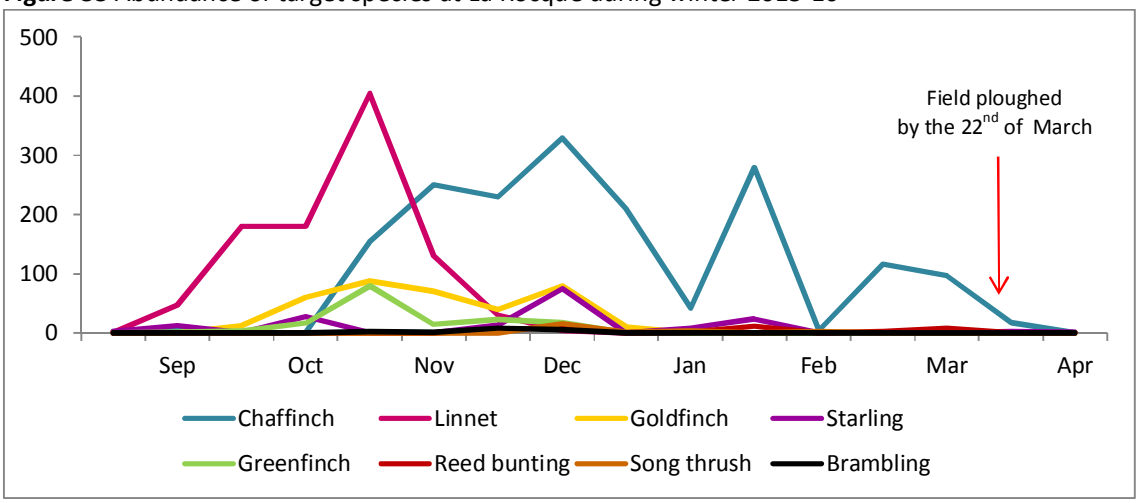
A total of 3,924 birds were recorded throughout the winter surveys, of which 3,509 (89.4%) belonged to target species. A record-breaking 13 target species were recorded at the site, the maximum number reached by any site on that winter. Five of them were also the five most abundant species overall, with Chaffinch top (44.3%) followed by Linnet (24.8%) and Goldfinch (9%).

Table 17 Abundance of target species (in bold) recorded at La Rocque

Top 10	Species	Total records	% of all site records	Average per survey	Max N on survey	Density (n/Ha)
1	Chaffinch	1738	44.29	108.63	330	201.16
2	Linnet	976	24.87	61.00	405	112.96
3	Goldfinch	361	9.20	22.56	88	41.78
4	Starling	164	4.18	10.25	74	18.98
5	Greenfinch	157	4.00	9.81	80	18.17
6	Crow	140	3.57	8.75	58	16.20
7	Wood Pigeon	82	2.09	5.13	53	9.49
8	Barn Swallow	54	1.38	3.38	23	6.25
9	Reed Bunting	36	0.92	2.25	11	4.17
10	Blackbird	31	0.79	1.94	13	3.59
Other target species present						
13	Song Thrush	22	0.56	1.38	16	2.55
15	Fieldfare	17	0.43	1.06	17	1.97
16	Brambling	16	0.41	1.00	8	1.85
17	House Sparrow	12	0.31	0.75	8	1.39
20	Stonechat	5	0.13	0.31	2	0.58
21	Meadow Pipit	3	0.08	0.19	3	0.35
22	Skylark	2	0.05	0.13	2	0.23

This field had also the highest density of birds of target species, with 461.4birds/ha on average before it was ploughed. This was the maximum density recorded at any of the sites and more than twice the second-best density, which was at Rozel with 207birds/ha. The T-test results indicated a robust and strong difference between records collected at this site and at the control site.

Figure 33 Abundance of target species at La Rocque during winter 2015-16



Flocks of Linnet were found at the site during most of September and October; however, they decreased in mid-November to very low levels which did not change for the rest of the winter. Chaffinch numbers started to increase by mid-October and were present throughout the winter. Goldfinch, Greenfinch, Starling and Brambling were observed regularly at the crop, and Stonechat were found on the boundaries between the crop and the wet meadow grazed by horses.

The other half of the field, which was planted with grass and later mustard, was also used by other species. Meadow Pipit, Skylark and even Common Snipe were observed there after the grass had been cut. After the field was ploughed, the density at the site dropped by 91% to an average of only 39birds/ha.

Incidentally, a very strong migration pass was observed on 8th November, during a non-survey ringing session, in which over 1000 Starlings, 750 Fieldfares and 1000 Redwings were counted flying over the site. The observers noted that this site might be right in their migration flightpath across Jersey on those particular weather conditions, with the entry point to the Island somewhere in the NE coast and the leaving point near La Rocque Harbour.

4.13.4 Discussion

When this site was added to the farmland scheme and standard monitoring started, it was expected that the data collected would show a certain success, as historical records from the Société Jersiaise Ornithology Section and the Channel Islands Ringing Scheme confirm a large presence of farmland birds at the crop every winter.

What was not expected was that it would be the site with the highest density of birds per planted hectare, and by a very large margin – twice as dense as the second best site. It also had record numbers of target species with all thirteen (the maximum for the 2015-16

winter) recorded at the site. Based on its surroundings, species such as Chaffinch, Goldfinch and Greenfinch were expected at the site, which are species that usually tolerate urbanised surroundings. Interestingly, the lack of habitats such as coastal grassland, gorse of heathland in the vicinity did not seem to affect the abundance or presence of species such as Linnet, Skylark and Stonechat, as it seems to happen at other sites with similar surroundings. This could be due to the antiquity of the site, which has been planted consistently for at least the last 10 years and attracts large numbers of other species, plus the short crop of cut grass and the bramble hedge around the grazed paddock where the Skylarks and Stonechats were found respectively.

