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Is there a viable population of Corncrakes *Crex crex* on Öland, southeastern Sweden? : habitat preference in relation to hay-mowing activities

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Abstract

Corncrake *Crex crex* numbers have declined on Öland, southeastern Sweden from 239 singing males in 1972–75 to 90 singing males in 1997. During the same period, the median date for the harvesting of silage and hay advanced about two weeks from late to early June. A census conducted in 1997 revealed that 86% of Corncrake males used silage or hay fields as calling sites before harvest. Alternative habitats after mowing were set-aside fields with *Phleum pratense*, meadows dominated by grass, and on southern Öland vegetation with herbs such as *Anthriscus sylvestris, Urtica dioica* and *Filipendula ulmaria*. Between the early 1970s and 1997, the number of singing males had decreased in almost all parishes that previously held large number of Corncrakes. The only exception was Löt where 24 males were registered in late June 1997 (26 in the early 1970s). This area probably attracted birds that had failed elsewhere. Later mowing at Löt in 1997 allowed survival to hatching of a small proportion of first broods in silage fields. However, successful reproduction in silage or hay fields of repeat and replacement broods was not likely as all fields were mown before 20 July. This study indicates that the breeding success of Corncrakes on Öland is below what is needed for a viable population.

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Introduction

The Corncrake Crex crex has suffered a dramatic decline in western Europe in the twentieth century (Tucker & Heath 1994). The species' breeding habitat is mainly agricultural land in flooded meadows, alpine meadows and dry meadows for hay production (Cramp & Simmons 1980). Changes in agricultural practises on the breeding grounds is considered to be the main cause for the decline (Norris 1947, Green 1995). Extended use of fertilizers and an increase in the proportion of grass harvested for silage have led to earlier mowing dates. Green & Rayment (1996) found negative correlations between Corncrake population density and the intensity and degree of mechanisation of farming. In parts of the breeding range with extensive agriculture management, Corncrakes are still abundant. In Sweden, the population size of Corncrakes has been rather stable, however with quite large between-year fluctuations since the 1950s (SOF 1990, Pettersson 1995, Ahlén & Tjernberg 1996). A survey on Öland, southeastern Sweden, in 1994 registered only 137 singing males compared to 239 males in 1972–1975, thus suggesting a rather strong decline on this island (Rodebrand 1978, Pettersson 1994).

A radio-telemetry study on southern Öland showed that Corncrake males mainly used wet meadows, tall herb vegetation like *Anthriscus sylvestris* and *Urtica dioica*, and silage fields (Ottvall & Pettersson 1998). Due to the secretive behaviour of Corncrake females that were not radio-tagged, it was not possible to establish the impact of hay-mowing on the reproductive success in our study area. We know, however, that all silage fields in our study area were cut too early to allow any reproduction of young, but we have no data on the reproductive success in other habitats.

Habitat choice of Corncrakes is similar during daytime and at night (Stowe & Hudson 1991, Ottvall & Pettersson 1998). Moreover, Corncrakes breed in the same habitats as used for the calling at night (Stowe & Hudson 1991). Therefore, a study of the habitats surrounding the nightly calling sites would provide important information on how suitable hab-

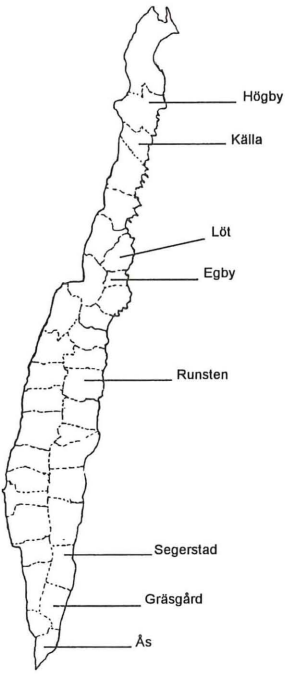

Figure 1. Map of Öland and the locations of eight parishes mentioned in the article.

Karta över Öland och lokaliseringen av åtta socknar som nämns i artikeln.

itat is affected by farming and enable us to draw some conclusions on how this may affect the viability of the population on Öland.

In this article, we present the results of a census of calling males and a vegetation classification of calling sites of Corncrakes on Öland in 1997. In particular we focus on two important questions: 1) How large proportion of the males are calling in silage fields before any cutting of grass? (We use this as an estimate of how many potential first breeding attempts that fail due to hay-mowing). 2) When grassland has been cut, are there any alternative habitats available for further breeding attempts?

