The Corncrake *(Crex crex)* in Austria

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1. Introduction

For geographical reasons, the situation of the corncrake in Austria differs from other countries within the range of this species. In this rather small country in the centre of Europe, the topography is extremely heterogenous, so corncrake habitats are found in floodplains, on undulating hills at medium elevations and in the high valleys of the Alps as well. The climate, accordingly, ranges from the warm and dry 'continental' type in the eastern lowlands, through an intermediate, cooler and more humid region, to the cold valleys and plateaus of the central Alps. Therefore, in a geographical position rather at the south-western edge within the species' distribution, corncrakes in Austria often reach their ecological limits. However, this inhomogeneity provides the opportunity to gain experience of this species in many different ecological situations. This makes it also necessary to consider those aspects for conservation.

2. Development of knowledge about the corncrake in Austria

The species' distribution before 1981 (the start of atlas work, see below) can be reconstructed only fragmentarily on the basis of incomplete bibliographical data, collected in the archive of BirdLife Austria (Fig. 1). Whereas for most regions only single records or very general statements on abundance exist, more precise information is available only for a few well known sites.

The Austrian Breeding Bird Atlas (DVORAK et al. 1993), based on surveys performed by BirdLife Austria between 1981 and 1985, for the first

Figure 1

actually not available

Figure 1: Distribution of Corncrake in Austria. Grid units are 3 x 5 geographical minutes (app. 35 km^2). Before 1989 only occasional records, since 1989 mainly specific censuses (1994-95 country-wide survey).

time highlighted the national situation of the corncrake. Due to the lack of special investigations with comparable effort, only a very rough, 'random' picture of the species' distribution could be drawn. Essentially, this was based on occasional observations, relating probably in most cases to daytime calling. Alarmingly, the atlas work produced a very small number of corncrake records, including only one (unsuccessful) breeding record. Therefore, from 1989 to 1991 the first systematic censuses were performed in the former strongholds (Styria) and in some promising regions (Lower Austria) (e.g. SACKL 1990, BERG 1993). Then, during 1994 and 1995, BirdLife Austria undertook the first corncrake survey on a nationwide scale.

However, the complex nature of Austria's landscape, with corncrake densities varying enormously, and the comparatively small number and uneven distribution of ornithologists, make it difficult to perform regular and systematic censuses covering the whole country. Therefore, only sites of special conservation interest were systematically counted after 1995, most of them annually or even several times a year. Despite knowledge of and interest in the species growing, and despite work done in various areas of the country in recent years, the picture of corncrake distribution changed only insignificantly, confirming basically the pattern known since 1995.

Knowledge about various aspects of ecology and biology was growing quickly after BirdLife started the first corncrake conservation activities in Lower Austria (1994). In the course of this project, comprehensive experience was gained on habitat requirements and management, breeding biology, calling behaviour, phenology, threats, and practical conservation issues. FLADE (1991) pointed out that in most regions within central Europe, today's mowing dates do not allow for successful reproduction. He argued therefore, that most of the corncrakes in central Europe, often recorded not before mid June, are males immigrating from eastern European populations during the breeding season, having low probability of reproducing or even to pair (a second time?). Taking this into consideration, a few years ago, it was not even clear if corncrakes in Austria had to be considered as regular breeders, because there were only a very few (mostly unsuccessful) breeding records available from the years before 1994.

Since 1994, when BirdLife Austria started corncrake conservation projects, many records of successful breeding became available from several different sites. It appears, that even very isolated males do not remain unpaired, so that virtually every corncrake can be considered as a potential breeder. However, to quantify breeding success is very difficult, but probably it is much higher than assumed in recent years. Records of very late successful broods, which by circumstantial evidence had to be considered as second clutches, come from at least four sites. Moreover, in the most important Austrian corncrake sites, arrival of territorial males takes place very early in the season (first days of May, often end of April), the numbers of calling males peaking in the second half of May.

