

## **The RSPB Scotland strategy for machair management with particular reference to birds and achievements of the great yellow bumblebee project**

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### **INTRODUCTION**

The Royal Society for the Protection of Birds (RSPB) Scotland has a long history of involvement with machair and the rich and varied wildlife it supports. The large numbers and variety of birds found in areas with machair make it of special significance. For example, the machair and associated “blackland” found on the Outer Hebrides support the densest concentrations of breeding waders in Britain and form one of the most important wader breeding grounds in western Europe (Fuller & Jackson 1999). Well managed machair can support huge numbers of breeding birds, surveys in 1983 estimated 17,000 pairs of breeding wading birds on the Uist machair alone including 25% of the total UK populations of ringed plover (*Charadrius hiaticula*) and dunlin (*Calidris alpina*) (Fuller *et al.* 1986).

Within the machair areas, our nature reserves and management agreements are long standing and intimately reliant on the involvement of local farmers and crofters. For example, our reserve at Balranald on N.Uist was established over 40 years ago and is an excellent example of a partnership between a conservation organisation and a crofting community regularly holding upwards of 30 corncrakes (*Crex crex*) and being one of the top visitor attractions in the Western Isles. On Tiree, our reserve on The Reef is an extensive and diverse machair plain that is maintained and managed in agreement with the local graziers. Here, the practice of seasonal cattle grazing produces exactly the right conditions for wildlife to thrive with clouds of breeding wading birds of many species and an ever changing carpet of wildflowers, including the rare Irish ladies tresses (*Spiranthes Romanzoffiana* Latin name).

### **Identifying importance and priorities**

Since the early 1990's the RSPB have adopted a strategic approach to conservation, largely driven by the need to tackle a multitude of issues with finite resources. This approach led to the production of species and habitat action plans, in line with the Convention on Biological Diversity signed by 150 countries in 1992 and the UK Biodiversity Action Plan. We have been able to do this for bird conservation due to the results of many decades of data gathering and analysis that resulted in the production of red data lists (Batten *et al* 1990), The atlas of breeding bird

distribution (Sharrock 1976 and Gibbons *et al* 1993) and Important bird areas in the UK (Pritchard 1992). Using criteria for assessing the conservation status of birds (JNCC 1996), species with recent sharp declines in numbers and contractions in range received a higher conservation priority. High priority species for machair include the many wading birds that can breed at very high densities such as lapwing (*Vanellus vanellus*), redshank (*Tringa tetanus*), snipe (*Gallinago gallinago*), ringed plover and dunlin. Also of priority are corn bunting (*Miliaria calandra*) and corncrake, two species that have contracted in number and range due to changes in agricultural practice. Both were much more widespread across the UK but now are quite restricted in range. Once a common and widespread bird, the corncrake had declined to 3250 calling males by the early 1970's with only 478 recorded by 1993 (Green and Gibbons 2000). The concerns over this decline in numbers and range led to corncrake being given the highest level of conservation priority by the IUCN, as being threatened with global extinction.

### **Finding solutions and developing the role of the RSPB**

The RSPB approach to conservation problems, once they are identified, is to research the issue thoroughly and trial a range of solutions, often on our own nature reserves and land holdings. In 1992 the RSPB and NUI Cork jointly funded a PhD study into the ecology of the corncrake and investigated what factors were reducing the UK population (Tyler 1996). The research confirmed that the main problem was the extremely low numbers of young being produced each year (Tyler *et al* 1998). The main factors driving this low productivity were the loss of “traditional” grassland mosaics with tall grass crops or peripheral vegetation persisting into late summer. The move from hay, cut late in the year, to silage cut from as early as May in some areas, had left the only suitable habitat for corncrakes in the crofted landscapes of the Hebrides, parts of Caithness and Sutherland and parts of Orkney.

The approach that the RSPB have taken with the great yellow bumblebee has been very similar. Once widespread across the UK, now restricted to parts of the Hebrides, the north coast of Scotland and the

Orkney Islands, the range contraction and the reasons for it mirror those seen for corncrake (Fig. 1).