Methods

Censusing Corncrakes

Corncrakes are secretive birds and hide in tall vegetation which makes them difficult to observe. The call is a characteristic "crex crex" which can be heard up to 2 km and the males perform their call mostly at night between 23.00h and 03.00h (Hudson et al. 1990, own unpublished data). Females have never been documented to call in the wild (Tyler & Green 1996), however, we have occasionally observed females calling with a characteristic song (Ottvall in prep.). Studies of radio-tagged male Corncrakes in Scotland have shown that there is an 80% probability to detect a territorial male on a single night check (Hudson et al. 1990, Tyler & Green 1996). Hence, nightly surveys of singing Corncrake males is a rather efficient way of estimating population numbers, even though the number of breeding pairs may not equal the number of calling males.

Similar to previous surveys on Öland (Rodebrand 1978, Pettersson 1994) the census work was divided into smaller census areas, parishes (Figure 1). Each field worker was responsible for one or several parishes. Volunteers were asked to listen for Corncrakes once before the start of mowing of silage fields in early June and once between 22 June and 5 July when the majority of the first harvest was expected to be accomplished. According to previous studies, the song activity decreases in mid July (Hudson et al. 1990, Green et al. 1997, own unpublished data). In our own studies, however, a radio-tagged male on southern Öland ceased singing already on 10 July when the bird started to moult. All volunteers were familiar with the parish/parishes they visited and had a good knowledge of where to find suitable Corncrake habitats. All visits were made at night between 23.00h and 03.00h local time. Night checks were done by car with stops approximately every 500 metres and each stop lasted for about five minutes. Nights with wind forces exceeding about 8 m/s were avoided. Cloud cover, precipitation and wind speed had no significant effect on the singing performance in a radio-telemetry study in Scotland, but strong winds tended to make it difficult to detect calling birds (Tyler & Green 1996).

Eight parishes were censused by the author and the rest by 13 volunteers. In the first part of the census, seven parishes were not covered and in the second part, six parishes were not sufficiently checked. In the survey of 1994 the parishes not covered in the present census contained less than 10% of the total number of calling birds (Pettersson 1994). Therefore, it is realistic to claim that only a few Corncrakes were missed in the parishes not surveyed in 1997. Few additional Corncrakes have spontaneously been reported by people not involved in the census. Such birds are included in the total sum of calling birds only if the risk of double counting has been considered to be small.

Classification of vegetation

If possible, the location of each calling male was plotted on a map (1:10 000). Later, a vegetation classification was done in the field in a square of 4.8 ha (220 x 220 m) centred by the calling site. This area is close to the mean home range size found for radio-tagged males on southern Öland (Ottvall & Pettersson 1998). Squares were classified by one of the authors (RO), mainly in July, but some squares were classified in late June or in early August. The areas of each vegetation category were later calculated by a digital planimeter that was placed on the map. Ten squares were not visited for a vegetation sampling, but the volunteers had been asked to conduct a habitat classification of the actual calling site. In these cases the volunteers' data were used.

Results

Weather and mowing in 1997

Rain and nights with low temperatures (sometimes even below 0° dominated in late May. However, conditions for grass growth in silage fields were excellent and the first fields at Ås parish were cut on 1 June. In many other parts of Öland, intensive mowing of silage took place in the first week of June. Due to the unexpected early mowing, the first night check in several parishes was just at the borderline to the first mowing, but this probably did not affect the census. Even if the first fields were mown early, in other fields mowing was considerably later due to high precipitation in mid June. Particularly the northern parishes were affected and when Löt was visited in early July, several hay fields were still uncut.

Distribution of Corncrakes on Öland

The first night visit resulted in 68 and the second in 58 calling males (Figure 2, Table 1). For a comparison with previous surveys, We combined the two checks and minimised double counts by not including birds calling within 300 m from each other at different visits. The combination of the two night visits gave a total of 90 birds (Table 1). Of 58 reported birds during the second night check, 24 were heard at Löt. This increase at Löt equals the decrease in the surrounding parishes of Alböke, Köping, Egby, Bredsätra and Gärdslösa.

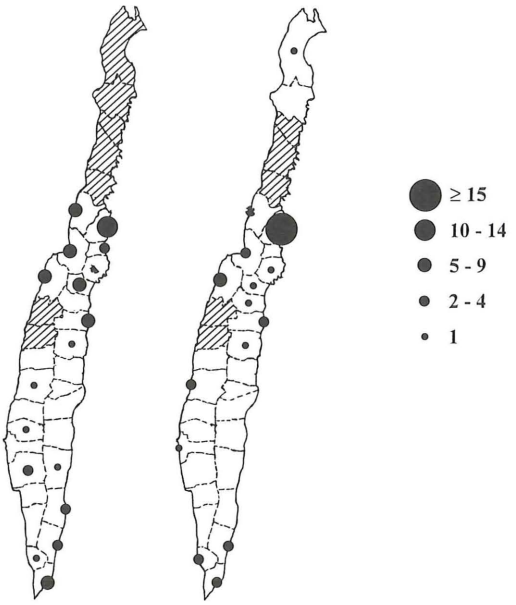

Figure 2. Number of singing Corncrake males in surveyed parishes on Öland in 1997. Shaded areas mark parishes not surveyed. First visit (left map) was before mowing and second visit (right map) after median date of harvest of silage and hay fields.