The fact that there is essentially no 'late' influx of males in (mid) June, favours the hypothesis of a 'true' Austrian population. The question that still remains unanswered is, which part of the corncrake population in Austria is self-sustaining in the light of the 'source-sink-model' (PULLIAM 1987). Furthermore, although it seems that corncrake populations recover, especially where conservation action is successful (e.g. Wienerwald, March-Thaya-Auen), it cannot be authenticated whether this increase is attributable to a higher production of young or to higher suitability of habitat, able to host larger numbers of immigrating males. Moreover, a pattern emerges more and more clearly from the species' distribution map in Austria: Corncrake concentrate along large rivers and mountain chains, especially when roughly north-oriented (e.g. the eastern border of the Alps). Sites along such topographical 'guiding lines' (e.g. Wienerwald) are much more regularly and densely occupied that others, which seem similarly suitable (e.g. Waldviertel). This supports the idea that such structures may concentrate birds during migration, favouring the (re)colonization of certain sites. The relative 'populations', then, would be more 'independent' from reproduction.

3. Distribution and important areas of corncrake population

Austria is essentially a mountainous and hilly country. More than 60% of the surface is in the Alps, and more than 46% is covered by forest, whereas alluvial plains, swamps and fens cover a relatively small area. Therefore, in comparison with the species' strongholds in eastern countries, the natural potential for corncrakes is rather small. Nevertheless, it was a very widespread and well-known bird in all parts of the country, often regarded as numerous (e.g. RUDOLF VON ÖSTERREICH & BREHM 1879, HÖPFLINGER 1958).

Although the species breeds almost exclusively in meadows, the area occupied by corncrakes in Austria does not mimic the distribution of stock farming as one would expect, and not even that of extensive hay production (grass cut one time per year). According to its well known ecological requirements (early cover, e.g. FLADE 1991, SCHÄFFER & MÜNCH 1993, STOWE et al. 1993), the species' present distribution is best explained by climate. Most of corncrake records are within the zone characterized by the 17° C - July-isotherm and less than 800 mm of precipitation. So, the species is found especially in the north-eastern lowlands and low hills, corresponding essentially to the area suitable for arable farming (Fig. 2). In this zone, however, the available habitats today are restricted to small fragments of land unsuitable for arable. In conrast, the western parts of the country are occupied at much lower densities. In the Alps, calling males were recorded up to 1.650 m a.s.l..

At present, the distribution of corncrakes in Austria is the result of a dramatic decline. Nowadays, in three federal states (Salzburg, Tyrol, Carinthia), corncrake are rarely heard, and in Styria, Vorarlberg and Upper Austria, formerly breeding strongholds, the species is confined to a few sites. The 10 most important regions for the spe-

Figure 2

actually not available

Figure 2: Corncrake records and important sites in Austria between 1990 and 1998. Federal states: V Vorarlberg, T Tyrol, S Salzburg, O Upper Austria, K Carinthia, M Styria, N Lower Austria, W Vienna, B Burgenland. Important sites: 1 March-Thaya-Auen, 2 Zentrales Waldviertel, 3 Freiwald-Westliches Waldviertel, 4 Südwestliches Waldviertel, 5 Machland Süd, 6 Wienerwald, 7 Donau-Auen, 8 Wiener Becken, 9 NÖ Alpenostrand Süd, 10 Seewinkel-Hanság, 11 Oststeirisches Bergland-Bucklige Welt, 12 Südöstliches Hügelland, 13 Ennstal, 14 Salzachauen, 15 Südliches Rheintal.

cies hold app. 64% of the national population of calling males (Table 1). About 60% of the national population belong to the federal state of Lower Austria, followed by Upper Austria (12,5%) and Styria (9,5%, Fig. 2). However, due to the conservation efforts in Lower Austria and the special situation at 'Allentsteig' (see below), probably about 75% of the successfully reproducing corncrakes breed in this federal state. By geographical regions, approximately 38% of the national population of calling males are found in the hills of the 'bohemian mass', 19% in the 'north-eastern lowlands', and 12% at the 'Eastern border of the Alps'. Two formerly very important regions, the 'south-eastern hills' and 'Rhine valley', have suffered a strong decline, which continued during the 90s. The estimate for the alpine valleys and basins is 15%, but these males are widely spread over a very huge area.