In 2003 The RSPB and the Institute of Zoology jointly funded a PhD researching the ecology of the great yellow bumblebee (Charman 2007). The research concentrated on what the bee required during its relatively short season from queens emerging from hibernation in late May to new queens leaving the nest and preparing for hibernation in August. The work identified a sequence of foodplants used through this summer season and together with work being undertaken by the Highland biological recorders helped to piece together some of the reasons why the great yellow bumblebee was no longer widespread across the UK. The main factors appeared to be the loss of foodplants at key times of year, this being linked to increasingly intensive management of grasslands.

Together with the suite of species that have always been restricted to machair such as Slender naiad (*Najas flexilis*), belted beauty moth (*Lycia zonaria atlantica*) and the northern Colletes (*Colletes floralis*), the biota that machair now supported highlighted its importance and the need for sympathetic management. In 1999 the JNCC published the Machair Habitat Action Plan (JNCC 1999) in which the world wide extent was estimated at 25,000ha with 17,500ha in Scotland. The main objectives for this action plan were to maintain the existing extent and reduce by 30% the amount of agriculturally improved machair grassland by 2010. The RSPB has an obvious vested interest in contributing to the achievement of these objectives as in doing so we can achieve our own objectives for corncrake, corn bunting and breeding waders, together with those for great yellow bumblebee and northern colletes, for which the RSPB are action plan joint lead partners.

### **Testing strategies and actions for recovery of populations and habitats**

There are three main grassland management actions that can be adjusted to suite the requirements of corncrake and great yellow bumblebee. Keeping areas of un-grazed vegetation that acts as cover for returning corncrake and/or flower source for emerging bumblebee queens; sowing arable crops that include flowering plants for bumble bees; creating or maintaining species rich grasslands that include red and white clover and other bee food sources, and that are not mown or grazed until late August/September.

Some of the trial management for corncrakes involved developing and testing various arable crops to provide cover in the spring and also winter food for passerines such as twite (*Carduelis flavirostris*) and corn bunting (*Emberiza calandra*). In partnership with the Glasgow Natural History Society (GNHS) and with funding generously provided by Esmée Fairburn Foundation, Heritage Lottery Fund and Forward Scotland, the RSPB were able to modify these arable plots for the great yellow and other bumblebees. This involved simply adding more of the required food plants as

identified through research (Charman 2007). By 2008 we were managing 54ha of arable land in this way on 9 sites, providing flowering plants at the start and end of the bumblebee season free from grazing livestock.

Adjustments were also made to the management of hay and silage meadows and field margins and headlands (early cover areas), to make them more suitable for great yellow bumblebees. This involved moving the cutting or grazing dates back to the end of August and into September if possible, leaving uncut and ungrazed flower rich areas and reseeding with suitable flowering plants within the seed mix. Nature reserves with machair on N.Uist, Coll, Tiree, Oronsay and Islay and also reserves and agreements on Skye, Mull, Orkney, in the North of Scotland and at Vane Farm in Kinross (a historic location), have all adapted their management accordingly. This is probably the first time that such targeted action has been directed towards benefiting an invertebrate over such a wide area in Scotland, if not the UK (Table 1).

Where grasslands, including machair, have been agriculturally improved and reseeded with a high proportion of rye grass, a late cutting or grazing date can be problematic. This is because many of the rye grass cultivars are quick and luscious growing and have been developed to be ready for mowing to produce silage early in the summer. Delaying mowing can therefore lead to a collapsed or lodged grass crop. Also, within a relatively intensively managed rye grass sward there are very few flowering plants. This is because they cannot compete with the rye grass, they have no time in which to develop flowers and set seed before the usual cutting dates. They may also have been treated with herbicide prior to reseeding. Agricultural intensification has been shown to have an impact on the variation in crop structure creating a simpler more homogeneous and denser sward. (Wilson *et.al.* 2005). To change this we have been developing seed mixes that include higher diversity of grass cultivars and species and flowering plants such as red and white clover. Where necessary we have been using such mixes in a programme of reseeding our grass fields as part of the usual rotational management (Table 2).