Ropande kornknarrar i inventerade socknar på Öland 1997. Rastrerade områden markerar ej inventerade socknar. Det första besöket gjordes före slåttern (vänstra kartan) och det andra besöket efter mediandatum för skörden av ensilage och hö (högra kartan).

Habitat selection

A compromise had to be made between efficiently counting the calling birds in a parish in the same night and to locate the calling sites precisely enough to describe the habitats. This explains why a habitat description is recorded for only about 65% of the calling birds.

Of 26 different vegetation variables chosen to describe the habitat in the 4.8 squares around the calling sites, 16 variables were representing habitats used by Corncrakes. For the statistical analysis, we combined the variables typical for meadow vegetation and the variables typical for pasture vegetation into two new variables. Meadows had similar vegetation and were often dominated by grass (height > 20 cm). Pastures were mostly too intensively grazed to be occupied by Corncrakes. Some pastures were more moderately grazed but then the vegetation was still too thin and too short to be used by Corncrakes besides for sporadic visits. By omitting unsuitable

Table 1. Number of singing Corncrake males at different parishes on Öland in 1997. Some parishes were not visited at all (–). I = first night visit (1–10 June) and II = second night visit (22 June–10 July). Birds recorded at the second night visit have been added as new individuals if not calling within 300 m from a calling site recorded during the first night visit.

Tabell 1. Antal spelande kornknarrshanar i olika socknar på Öland 1997. Några socknar besöktes inte alls(–). I = första nattbesöket (1–10 juni) och II = andra nattbesöket (22 juni–10 juli). Fåglar noterade vid det andra nattbesöket har inkluderats som nya individer endast då de har spelat minst 300 m från en spelplats registrerad vid det första nattbesöket.

Parish *Socken*	I	II	Total
Böda	–	1	1
Högby	–	0	0
Källa	–	–	–
Persnäs	–	–	–
Föra	–	–	–
Alböke	5	3	5
Löt	13	24	26
Egby	2	0	2
Köping	8	4	8
Bredsätra	2	1	2
Gärdslösa	5	1	5
Räpplinge	5	5	5
Långlöt	0	1	1
Högsrum	–	–	–
Runsten	6	4	8
Glömminge	–	–	–
N. Möckleby	1	1	2
Algutsrum	0	0	0
Torslunda	1	2	3
Gårdby	0	0	0
Sandby	0	0	0
Stenåsa	0	0	0
Vickleby	0	0	0
Resmo	1	0	1
Mörbylånga	0	1	1
Hulterstad	1	0	1
Kastlösa	3	0	3
Smedby	0	0	0
S. Möckleby	0	0	0
Segerstad	3	0	3
Gräsgård	4	4	4
Ventlinge	1	2	2
Ås	7	4	7
Total	68	58	90

ground (forests, roads and buildings) and variables with a very low representation in our data set, six different variables remained (Table 2). Not surprisingly, the area of silage/hay fields decreased between the two night visits. The use of areas with pastures, cereals and tall vegetation did not differ between the two periods. However, the use of areas with meadows and set-aside fields (e.g. with *Phleum pratense*) was significantly higher during the second visit. These two vegetation types together covered less than 20% of the surveyed squares during the second visit. In four parishes at least three squares were classified on both visits and the mean average areas of important vegetation variables are presented in Figure 3a–d. At the parishes of Ås and Runsten almost all silage or hay fields disappeared before the second visit, while in Löt and Gräsgård a larger proportion of this vegetation type were still present during the second visit.

A further analysis was conducted on the vegetation of the actual calling sites of Corncrakes. The majority, 86%, of known calling sites during the first night visit was located in silage or hayfields (Table 3). Included are four birds that were calling in narrow marginal zones next to silage fields, as they were known to have left their territories after mowing. During the second night visit, 50% of the calling sites were in silage or hay fields. Only 5% of the calling sites recorded from both visits were outside agricultural habitats, however also at these sites a large part of the habitat surrounding the actual calling sites consisted of silage or set-aside fields.

Discussion

Censuses of Corncrakes

The total number of calling males in 1997 was 90, which should be compared with 239 in 1972–75 and 102 in 1994 (Rodebrand 1978, Pettersson 1994). In 1994, 35 calling birds (25%) were reported by the public and are therefore not included in this comparison (Pettersson 1994). The high between-year variation in numbers of calling Corncrakes call for some caution when interpreting population trends based on single-year estimates. However, the surveys in the 1990s suggest a decline with 60% since 1972–75, that is a yearly decrease of about 4%.