The five most important single sites are (1) the military training area 'Allentsteig' in the central part of the 'Waldviertel', belonging to the hills of the 'bohemian mass'; (2) the 'Wiener Becken' basin south of Vienna (north-eastern lowlands); (3) the 'Wienerwald', a forested area west of Vienna; (4) 'Freiwald', a highland bordering to Czech Republic; and (5) the remaining meadows of the 'March-Thaya' - floodplains (see Table 1).

4. Size and development of population

4.1. Size of national corncrake population

For the reasons mentionae above, the present population estimate is based on a mixture of data stemming from well censused, densely populated core sites, and rough estimates for regions with poor data and low corncrake densities (Table 1). Moreover, it is well known from annually surveyed sites, that numbers vary greatly between different years. Taking these uncertainties into account, the current estimate for the years 1995-98 is 150 to 500 males, with approximately 270 males being an 'average' number for 'typical' years.

Fluctuations in corncrake numbers seem to be related mainly to large-scale weather conditions. In some years, part of the huge populations of the eastern european countries, belonging to densely populated 'optimal' habitats in floodplains, probably are forced by flooding to settle farther west; for example, a well known population in Poland was much smaller than usual in 1996 (SCHÄFFER, pers. communication). Weather conditions may even explain the variations in numbers of calling corncrakes on a regional scale concerning particular years and sites, as low rainfall and low temperatures in April and May provide littel vegetation cover at the time of arrival. Moreover, year-to-year differences within certain sites may probably at least partially be attributed to reproducive success. This appears to be the case especially in floodplain areas, where the in years after summer floodings, when nest are destroyed, and most young are assumed to have died, corncrakes are exceptionally rare (e.g. at March-Thaya-Auen in 1998).

4.2. Development of population

Corncrake was widespread and even common in Austria. Some authors reported on dramatical decreases of corncrake on a regional scale since the beginning of the century (see DVORAK et al. 1993). During the 60s and 70s, the decline became widespread (e.g. WEISSERT 1972). Unfortunately, quantitative information on former population size is unavailable, but there are several well documented cases of single sites. The case of the Rhine delta is infamous: a population of approximately 170 males in 1964, with 103 males calling on 12 km2 including the most densely populated site known at this time in central Europe, disappeared completely after only six years following changes in land use and melioration (WILLI 1985, DVORAK et al. 1993). Another example is the Enns region in Upper Austria: Corncrakes were fairly abundant till around 1920, then they became rare, but were still regular heard and breeding till 1965; since then, the species probably almost disappeared. From 1982, during the atlas period a last (unsuccessful) breeding record is available. Since 1982, only migrating birds were

Table 1: Population estimates (1995-98), assessments of population trends and reproductive success for different regions rsp. sites in Austria. [1] federal provinces see Fig. 2; [2] assumed trend since app. 1950; [3] trend since 1989-95 (Frühauf 1997); [4] population estimate (calling males) for the years 1995-98, in parentheses a figure for ‚normal' years; [5] accuracy code (0 to 3); [6] successfull reproduction (based on observation and assumption: +++ regular and apparently in sufficient number, ++ regular, + occasional, - low probability, - - very low probability).