It would have been preferable to have the whole field planted, but the half which had grass and then was cut still attracted Meadow Pipit, Skylark and even a Common Snipe. If the total area of the field were to be planted it would be interesting to see how it affects the diversity and abundance of the site.

4.13.5 Recommendations

- To continue planting and monitoring this site.
- To increase the planting area to cover the rest of the field or other adjacent fields if possible.
- To encourage the planting of other beneficial crops in the area such as barley, mustard or prickly potato, where WBCs are not possible, with a management regime that includes cutting and leaving some of them in overwinter stubble.

5. FINAL CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

- In 2016 most of the winter bird crops were planted within the recommended timeframe and, with a few exceptions, developed in height, structure and seed variety.

- The fields that were observed with the highest numbers of birds, like J16 in Sorel for example, had thick hedges in most boundaries and were not the largest fields of their sites. This might suggest that hedges and field size or shape are more important that we already thought. If the hedge is crucial for field utilization, then perhaps the most effective way to optimize utilization of the crop is by planting it in narrow and long fields with good hedges on the long sides.

- The sites with highest densities were the smallest ones too, with only one field each. Both had been planted in the past before they were included in the BOTE scheme, and neither is in an area with natural habitats such as gorse, heathland, scrub or reeds. The high density at the site could be explained by the fact that birds would have no other areas of quality to feed from and, therefore, they would all concentrate at the one field. This proves that even small sites with one field can be highly effective; however, the downside is that the main source of food disappears once when the field is ploughed. The density of birds at these two top-performing sites dropped dramatically after the field at each site was ploughed.

- The winter bird crops are an effective tool to provide target species with a source of food in the winter. The evidence suggests that the bird numbers are significantly higher at crop sites while the crops have seeded and that the numbers decrease steeply after the crops are removed.

- The most abundant target species recorded at the WBCs are Chaffinch, Linnet, Starling, Goldfinch and Greenfinch. Other species present which also benefit indirectly from the sites are Skylark, Meadow Pipit, Stonechat and Song Thrush.

- It is believed that a high percentage of target birds feeding at the sites are wintering individuals, this is likely to have a positive effect on local breeding birds by increasing their chances of survival and by recruitment into the local breeding population.

- In relation to the WBCs planted in 2013, the surface area planted in 2014 increased by 137.4% and there was a net increase of density of target birds of 73.8%.

- The winter bird crops were more likely to develop the desired heights and seed load if they had been planted between May and June.

5.2 Recommendations

1) Plant winter bird crops at all sites again, except Câtel unless the recommended changes in the management can be implemented.

2) Increase the planted area of the existing sites, especially the ones with one single field and the ones with highest densities (in some cases they are the same).

3) Plant the winter bird crops at the times recommended by the seed producer and leave the crops until late February-March.

4) Set up an unplanted control site similar to the one monitored in 2013-14.

5) Adapt the type of crop and management to particular target species if necessary, such as Cirl Bunting, Yellowhammer, Skylark or Reed Bunting.

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APPENDICES

I. Summary of fields planted with Winter Bird Crops (removed)

II. Common and scientific names of species

Common name	Scientific name
Greylag Goose	*Anser anser*
Western Marsh Harrier	*Circus aeruginosus*
Hen Harrier	*Circus cyaneus*
Eurasian Sparrowhawk	*Accipiter nisus*
Common Buzzard	*Buteo buteo*
Water Rail	*Rallus aquaticus*
European Golden Plover	*Pluvialis apricaria*
Northern Lapwing	*Vanellus vanellus*
Stock Dove	*Columba oenas*
Common Wood Pigeon	*Columba palumbus*
Barn Owl	*Tyto alba*
Common Kestrel	*Falco tinnunculus*
Merlin	*Falco columbarius*
Peregrine Falcon	*Falco peregrinus*
Western Jackdaw	*Corvus monedula*
Northern Raven	*Corvus corax*
Eurasian Skylark	*Alauda arvensis*
Sand Martin	*Riparia riparia*
Barn Swallow	*Hirundo rustica*
Common House Martin	*Delichon urbicum*
Cetti's Warbler	*Cettia cetti*
Common Chiffchaff	*Phylloscopus collybita*
Willow Warbler	*Phylloscopus trochilus*
Eurasian Blackcap	*Sylvia atricapilla*
Dartford Warbler	*Sylvia undata*
Common Starling	*Sturnus vulgaris*
Song Thrush	*Turdus philomelos*
Spotted Flycatcher	*Muscicapa striata*
Whinchat	*Saxicola rubetra*
European Stonechat	*Saxicola rubicola*
Northern Wheatear	*Oenanthe oenanthe*
Yellow Wagtail	*Motacilla flava*
Meadow Pipit	*Anthus pratensis*
Brambling	*Fringilla montifringilla*
Common Chaffinch	*Fringilla coelebs*
Eurasian Bullfinch	*Pyrrhula pyrrhula*
European Greenfinch	*Chloris chloris*
Common Linnet	*Linaria cannabina*
European Goldfinch	*Carduelis carduelis*
European Serin	*Serinus serinus*
Yellowhammer	*Emberiza citrinella*
Cirl Bunting	*Emberiza cirlus*
Common Reed Bunting	*Emberiza schoeniclus*