There is some risk of double counts as birds that are forced to switch calling sites due to mowing may move large distances. The history of eight males on southern Öland that have had their calling sites in a silage field by the time of mowing is known from 1994–96 (own unpublished data). Seven birds were

Table 2. Average area of the most important vegetation variables in surveyed 4.8 ha squares around calling sites of Corncrakes on Öland. The first visit was before the first mowing (I; n = 36 calling sites) and the second visit (II; n = 34 calling sites) when most of the first harvest of silage and hay was accomplished. Differences between the two visits were tested with t-tests of arcsine squareroot transformed proportions.

Tabell 2. Medelarealen av de viktigaste vegetationsvariablerna i inventerade 4.8 ha rutor kring spelplatser för kornknarr på Öland. Det första besöket (I) gjordes före slåttern och det andra besöket (II) efter mediandatum för skörden av ensilage och hö. Skillnader mellan de två besöken testades med t-test på transformerade proportioner.

Vegetation variable	*Vegetationsvariabel*	I (ha)	%	II (ha)	%	p
Silage/hay field (Si)	*Ensilage/höåker*	2.89	61.4	1.67	35.2	<0.001
Set-aside field (S-a)	*Trädesåker*	0.16	3.4	0.51	10.8	0.028
Grass meadow (Me)	*Gräsrik äng*	0.06	1.3	0.39	8.2	0.034
Cereals (Ce)	*Sädesfält*	0.61	1.0	0.63	1.3	ns
Pasture (Pa)	*Betesmark*	0.27	5.7	0.39	8.2	ns
Tall vegetation (Ta)	*Högväxt vegetation*	0.18	3.8	0.12	2.5	ns
Number of squares	*Antal rutor*	36		34		

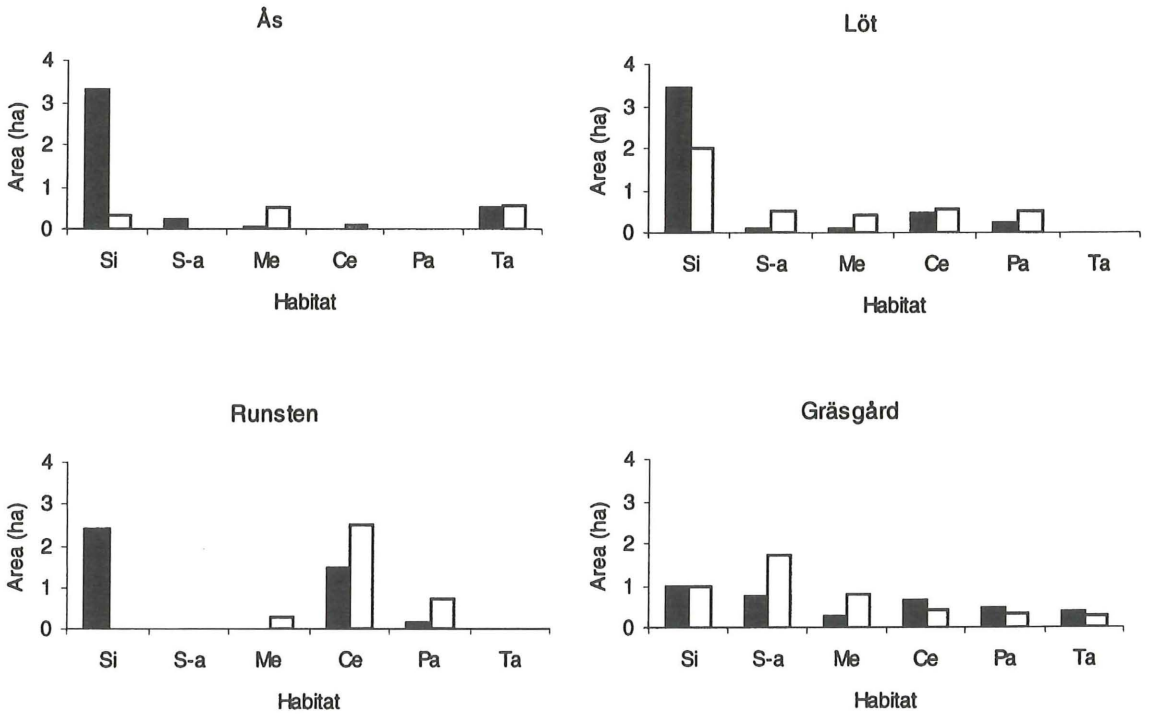

Figure 3. Average area of six important vegetation variables denoted as in Table 2 in squares around calling sites at four parishes; a) Ås, b) Löt, c) Runsten, and d) Gräsgård. Dark bars = before mowing (n = 7 squares) and light bars = after mowing (n = 4 squares).

Medelareal av sex viktiga vegetationsvariabler med beteckningar som i Tabell 2 i rutor vid kornknarrars spelplatser i fyra olika socknar; a) Ås, b) Löt, c) Runsten, och d) Gräsgård. Mörka staplar = före slåttern (n = 7 rutor) och ljusa staplar = efter mediandatum för slåttern (n = 4 rutor).