Geographical areas main sites (federal province [1])	long term trend [2]	recent trend [3]	Population estimate [4]		accuracy [5]	reproduction success [6]
Hills of the 'bohemian mass' (N,O)	- -	+	**40 - 200**	**(103)**		
Central Waldviertel (N)	-	+/-	20 - 110	(60)	2	+++
Freiwald (N, O)	-	++	10 - 30	(20)	3	++
South-western Waldviertel (N)	- -	-?	3 - 20	(5)	2	+
Northern Waldviertel (N)	- -	+	5 - 15	(8)	2	+
other sites (N,O)	- - (-)	+/-?	6 - 30	(10)	1	-
North-eastern lowlands (N,B,W)	- -	+	**35 - 100**	**(50)**		
Wiener Becken (N)	+/-	+	15 - 40	(20)	3	+++
March-Thaya-Auen (N)	-	++	8 - 30	(15)	3	++
Region of rivers Danube and Leitha (N; B)	- -	+/-	4 - 20	(5)	1	-
Lake Neusiedl surroundings (B)	- -	+	4 - 12	(5)	1	+++
other sites (N)	- - -	+	2 - 15	(5)	0	+
Eastern border of the Alps (N, M, W, B)	-	+	**25 - 60**	**(32)**		
Wienerwald (N,W)	-	++	15 - 40	(20)	2	+++
western border of the Vienna Basin (N)	-	+/-	3 - 10	(5)	2	+
Hills of eastern Styria (M)	- -	- -	2 - 10	(5)	1	- -
other sites (N, B)	- -	-	1 - 7	(2)	1	-?
Alpine valleys and basins (M,K,T,V,S,O)	- -	-	**20 - 80**	**(49)**		
Enns valley (M)	-	++	8 - 20	(14)	3	++
Basins and Drau valley/Carinthia	- -	+	2 - 10	(4)	1	+
Upper Mur valley (M)	- -	- -	2 - 10	(5)	1	+
Valleys in Tyrol (T)	- -	-	2 - 20	(5)	1	- -
other sites (K, M, T, O, S, V)	- - -	- -	3 - 27	(12)	1	-
Northern border/forelands of the Alps (N, O, S, M)	- - -	-	**10 - 50**	**(28)**		
Machland Süd (N)	-	+/-	0 - 10	(4)	3	- -
Flachgau (O, S)	- - -	+/-	1 - 6	(4)	1	+
North. border/forelands/Lower Austria (N)	- - -	- -	2 - 15	(10)	1	-
North. border/forelands/Upper Austria (O)	- - -	- -?	3 - 20	(10)	1	- -?
South-eastern hills (M, B)	- - -	-	**5 - 20**	**(10)**		
South-eastern hills in Burgenland (B)	- -	+	3 - 15	(7)	1	+
South-eastern hills in Styria (M)	- - -	- -	1 - 10	(3)	1	-
Rhine valley (V)	- - -	- -	**3 - 15**	**(7)**		
Southern Rhine valley (V)	- -	- -	2 - 10	(5)	3	+
Northern Rhine valley (V)	- - -	+/-	1 - 8	(2)	2	-
Austria (total)	- -	+	**150 - 500**	**(270)**		

recorded on two occasions, despite the region being well researched by ornithologists (M. BRADER, pers, comm.).

Because comparable data are lacking, any approach to quantify corncrake decline is tentative. In any case, a marked contraction of occupied area evidently happened since 1960, as probably more than 50% of the species' area was lost (FRÜHAUF 1997). On the basis of land-use data, however, the loss of corncrake habitat (especially humid grassland) is even larger, and can be estimated as 70-80% since 1950; regionally, nearly 90% of suitable meadows disappeared within only 14 years (FRÜHAUF 1997).

The lowest population level probably was reached in the 1980s. Between 1989 and 1995, the available inhomogeneous data do not reveal any clear trend, although 1990 and 1991 emerged as particularly good corncrake years. In recent years, since the period of Austria's accession to the European Union in 1995, the trend of total population size has apparently changed. Despite considerable fluctuations in the different sites, corncrake numbers were noticeably higher than before. In 1996, a very wet year, more than 200 males were recorded, despite a national census not being performed. A similar number (190 males) was counted in 1998.

Overall, the estimate was 60-425 males for the period 1989-95, with 120 males in 'typical' years (FRÜHAUF 1997). The new, roughly twofold higher estimate (see table 1) seems to be attributable to better knowledge only to a small degree (a few sites are affected), and mainly to a real increase in total population. Behind the specific patterns of the different sites there is a more general one related mainly to three factors: (1) the development of agriculture (stock raising), (2) the development and application of agri-environmental grant schemes, and (3) regional conservation efforts. Corncrake trends apparently reflect the intensification level of grassland management in specific regions. In the northern forelands of the Alps, most alpine valleys, the Rhine valley and the hills of eastern Styria, where stock farming is increasingly based on silage and high fertilizer input, corncrakes disappeared, as happened in Styria, Vorarlberg, Tyrol, Salzburg, Carinthia, the larger part of Upper Austria, Tyrol, and some regions of Lower Austria. Populations dropped markedly even in single important sites as southern Rheintal, Machland Süd, and southwestern Waldviertel.