One of the reasons that machair grassland is so flower rich is the relatively low intensity of management that persists on some of the crofts and farmland. A system of rotational cropping with crops such as bere barley, black oats and rye has been practiced for generations, without herbicide or large amounts of compound fertiliser. The machair grasslands within such systems can have a very high diversity of flowering plants throughout the summer. In partnership with the Bumblebee Conservation Trust (BBCT) and The University of Stirling we are researching methods to restore flower rich machair – (see Redpath *et al* this volume). With this research we hope to be able to provide details of cost-effective management techniques that would enable land managers to recreate diverse machair where the original sward has been

replaced by more intensive, low diversity rye grass leys. By 2008 we were managing just over 1400ha of grass crops that would be cut or grazed at the end of August or early September: 1184ha was within the current range distribution of great yellow bumblebee and 888ha of this was on machair. Our management will ensure that eventually this area will all become species rich grassland.

### **An integrated approach to conservation**

In general, conservation of a habitat or for a widespread population cannot be done via nature reserves alone. Machair, great yellow bumble bees and corncrakes require more than what can be achieved on these relatively small patches of land. To help achieve appropriate management and also to restore good quality habitat in the wider countryside the RSPB work at several levels, from influencing public policy to innovative partnerships, such as the Nadair LIFE project and the Great Yellow Bumblebee Project. Where it makes good conservation sense, we have acquired land and entered into management agreements and these have been used to enhance our advocacy and advisory work. Owning and managing nature reserves allows the development of a series of core sites where high quality management for key species can be guaranteed. These core areas then act as focal points for activity to influence and promote positive management in the surrounding area via advice, demonstration, or simple word of mouth.

An integral part of the great yellow bumble bee project was to publicise and promote good management practice. Working with the BBCT and GNHS we produced an advisory leaflet for farmers, crofters and land managers and also provided specially produced education packs to schools throughout the range of this species. Part of this was the production of a 'Brilliant Bumblebees' poster as part of the Great Yellow Bumblebee education pack. It is currently being translated into Gaelic with two elements - a teachers pack, which includes lesson notes and activities about the great yellow bumblebee, and bumblebee identification materials for children living in the project area to use.

For corncrakes and bumblebees, the research findings and results of trial management were translated into management solutions. RSPB Scotland was involved in the stakeholder process for re-designing Scotland's agri-environment schemes and could therefore input information from this work. As a result there is a range of management options and requirements for these two species within the Government led Scottish Rural Development Programme (SRDP) 2007-2013. This provides a landscape scale £1.6 billion programme of economic, environmental and social measures designed to develop rural Scotland over the six year period.

RSPB Scotland will continue our advocacy through various agri-environment stakeholder and technical working groups, to the benefit of the great yellow bumblebee. One of our key advocacy priorities is highlighting the need for adequate funding for

Scotland's agri-environment programme, to the benefit of the great yellow bumblebee and many other species. This will be carried out at all levels of government, from the EU and European Commission, to Westminster, and to Scottish ministers and the rest of the Scottish Parliament. We will also input the results of our management for great yellow bumblebees into the Species Action Framework that Scottish Natural Heritage (SNH) implement for this species. In these ways we aim to influence and promote beneficial management for machair and the species it supports over its whole extent in Scotland.

### **Has it worked?**

In areas that support corncrake and great yellow bumblebee RSPB Scotland now has 20 nature reserves and over 50 land management agreements covering nearly 3,000ha. Over half of this area is managed grassland and this includes some of the very best examples of machair in the world. All RSPB Scotland nature reserves undertake annual monitoring of key breeding and wintering birds and also report on habitat management. We know that in 2008 a total of 1472ha of grass crops were being managed for corncrakes and bees, of which 888ha was machair. With the 92.2ha of early cover and 54ha of arable cover crops this habitat attracted 240 calling male corncrakes, about 20% of the UK total (1178). Thirteen of the 20 reserves have had great yellow bumblebees using them in the past three years. The remaining seven are currently just outside the range distribution of the great yellow bumblebee and now offer the chance of range expansion for this species.