Table 3. Number of calling Corncrakes in different vegetation types. I = first night visit – before mowing, II = second night visit – when most of the first harvest was accomplished.

Tabell 3. Antal ropande kornknarrar i olika vegetationstyper. I = första nattbesöket – före slåttern, II = andra nattbesöket – när den mesta grässkörden var bärgad.

Vegetation types	*Vegetationstyper*	I	%	II	%
Silage/hay field	*Ensilage/höåker*	38	86.4	18	50.0
Set-aside fields	*Trädesåker*	0	0	8	22.2
Cereals	*Sädesfält*	2	4.5	4	11.1
Tall vegetation (e.g. *A. sylvestris, U. dioica, F. ulmaria*)	*Hög vegetation*	2	4.5	4	11.1
Potentilla fruticosa		1	2.3	0	0
Meadow dominated by grass and *F. ulmaria*	*Gräsrik äng med älgört*	0	0	2	5.6
Bush by a open ditch	*Buske vid dike*	1	2.3	0	0
Total		44		36	

tagged with radio-transmitters and one ringed bird was recaptured after the mowing. Two birds with transmitters could not be found again and probably left the study area. Five birds reappeared on new calling sites less than 500 m away but two males moved 2.5 and 3.0 km respectively. This suggests that the distance of 300 metres used in the present survey as a limit for not counting the same bird twice, is not enough to completely exclude double counts. Hence, the increase in the numbers at Löt between the two night visits in 1997 is probably best explained by immigration of displaced birds after mowing.

The survey method with two night visits that has been used on Öland, probably slightly underestimate the number of Corncrakes. However, the survey technique is still useful in estimating the viability of the Corncrake population on Öland.

Is there a self-sustaining population of Corncrakes on Öland?

It has been shown that female Corncrakes have the same habitat preference as males and that the majority of nests are located in the same habitat as males are using for calling (Stowe & Hudson 1991). In Scotland, radio-tagged females laid their eggs in nests less than 200 m from the male´s singing place (Tyler & Green 1996). On southern Öland, four clutches of young have been found less than 50 m from the male´s calling site (own unpublished data). The size of the squares around calling sites used in this study therefore should present the breeding habitat well.

Studies of radio-tagged female Corncrakes in Scotland showed that two broods were frequent in areas where mowing was late. Other studies in Poland and France suggest that females produce double broods in these areas (Broyer 1995, Schäffer 1995). Annual survival rates of adult Corncrakes appear to be rather low, it might be as low as 20% (R. Green pers. comm.). Similar to other studies (Fox 1993) we found a low retrap rate (13%) of ringed male Corncrakes in our study area, suggesting low annual survival of Corncrakes also on Öland. Assuming that female survival is equally low, this indicates that a large fraction of the females have to rear two broods to compensate for the high mortality.

The mean date of the first calling Corncrake male on southern Öland is 16 May based on data from 1963–91 (Pettersson 1992). The peak of the arrival to our study area is 20–25 May. We assume that females need two weeks for the pair-bond establishment and the laying of the first clutch of 10 eggs (Cramp & Simmons 1980, Tyler & Green 1996, Green et al. 1997). The incubation period is around 18 days (Green et al. 1997) which means that few, if any, clutches of the first brood hatch before 25 June on Öland. Data on agricultural land use in Sweden (SCB 1973–1993) demonstrate that the area used for lay (silage and hay) on Öland increased with 59% from 1972 to 1992. Median date of the first harvest in sample areas of lay-land in Kalmar county, which includes the island of Öland, has been advanced about two weeks during this period (Figure 4). In 1992, 91% of the lay-land in the sample areas was mown before 21 June. Mowing on Öland is sufficiently early to preclude any successful production

of a second brood in hay or silage, and the success of the first brood is also severely threatened. A further implication is that mowing removes the preferred nesting habitat which forces Corncrakes to breed in other habitats such as grass meadows and set-aside fields not liable to mowing. We know from our study area that Corncrakes are able to breed successfully in those alternative habitats, but we have only found small broods late in the breeding season (Ottvall & Pettersson 1998).

Rapid declines of Corncrake populations in western Europe are also related to the mean date of mowing (Broyer 1994, Green 1996). A simulation model developed in order to estimate the productivity in relation to mowing dates and mowing methods and based on reproduction values of radio-tagged females, indicates that a mean mowing date in mid August is required for Corncrake populations in Scotland to remain stable or increase (Green et al. 1997). Note that the retrap rate in Scotland is similar to what we have found on southern Öland (R. Green pers. comm.) and that almost all females in Scotland produce two broods. As another example, two regions in Ireland with a mean mowing date of 12 July had an average annual decline of 32% between 1988–91.