On the other hand, where agri-environmental schemes (e.g. for late mowing or set-aside) are available on a larger scale (especially in Lower Austria, parts of Upper Austria and Burgenland), or where special corncrake conservation programmes are running (Lower Austria, Upper Austria, Vienna), corncrake are recovering. This occurs especially at lower levels in the north-eastern part of the country (e.g. March-Thaya-Auen, central Wienerwald, and probably Wiener Becken, see Table 2). It is encouraging that in this region, for climatic reasons, breeding starts very early in the season allowing even for some successful second broods. The ecological situation responsible for the strong increase in Freiwald, which borders to Czech Republic, however, is very different: this population is probably fed by the population of the Sumava mountains (see Pykal et al. 1999).

Although a large portion (45%) of the present corncrake population is found within 'special protected areas' (SPAs) of the the Natura 2000 network, probably almost the total of the successfully breeding birds depend on specific conservation measures based on agri-environmental schemes. Therefore, the future of the corncrake in Austria will depend mainly (1) on the continuation and the further development of agri-environmental schemes, which basically allow those measures; (2) on how large the portion of Austrian population in SPAs will be; (3) on the efficiency of specific conservation measures within SPAs; (4) on the general conditions for agriculture and rural economy; and (5) on the development of corncrake populations in the neighbouring countries, especially in the eastern strongholds.

Because of the unpredictable nature of the majority of these impacts, it is extremely difficult to anticipate corncrake population trends. However, based on present developments in agro-politics, a wide general expectation is that the gap between 'intensive' and 'extensive' agriculture

(which finally may lead to abandonment) will further widen. One clear effect is the structural change in stock farming and grassland management, driven by the collapse of beef and milk prices. An analysis in Lower Austria showed, that corncrake distribution is strongly linked to regions where a large portion of grass is harvested for horses, and not to regions important for milk and beef production. This is easily explained by the fact that horses feed on rather late cut hay, allowing for better chick survival in corncrakes, whereas 'efficient' milk production today can hardly be achieved without silage. Moreover, a increasing number of farmers in Austria, under today's economic conditions, are no longer finding farming viable and probably will soon abandon their land.

So, the occupied range of the species will probably continue to shrink, leading to a even more fragmented distribution, even if numbers in important sites increase. As the second edition of the currently running agri-environmental programme ('ÖPUL 2000') has a high probability of coming into operation in 2001 for another five years, the population should probably at least remain more or less stable until 2006. This may happen if the Austrian population does not greatly depend on eastern countries, otherwise the trend will follow that of eastern countries.

5. Threats to the corncrake population

5.1. Intensive grassland management

At present, the major negative impact on corncrake population is, as in most other european countries, intensified grassland management, the date of mowing being the definitive cause affecting reproductive success. As males often choose to settle in the most productive patches of grassland in comparison to the immediate surroundings (own observations), which are the first harvested by farmers, there would virtually be no chance of allowing for successful rearing of young in most parts of Austria without special prevention measures like compensation payments. Nowadays, in typical stock farming regions, silage has become increasingly common, with mowing in some sites (e.g. Machland Süd) starting as early as May, often not even allowing for the settlement of calling males. A side-effect is that meadow habitats impoverish by means of vegetation structure, plant species richness, and probably even food abundance. In turn, evidence is accumulating (own observations), that late hay harvest increases habitat quality for corncrakes. It changes plant composition, and especially vegetation structure, favouring tall herbs and grasses, which provide good cover combined with good penetrability.

As intensification proceeded from the lower to the higher levels, between 1950 and 1990 corncrakes successively tended to avoid the lowlands and bottoms of the valleys (e.g. south-eastern hills in Styria; FRÜHAUF 1997, see Table 2). However, the often isolated meadows on the steep slopes of the alpine valleys do not provide a suitable breeding habitat. Vegetation grows slowly, allowing establishment of territories usually only as late as June, whereas hay cutting time is roughly the same as in the valleys, so successful fledging does not seem possible to a substantial amount. It is a serious question, if such areas, as Freiwald

Table 2: Vertical distribution of Corncrake in Austria in four different time periods.

altitude (metres a.s.l.)	till 1970	1971-88	1989-94	1995-98
>800	0,09	0,21	0,19	0,1
-800	0,1	0,14	0,13	0,22
-600	0,24	0,38	0,44	0,17
-400	0,47	0,15	0,16	0,22
-200	0,1	0,13	0,07	0,29
sample size	**164**	**236**	**349**	**349**

for example, where corncrake records range between 600 and 1.000 m a.s.l., and where recent numbers of calling males increased strongly, in the medium and long term can establish as self-sustaining populations.

