

## Meadow management and occurrence of corncrake *Crex crex*

Åke Berg<sup>a,b,\*</sup>, Tomas Gustafson<sup>b</sup>

<sup>a</sup>The Swedish Biodiversity Centre, SLU, Box 7007, SE-750 07 Uppsala, Sweden

<sup>b</sup>Department of Conservation Biology, SLU, Box 7002, SE-750 07 Uppsala, Sweden

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### Abstract

The aim of this study was to analyse the occurrence of corncrakes in two Swedish meadow sites managed by mowing and grazing, but also with abandoned meadows. Most corncrakes (58%) on meadows were found in unmanaged areas without subsidies to the farmers (i.e. areas with tall vegetation). Several corncrakes (62%) were found in restored areas, managed for less than 10 of the last 40 years, fewer (38%) in areas under continuous management. Vegetation height was negatively associated with number of years of management the last 40 years, and the continuously managed areas were avoided by corncrakes. Sites where corncrake territories occur regularly should be managed to maintain tall vegetation suitable for the species, which requires increased use of mowing. However, the results from our study also suggest that yearly mowing might result in a vegetation structure that is avoided by corncrakes. To achieve a balance between tall grassy vegetation and prevention of succession to scrub a possible management regime would therefore be mowing at intervals of a few years.

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### 1. Introduction

Long-term reductions of bird populations in farmland have attracted attention among scientists and conservationists in western Europe (e.g. Robertson and Berg, 1992; van Strien et al., 2001), especially in Britain (e.g. Chamberlain et al., 2000; Newton, 2004). For most species, the modernisation of farming has been viewed as the main cause of the observed decline (Fuller et al., 1995; Newton, 2004).

A major change in farmland landscapes has been the drastic reduction in the area of semi-natural pastures and meadows. In Sweden, the total area of semi-natural grassland was estimated at 2 000 000 ha in 1870, but to less than 400 000 ha in 1990. A large part of the decrease was due to cultivation or abandonment of wet meadows,

which were reduced from 1 200 000 to 24 000 ha during the same period (Bernes, 1994). At present, 46% of the species on the Red List of Swedish Species occur in the agricultural landscape (Gårdenfors, 2005) of which semi-natural grasslands are identified as the most important farmland habitat.

During the 1990s, the number of restoration projects on semi-natural grasslands increased, especially on wet meadows. Subsidies have financed many restoration projects and are important for the maintenance of the present management regimes (Swedish Board of Agriculture, 1999; Stenseke, 2004). The allowance guidelines have required intensive yearly management. However, the effects of such management regimes on species with different habitat demands have not been evaluated properly (cf. Hellström and Berg, 2001). The general effects on biodiversity of agri-environment schemes have also been debated (Kleijn et al., 2004). A Dutch study of the effects of “meadow bird agreements” between farmers and authorities (i.e. postponed first date for agricultural activities on meadows) found that population trends for selected meadow birds between sites with and without agreements did not differ,

\* Corresponding author at: The Swedish Biodiversity Centre, SLU, Box 7007, SE-750 07 Uppsala, Sweden. Tel.: +46 18 672624; fax: +46 18 673537.

E-mail address: [Ake.Berg@cbm.slu.se](mailto:Ake.Berg@cbm.slu.se) (Å. Berg).

probably because the schemes were not targeted at areas with the most appropriate soil moisture conditions (Kleijn and Zuijlen, 2004).

In central Sweden management-dependent species (e.g. waders) and the corncrake occur in the same meadow sites. Thus, management of wet meadows supported by subsidies should benefit both species preferring short vegetation, such as the lapwing *Vanellus vanellus* (Klomp, 1954) and other waders, and species preferring tall vegetation such as the corncrake *Crex crex*. Today the corncrake is classified as near threatened across its range (BirdLife International, 2004). In Sweden, the corncrake is classified as vulnerable (Gärdenfors, 2005) and occurs mainly on wet meadows, but in some regions the most important habitat is cultivated grassland (Ottwall and Pettersson, 1998a). The species has increased in numbers in central Sweden during the last few decades (SOF, 2003), whereas it has continued to decrease regionally in southeastern Sweden (Ottwall and Pettersson, 1998b).