With the exception of some parishes with few calling Corncrakes, Löt is the only parish with the same number of calling males in 1997 as in 1972–75. Considering that the rest of the island suffered a 70% decline during this time and that 20 out of 36 known calling sites from the second night visit in 1997 were from Löt, the later mowing at Löt is of particular interest. The later mowing at Löt is probably best explained by conservative farmers that harvest a larger proportion of grass as hay rather than as silage. Two small fields (<2 ha) were not cut until 13 July and in one of them, 3–4 small young managed to escape the mower according to the farmer. However, also at Löt, most silage fields were mowed too early to allow any production of first brood young and all silage and hay fields occupied by Corncrakes on the second night visit were cut too early for repeat and replacement clutches to survive.

For a species depending on two broods, early mowing will lead to severe implications for the survival of the population. Consequently, censuses of calling males will give a too high estimate of the number of productive pairs and this has to be considered in future conservation actions. If birds move between areas, differences in trends among areas might not be caused by differences in breeding success but by differences in the capacity of habitats

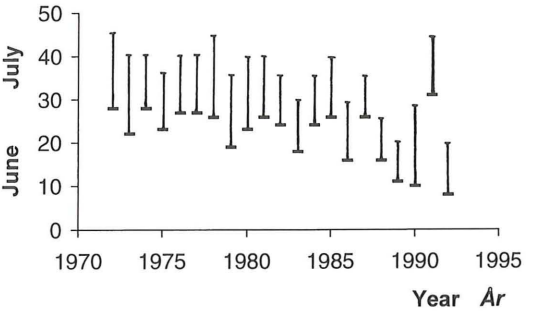

Figure 4. Median harvest date in June of ley (silage and hay) and the upper 90% confidence interval of harvest in sample areas in Kalmar county in 1972–92. Date 1 = 1 June. Data collected from SCB (1973–93).

Mediandatum för skörd av slåttervall och övre 90% konfidensintervallet av skörden i provytor i Kalmar län 1972–92. Dag 1 = 1 juni. Uppgifter från SCB (1973–93).

to attract birds who have failed to breed successfully elsewhere. Therefore, Löt parish with later mowing was attractive for a longer period of the season compared to Ås and Runsten where number of calling birds decreased between the two night visits (Figure 3a–d).

Our study strongly suggests that there is a low breeding success of Corncrakes on Öland, as a consequence of early mowing of the preferred habitat (silage and hay fields). The potential negative effect of this factor calls for great concern regarding the future for the Corncrake on Öland and in Sweden. The population of Corncrakes on Öland constitutes a substantial part of the total population in Sweden and therefore has a high conservation priority. The trend with earlier mowing dates is not unique for Öland, but is rather the overall trend in Sweden. Gotland and Uppsala county support considerable numbers of Corncrake and in 1972 the median date for the first harvest of lay was on 30 June and 29 June respectively (SCB 1973–1993). In 1992, however, the median date was 6 June on Gotland and 16 June in Uppsala county. The survival of the nation-wide population is most certainly dependent on immigration of birds from other areas where Corncrakes are still common. Although the present populations are quite large in eastern Europe (e.g. Mischenko et al. 1997), mechanisation of farming practises could lead to the same pattern of decline as observed in western Europe. Hence, to secure a viable population of Corncrakes on Öland and in Sweden, enough habitats suitable for successful breeding has to be set aside. In Great Britain a conservation programme

was initiated in the early 1990s (Stowe & Green 1997). Actions include delayed mowing of hay and silage, purchase and management of nature reserves and establishment of tall vegetation acting as cover for Corncrakes when grass in meadows are too short. The success has been immediate with an increase in Corncrake numbers by 30% over a 4-year period of management after a century of decline.

Similar conservation programmes ought to be implemented in Sweden, including later mowing of some fields and the establishment of zones of tall vegetation next to fields. The Corncrake is a flagship species for the better and urgent management of the agricultural landscape. Today several farmland bird species are declining (Robertson & Berg 1992). But if we can safeguard the Corncrake in modern agricultural areas, there should be hope for many other threatened species as well.

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Sammanfattning

Finns det en självbärande kornknarrspopulation Crex crex *på Öland?: biotoppreferens i relation till grässlåttern*

Jordbrukets modernisering med tidigarelagd gräsSlåtter som följd, anses vara den viktigaste orsaken till kornknarrens dramatiska nedgång i västra Europa under 1900-talet. I Sverige har antalet spelande kornknarrar visat stora årsfluktuationer men den generella nivån har varit tämligen stabil sedan 1950-talet. En inventering på Öland 1994 antydde dock att arten minskat på ön sedan 1970-talet (Rodebrand 1978, Pettersson 1994).