The second most important impact is mowing with fast machines and from the outside towards the centre of hay fields, killing the majority of flightless young. However, according to my own experience, the influence of fast mowing machines by itself is high in particular on small chicks. Provided that mowing starts after 25th July, when most chicks of first broods are more than 30 days old, they are generally capable of escaping fast enough, even during outside-inside mowing. On the other hand, a very thick grass vegetation, typically a consequence of high fertilizing levels, appears to be as dangerous as high speed, because it obstructs a quick escape, and may appear to the birds as protection.

5.2. Habitat loss

In a first period, roughly until the late 80s, habitat destruction through drainage and conversion of meadows to arable land (prevalently maize) was a main threat to the corncrake in Austria. It contributed largely to the contraction of the occupied area (see above), but will play a negligible role in the future. A still minor, but increasing effect is habitat loss through abandonment. Especially at higher levels or in not easily accessible areas, meadows may be overgrown due to vegetational succession with bushes; probably much more common is the afforestation of such poorly rewarding soils (e.g. Waldviertel). One corncrake site (or parts of them) is threatened by habitat loss through a golf-course (Enns valley).

In the framework of the complex, small-scale topography in Austria, road construction may be another, up to now disregarded reason for habitat loss. Apart from direct habitat destruction, there is evidence that calling corncrakes avoid roads that have a high car frequency at night. Males usually hold minimum distances of app. 500 m to highly frequented roads (highways, major roads) and about 200 m to secondary roads, which have a much lower car frequency during calling time, as data available from different regions in Austria show (90%tiles, FRÜHAUF & ZECHNER 1998). There is no indication that there is a strong bias caused by unevenly distributed habitat quality. The explanation for this could be that the breeding system of corncrakes (females find males by their song) obviously relies on acoustic communication. If pairing probability depends on the continuous singing output of the males, continuous noise from car traffic may reduce the chances of unpaired males. Traffic noise may 'cover' corncrake calls by interference effects, because there is a considerable overlap in spectral frequencies of traffic noise and calls. Adverse effects such as reduced habitat quality and lower chance of pairing were found in Willow Warblers *Phylloscopus trochilus* in the Netherlands (REIJNEN & FOPPEN 1994, 1995, REIJNEN et al. 1994).

Anecdotal evidence sustains this hypothesis (own observations), as corncrakes in Austria often establish calling sites at very short distances to railways, sometimes calling only a few metres near the rails, which seems never to happen near roads. When a train passes, these males stop calling, but resume calling immediately or after a few minutes; analogous behaviour could be recorded in corncrakes calling at short distances to small roads with extremely low car frequency. It can reasonably hypothesized that there should be a frequency treshold of such interruptions, which a corncrake male would not accept during his singing performance. In the Enns valley (Styria), corncrakes occupy calling sites initially in the season which are better protected from traffic noise by distance or screened e.g. by forest patches (FRÜHAUF, unpubl. data). However, this hypothesis should be properly tested.

5.3. Other threats

The general importance of other reasons for mortality gathered from Austria cannot be judged. As a natural influence, weather conditions may be an essential factor for corncrake population size. In the lowlands, floodings during Summer can annul a year's reproduction outcome

(e.g.March-Thaya-Auen, Wiener Becken in 1997): more important, cold and wet periods especially in June seem to reduce considerably the number of fledged young. Predators do not appear to have any substantial impact on the species' population (only one case of predation by Eagle Owl *Bubo bubo* is reported).