The aim of this study was to investigate occurrence of corncrakes in different habitats in two farmland sites in central Sweden. Both sites have large areas of wet meadows that until recently were abandoned and unmanaged (no grazing or mowing). However, today large parts of these meadows have been restored and are currently managed by grazing or mowing. Here we analysed: (1) preferences of the corncrake for meadows with different management regimes and vegetation height and, (2) effects of management continuity on vegetation height and corncrake occurrence. Effects of different management regimes on meadow birds in Sweden, especially the corncrake, and management strategies for corncrakes and other meadow birds are discussed.

## 2. Methods

Corncrakes were censused at two study sites in central Sweden. The first site, the Svartån area, consists of 59 km<sup>2</sup> of mixed farmland around the village of Västerfärnebo in the province of Västmanland (approximate location 59°57'N, 16°17'E). Arable fields are the dominant habitat in the area (72% of the farmland area). However, remnants of wet meadows cover large areas (13% of the farmland area). During years with maximum spring flooding, the meadows and large areas of the arable fields are flooded from mid-April to mid-May (up to 22% of the farmland area). Approximately 42% of the managed meadows are used for mowing and 58% of the meadows are grazed by cattle (a low grazing pressure with less than one animal per ha in most areas). However, 19% of the meadows are not managed (grazed or mowed) and have been abandoned during the last 40 years. Parts of the site are considered to be of great conservation interest because of breeding and migrating birds, and are therefore included in the Convention of Wetlands (Swedish Environmental Protection Agency, 1989).

The second smaller site, the Fyrisån site, is situated in Uppsala (approximate location 59°56'N, 17°45'E) and consists of 4 km<sup>2</sup> of farmland just southeast of Uppsala along the river Fyrisån. Arable fields cover 55% of the site, but large areas of wet meadows are found in the site (45%). Thirty-five percent of the meadows are unmanaged (not grazed or mowed during the last 40 years), 35% are managed by mowing and 30% are managed by grazing. Restoration measures and management projects have improved the conditions for management-dependent meadow birds in the area. Until recently, most meadows were abandoned and overgrown with shrubs and tall vegetation also in this area. However, restoration programmes initiated in 1998 have increased the grazed wet meadow area substantially (from almost 0 to 62 ha).

All arable fields and meadows at the two study sites were censused for calling corncrake males with territory mapping (Bibby et al., 1992) during four nights (22:00–05:00) in spring (15 May–25 June) each year during 1999–2002. The position of all calling males was recorded on maps. All sites with at least two observations (all calls during one night were classified as one observation) within 100 m were classified as territories.

The habitat was classified as cereal crop (all annual spring-sown and autumn-sown crops), set-aside (including both rotational and permanent fallows), ley (sown cultivated grassland with grass or clover), abandoned wet meadow (currently unmanaged, usually abandoned for more than 10 years), wet meadow used for mowing or meadow used for grazing. The study meadows have natural vegetation, are uncultivated and unfertilised. Mowed areas are cut once a year (in mid-July) and grazed areas are grazed by cattle from beginning of June to beginning of October. Arable fields are dominated by spring-sown and autumn-sown cereal crops (55–65%), leys and cultivated pastures (15–25%) and set-asides (10–20%). Leys are cut twice every year, the first time in the beginning of June and the second in late July. They are usually fertilised with 130–190 kg nitrogen per ha and year.

Habitat selection of corncrakes on meadows was analysed by comparing habitat composition within territories and random meadow sites (radius of 200 m). These sites were randomly selected from a 100 m × 100 m grid system covering the sites by the use of random number tables. Fifty-two random sites (13 new sites each year) were situated in the Svartån site and 32 (eight new sites every year) in the Fyrisån site. The proportion of arable land, wetland and the proportion of meadows with different management regimes (grazing, mowing or unmanaged meadow) were estimated within territories and random sites. Distance to nearest forest edge and nearest wetland (river or lake) was also measured.

The vegetation height was measured with a measurement stick (Stewart et al., 2001) at sites with calling corncrakes and in the centre of all random sites. A single vegetation height measurement was made at each site in order to reflect

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