En radiosändarstudie på södra Öland visade att kornknarrshanar främst utnyttjade fuktängar, kantzoner med brännässla och hundkex samt ensilagefält (Ottvall & Pettersson 1998). Studien kunde emellertid inte fastställa slåtterns inverkan på häckningsframgången. Alla ensilagefält i studieområdet slåttrades dock alltför tidigt för att någon lyckad ungproduktion skulle kunna förekomma i den biotopen.

Vi presenterar inventeringsresultat och vegetationsklassificering av området närmast revirhävdande kornknarrar på Öland 1997 och försöker besvara två viktiga frågor: 1) Hur stor andel av hanarna ropar i ensilagefält före grässlåttern? Det är också ett mått på hur stor andel potentiella häckningsförsök som misslyckas på grund av tidig slåtter. 2) Finns det alternativa biotoper efter slåttern som kan utnyttjas för nya häckningsförsök?

Inventering och vegetationsklassificering

Liksom tidigare kornknarrsinventeringar på Öland delades inventeringsarbetet upp i mindre delområden, baserat på sockengränser (Figur 1). Varje inventerare förlade ett nattbesök före ensilageslåttern, som erfarenhetsmässigt normalt startar i början av juni, och ett andra besök under perioden 22 juni–5 juli när merparten av den första grässkörden antogs vara bärgad. Alla besök ägde rum nattetid mellan 23.00 och 03.00 och nätter med frisk vind undveks eftersom inventeringsresultatet avsevärt försämras vid kraftigare vindar.

Åtta socknar inventerades av författarna och resten av 13 frivilliga ornitologer. I de sju socknar med dålig eller ingen täckning 1997 fanns mindre än 10% av kornknarrarna vid inventeringen 1994. Vid inventeringen 1997 missades därför sannolikt endast ett fåtal kornknarrar genom att dessa socknar ej inventerades. Spontant inrapporterade kornknarrar har inkluderats i totalsumman endast då risken för dubbelräkning ansetts vara liten.

Om möjligt markerades platsen för en revirhävdande kornknarr på en ekonomisk karta (skala 1:10 000). En vegetationsklassificering utfördes senare i fält i rutor (kvadrater) om 4,8 ha (220x220m) med spelplatsen i rutans centrum. Denna areal ligger nära hemområdets storlek funnet vid en studie med radiosändarförsedda hanar på södra Öland. Rutorna klassificerades av en av författarna (RO), främst i juli, men ett fåtal rutor också i slutet av juni och i början av augusti. Arealen av respektive vegetationsklass erhölls med en digital planimeter som placerades på kartan. Tio rutor kunde av praktiska skäl inte besökas i efterhand, men inventerarna var ombedda att klassificera vegetationen vid själva spelplatsen och deras uppgifter kunde användas i dessa fall.

Resultat

I Ås socken slogs de första ensilagefälten redan 1 juni och intensiv slåtteraktivitet pågick på många håll på Öland första veckan i juni. Den oväntat tidiga ensilageslåttern innebar att den första nattinventeringen i några socknar tangerade starten för den första slåttern. Riklig nederbörd i mitten av juni försenade höskörden på norra Öland. När Löt socken besöktes i början av juli fanns det fortfarande oslagna åkrar med gräs avsedda för hö.

Den första nattinventeringen resulterade i 68 ropande kornknarrar medan det andra nattbesöket gav 58 spelande hanar (Figur 2, Tabell 1). För att kunna jämföra med tidigare inventeringar kombinerade jag de två besöken. Dubbelräkning minimerades genom att fåglar som vid det andra besöket ropade inom 300 m från en spelplats registrerad vid det första besöket, inte inkluderades i totalsumman. Totalt erhölls då 90 ropande kornknarrar (Tabell 1). Av 58 fåglar som rapporterades vid den andra avlyssningen hördes 24 i Löt socken. Ökningen av antalet kornknarrar i Löt mellan de två besöken motsvarar nästan exakt minskningen i de närmast omgivande socknarna.

I Tabell 2 redovisas den statistiska analysen av de sex viktigaste vegetationsvariablerna i de inventerade rutorna kring spelplatserna. För kornknarren olämplig mark (skogar, vägar och byggnader) och fåtaligt representerade variabler uteslöts i analysen. Arealen av ensilage/höåkrar minskade givetvis mellan de två nattbesöken. Utnyttjandet av områden med betesmark, åkermark med grödor och hög örtvegetation

förblev oförändrat mellan de två inventeringarna. Däremot ökade arealen ängsmark och trädesåkrar (med till exempel timotej) signifikant till det andra inventeringstillfället. I fyra socknar inventerades minst tre rutor vid vardera nattavlyssningen och medelarealen av de viktigaste vegetationsvariablerna i respektive socken presenteras i Figur 3a–d. I Tabell 3 kan utläsas att 86% av kända spelplatser vid det första nattbesöket och 50% vid det andra låg i ensilage/höåkrar.