Other man-caused threats were observed in several instances. A series of cases were recorded from many parts of Austria, where birds died because of collisions with electric wires (or similar obstacles) during Autumn migration (August to October). Feral cats are apparently able to kill flightless chicks especially in the period when they are abandoned by females (one case in Wienerwald 1998, where one cat killed at least two 15 to 20 days old chicks). As feral cats are very numerous in some areas, it may be possible that they exert a substantial influence on chick survival.

6. Conservation status

The corncrake is considered to be Critically Endangered in Austria (BAUER 1994). In Lower Austria, which holds at least 60% of the population, corncrake has the same red data book status (BERG et al. 1997).

Corncrakes, including nest sites, eggs and young, are protected from shooting, disturbance and rearing in captivity in all nine federal states. Since Austria's accession to the Europen Union, it is protected even by Birds Directive, but most federal states have not yet transposed this Directive into federal laws. In fact, this is rather meaningless because there is no evidence that corncrakes are hunted even by chance or persecuted anyhow, and protection of nests and young do not have any consequences for agricultural practices. Of great importance, however, is that Austria is committed to instal 'special protected sites' (SPAs) for this species as it is listed in Annex I of Birds Directive.

Approximately 66% of the number of calling corncrake males are covered by IBAs. But, at present, only app. 45% of the Austrian population is protected by SPAs according to the Birds Directive. Austria's most important site, the IBA 'Allentsteig', a military training area in the central Waldviertel which holds the largest population, still is missing from this list. Even the largest part of the IBA 'Styrian Enns valley', lacks protection, and is still threatened by road construction plans and an expanding golf-course. Effective protection measures have only been undertaken in a few sites, mainly in Lower Austria.

7. Conservation projects

BirdLife Austria started in 1994 with its first corncrake conservation actions. Since 1995, a corncrake conservation programme financed by the federal state of Lower Austria is running successfully, aiming to increase corncrake reproduction and population in priority areas (Wienerwald, Wiener Becken, southern Waldviertel, Machland Süd etc). This project includes regular counts, identification of important breeding sites, advising and contracting landowners for late (usually at end of July) and corncrake-friendly mowing, surveys of mowing and breeding success, and enlargement of suitable habitat by using agri-environmental programmes. Similarly structured projects were started in 1997 in Vorarlberg and Vienna. BirdLife is further involved in four LIFE-Projects within Natura 2000 sites, where corncrake is amongst the target species for conservation measures (March-Thaya-Auen, Waldviertel, Donauauen, Enns valley). WWF Austria started conservation measures in 1998 in Freiwald (Upper Austria).

The medium term component of these actions (5 year-contracts) rely almost exclusively on agri-environmental compensation payment schemes, which have been available since 1995, as the ÖPUL (Austrian programme for an environmentally suitable agriculture), came into force according to EC reg. 2078/92. The main problem is that the real opportunities offered by this programme vary considerably between the singular federal states. This is a consequence of Austria's strong federalistic structure, the reliance of this programme being in the competence of each state. It was therefore relatively easy to use this opportunity for late mowing or set aside in some states

(especially Lower Austria), whereas in others (e.g. Styria) no such possibilities exist up to now.

However, according to reg. 2078/92, payment contracts are only possible for 5 year periods, so ÖPUL does not allow for immediate action (in the same year) as it would be necessary and sensible to do, given the low site faithfullness of corncrakes. Fortunately, a large amount of compensation payments came directly from federal states (Lower Austria, Upper Austria, Vienna, and Vorarlberg) or from LIFE funds. Without these payments, successful corncrake conservation could probably not be done in recent years in Austria.

8. Ongoing or planned conservation or study projects

The conservation programme in Lower Austria, Vienna and Upper Austria will probably continue in the coming years. A further nationwide corncrake census is planned for 2000 or 2001, and then to be continued approximately every five years depending on resources.

In 1996, on a very small scale, ringing was started in Lower Austria. The main intention is to ring young birds, in order to gain knowledge of return rates and medium scale movements. Furthermore, since 1997, males were recorded on digital tapes for individual recognition.

As it is expected that the opportunities for compensation payments will be enlarged in the course of the continuation of ÖPUL, corncrake conservation projects are planned for some more important sites (e.g. Enns valley). Major effort will given to deal with the real challenge for corncrake conservation, that is to make it compatible with a economically meaningful rural development.

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