It is safe to say that our programme of work, together with the GNHS and others has helped to raise the profile of this species with the result that it now is recognised in many Local Biodiversity Action Plans, is included in SNH Species Action Framework and features as a priority species in the new SRDP.

Our strategic approach over the next five years will aim to safeguard the extent and quality of the machair habitat and the varied and special wildlife it supports. We will continue to achieve this through a wide variety of means, from the direct management of nature reserves, to partnership projects with others and positive advocacy and policy work. We will also promote the restoration of degraded machair habitat, where possible and practical so that the future of one of Scotland's most unique and enigmatic wildlife havens is secured.

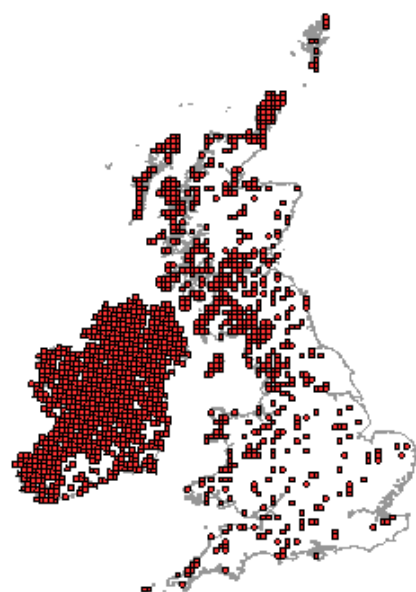
<b>Reserve holdings and agreements (by island/island group)</b>	<b>Early Cover (ha) (grazing break from 1<sup>st</sup> April to September or longer)</b>	<b>Cover crop or arable with flowering plants (ha)</b>	<b>Late cut or grazed species rich grassland (ha) (no grazing or mowing between 1<sup>st</sup> April and mid to late August or longer)</b>
Orkney	17	13	64
Durness	12	1.2	58
Broubster	1	2.4	37
N.Uist	13.4	13	94
S.Uist	2.6		9
Skye	1.7	0.4	7.8
Tiree			177
Coll	21		566
Mull	2		
Colonsay			160
Oronsay			42
Islay	21.5	24	175
Vane Farm*			26
<b>Totals</b>	<b>92.2</b>	<b>54</b>	<b>1415.8</b>
<b>Machair</b>	<b>41</b>	<b>13</b>	<b>888</b>
<b>In GYBB range</b>	<b>68</b>	<b>27</b>	<b>1184</b>

\* Area being managed by BBCT with the RSPB Scotland nature reserve

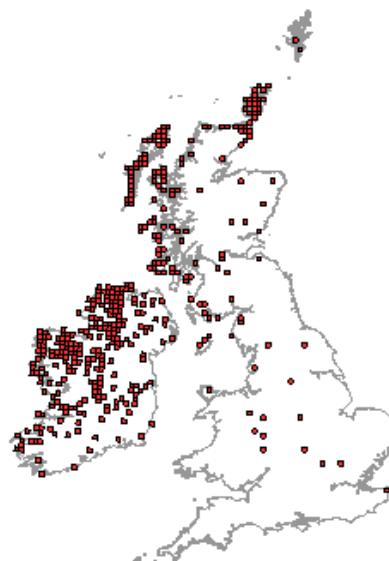
**Table 1.** Locations being managed for the great yellow bumblebee and corncrake between 2004 and 2008 by RSPB Scotland in partnership with GNHS and supported by Esmée Fairburn Foundation, Heritage Lottery Fund, Forward Scotland and SNH.