Diskussion

Årliga fluktuationer i kornknarrsantal föranleder en viss försiktighet när trender i populationsstorlek ska bedömas utifrån enstaka inventeringar. Inventeringsresultaten 1994 och 1997 tyder ändå på en minskning på Öland med 60% sedan 1972–75, eller en årlig minskning med drygt 4%.

Dubbelräkning av ropande kornknarrar kan vara ett problem då fåglar som tvingas flytta på sig på grund av gräslätter kan förflytta sig ganska långa avstånd. Ökningen av antalet ropande kornknarrar i Löt mellan de två besöken 1997 förklaras sannolikt bäst av en inflyttning av fåglar efter slåttern från näraliggande socknar. Inventeringsmetoden med endast två nattbesök ger förmodligen en viss underskattning av antalet kornknarrshanar på Öland.

Radiosändarstudier i Skottland har med tydlighet visat att kornknarrsbon placeras i samma biotop som revirhävdande hanar utnyttjar nattetid. Erfarenheter från Skottland och på södra Öland visar att boet ligger inom 200 m, oftast närmare, från den revirhävdande hanens favoritspelplats. De inventerade rutorna kring spelplatser i den här studien torde därför väl omfatta lämpliga häckningsbiotoper.

I områden i Skottland där slåttern var sen producerade flertalet radiosändarförsedda kornknarrshonor två kullar samma häckningssäsong. Andra undersökningar i Polen och Frankrike antyder att två kullar regelbundet förekommer i dessa länder. Överlevnaden hos adulta kornknarrar kan vara så låg som 20% (R. Green muntl.) och den låga återfyndsprocenten (13%) av kornknarrshanar i vårt studieområde på Öland tyder på att överlevnaden hos kornknarrar är låg också på Öland. Om vi antar att honorna har en lika låg överlevnad, måste sannolikt merparten av honorna producera två kullar för att kompensera för den höga dödligheten.

Mediandatum för den först hörda kornknarrshanen på södra Öland är 16 maj (Pettersson 1992) och majoriteten av hanarna anländer till vårt studieområde omkring 20–25 maj. Vi antar att honorna anländer samtidigt som hanarna och behöver två veckor till parbildning och läggning av den första kullens 10 ägg. Eftersom ruvningstiden är 18 dagar kläcks få, om några, första kullar före 25 juni på Öland. Statistik hämtat från SCB (1973–1993) visar att arealen vall på Öland ökade med 59% mellan 1972 och 1992. Mediandatum för första skörden av slåttervall i provytor i Kalmar län, vilket inkluderar Öland, har tidigarelagts ungefär två veckor under samma period. I Figur 4 kan utläsas att 1990 var 91% av vallen slagen före 21 juni. Grässlättern på Öland är i tidigaste laget för lyckade andrakullar och förstakullarna ligger också ordentligt i farozonen.

Snabba nedgångar i kornknarrens populationsstorlek har kunnat relateras till tidpunkten för slåtter i flera västeuropeiska länder. En simuleringsmodell baserad på reproduktionsvärden hos radiosändarförsedda honor indikerar att en slåtter så sent som i mitten av augusti är nödvändig för att kornknarrspopulationen i Skottland inte ska minska (Green et al. 1997). På grundval av kornknarrshanarnas preferens för gräsmark som slåttras som ensilage eller hö, blir slutsatsen av den här studien att den öländska populationen inte är självbärande. Den tidiga slåttern utgör en stark indikation på att många häckningsförsök går till spillo. Den öländska kornknarrspopulationen utgör en viktig del av den svenska populationen och har därför ett högt bevarandevärde. Tidigarelagd slåtter är inte unik för Öland utan snarare en allmän trend i Sverige. I Gotlands och Uppsala län med betydande kornknarrsantal var 1972 mediandatum för första skörden av slåttervall 30 respektive 29 juni. Tjugo år senare var mediandatum 6 respektive 16 juni (SCB 1973–93). Kornknarrens fortlevnad på Öland och i Sverige är sannolikt avhängigt inflödet av individer från idag kornknarrsrika områden på andra sidan Östersjön. I dagsläget är det dock osäkert huruvida dessa områden i Österuropa kommer att förbli kornknarrstäta även i framtiden. Konkreta åtgärder i ett försöksprogram i Skottland tyder på att det med relativt enkla medel går att förhindra fortsatta minskningar av kornknarr.

Skyddsåtgärder i Sverige som inkluderar senarelagd slåtter kan förväntas bli kostsamma. Vissa åtgärder som t.ex. införande av kantzoner med hög vegetation intill åkrar är dock inte så kostsamma och skulle också sannolikt gynna annat djurliv. Många jordbruksfåglar har de senaste decennierna minskat kraftigt i antal. Om vi kan bevara kornknarren i det moderna jordbrukslandskapet, borde det finnas hopp även för flera andra hotade jordbruksfåglar.