<b>In-by Grassland seed mix - Orkney</b>		<b>Kg/ha</b>
Rye grass	Bastion	2
	Premo	1.5
	Morgana	1.5
	Morenne	4
	Talbot	3
	Fantoom	1
	Lamora	2
	Springfield	3
	Belfort	5
	Condesa	2
Timothy	Scots	7
	Goliath	2
Fescue	Rossa	0.5
	Comtessa	1.5
White clover	Huia	2
	rivendell/kent/donna	2
Red clover	Britta	2
Kidney vetch	<i>Locally sourced</i>	0.5
Tufted vetch	<i>Locally sourced</i>	1

**Table 2.** A typical seed mix with sowing rates. This was used in trial plots in Orkney from 2004 and is now the basic seed mix for use on RSPB Scotland nature reserves where reseeded to provide a flower rich grass crop that can be harvested late in the season. Rates and varieties will differ slightly according to location and soil types.

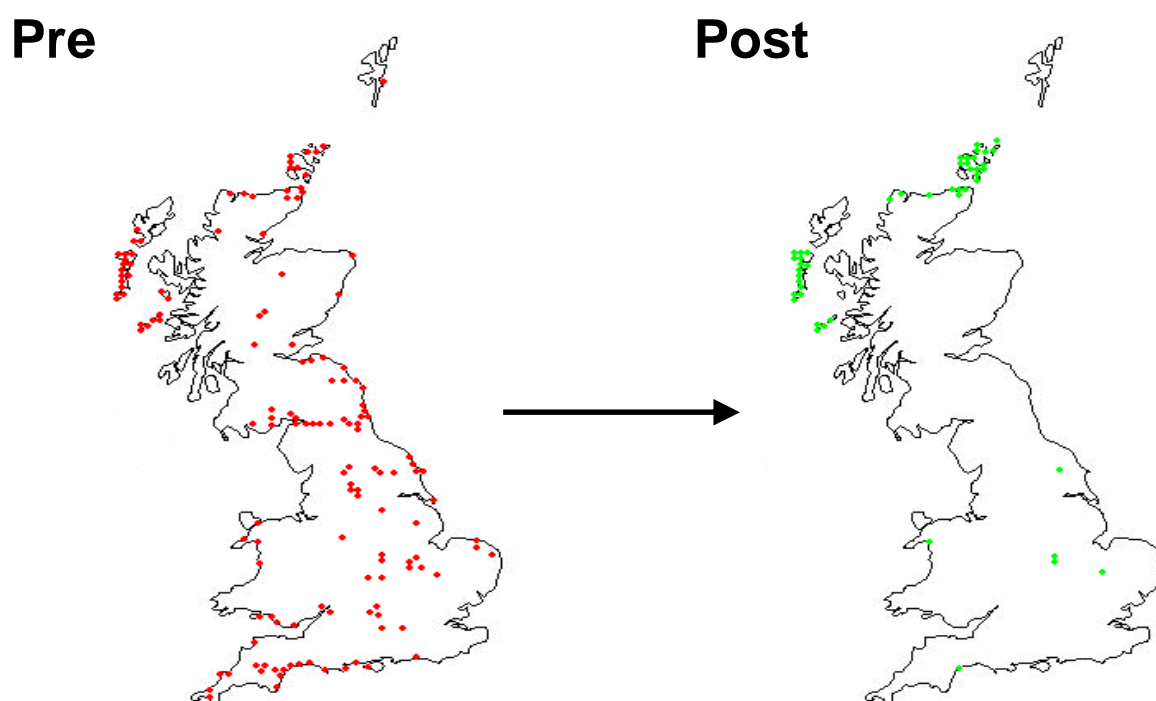


Corncrake distribution 1968 –1972



Corncrake distribution 1988-1991

**Fig. 1.** Distribution of Corncrake (*Crex crex*) from BTO Atlas data (from NBN Gateway)



**Fig 2.** Map of past and current distribution of great yellow bumblebee. From Charman (2007).

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