Ornis Hungarica 7: 19-26. 1997

Status of Kentish Plover (Charadrius alexandrinus) in Hungary

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Székely, T. 1997. Status of Kentish Plover (*Charadrius alexandrinus)* in Hungary. – Ornis Hung. 7: 19-26.

Population size, distribution and reproductive success of Kentish Plovers in Hungary are summarised. 105-140 pairs bred in 1988-1992. Two breeding sites (Miklapuszta and Southern Hungary) contained the bulk of the population, with 60-80 pairs and 35-40 pairs, respectively. The number of breeding pairs has declined in recent years. Kentish Plovers have disappeared from some of their traditional breeding sites such as Hortobágy-puszta, and their numbers have dwindled in other areas such as in Southern Hungary and Vásárhelyi-puszta. I suggest two reasons for the reduction in number of breeding pairs: loss of breeding habitat and low reproductive success. First, the loss of breeding habitat may be due to reduction in grazing pressure by sheep flocks. I argue that sheep grazing is important in maintaining short vegetation and bare ground in these alkaline grasslands. Short vegetation and bare grounds may attract Kentish Plovers to settle. In addition, Kentish Plovers prey upon the insects following sheep flocks and they may feed on insect larvae which develop in sheep dung. Second, the breeding success of Kentish Plovers was poor: 28% of eggs hatched and 29% of chicks that hatched reached fledging age. I estimate that new recruits replace only 17% of adults which die each year. To prevent the disappearance of Kentish Plover from Hungary urgent measures are needed, such as to increase hatching success by stricter control of stray dogs and cats, erect protective fences around some nests and maintain, or preferably increase, the current intensity of sheep grazing.

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1. Introduction

Kentish Plovers *Charadrius alexandrinus* are cosmopolitan and in most parts of their range they breed on the coast. Nevertheless, in the Carpathian Basin they breed in alkaline grasslands ('puszta') and at the edges of alkaline lakes. The Kentish Plover is one of the characteristic birds of the Hungarian alkaline grasslands (Udvardy 1941, Sterbetz 1965), and thus any change in their distribution or population size may indicate a change in overall quality of this habitat.

In this paper I report on the current status of Kentish Plover in Hungary, illustrate recent changes in breeding numbers, investigate the causes of the reduction and suggest measures for the protection. Much of the data is based upon my field study in Southern Hungary (1988-1990) and Central Hungary (1991-1994). The study sites, field work and statistical analyses are described elsewhere (e.g. Székely 1991, Székely 1994).

2. Breeding sites

The bulk of the Hungarian population bred in Miklapuszta, Central Hungary (near the

villages of Harta and Akasztó): 60-80 pairs in 1990-1992; and in Southern Hungary (near the towns of Szeged and Kistelek): 35-40 pairs in 1988-1990. Miklapuszta was an extensive alkaline grassland whereas several patches of alkaline grasslands and cultivated fish-ponds made up the breeding sites in Southern Hungary. The number of breeding pairs was 3-12 pairs in the Nagyszék alkaline grassland (near the town of Balmazújváros) between 1980 and 1989 (Kovács 1984, Ecsedi, Z. & L. Szondi pers. comm.), 3-4 pairs in Kelemen-szék alkaline grassland of Kiskunság National Park in 1990-1992 (Bankovics, A. pers. comm.), three pairs in Kardoskút alkaline grassland in 1990-1991 (Sterbetz, I. & A. Széll pers. comm.) and one pair in 1992 in Sárkány Lake near the village of Sárkeresztur (Fenyvesi, L. pers. comm.). Thus approximately 105-140 pairs of Kentish Plovers bred between 1988 and 1992 in Hungary.

Kentish Plovers also bred in neighbouring countries such as Austria, Croatia and Serbia. 12-19 pairs of Kentish Plovers bred on the Austrian side of the Neusiedler-See (Rauer & Kohler 1990) and Glutz von Blotzheim *et al.* (1975) estimated 35-45 breeding pairs in Burgenland, Austria. Bartovsky *et al.* (1987) reported that 44-71 pairs of Kentish Plover bred in the former Yugoslavia (Voivodina, Slovenia and Croatia).

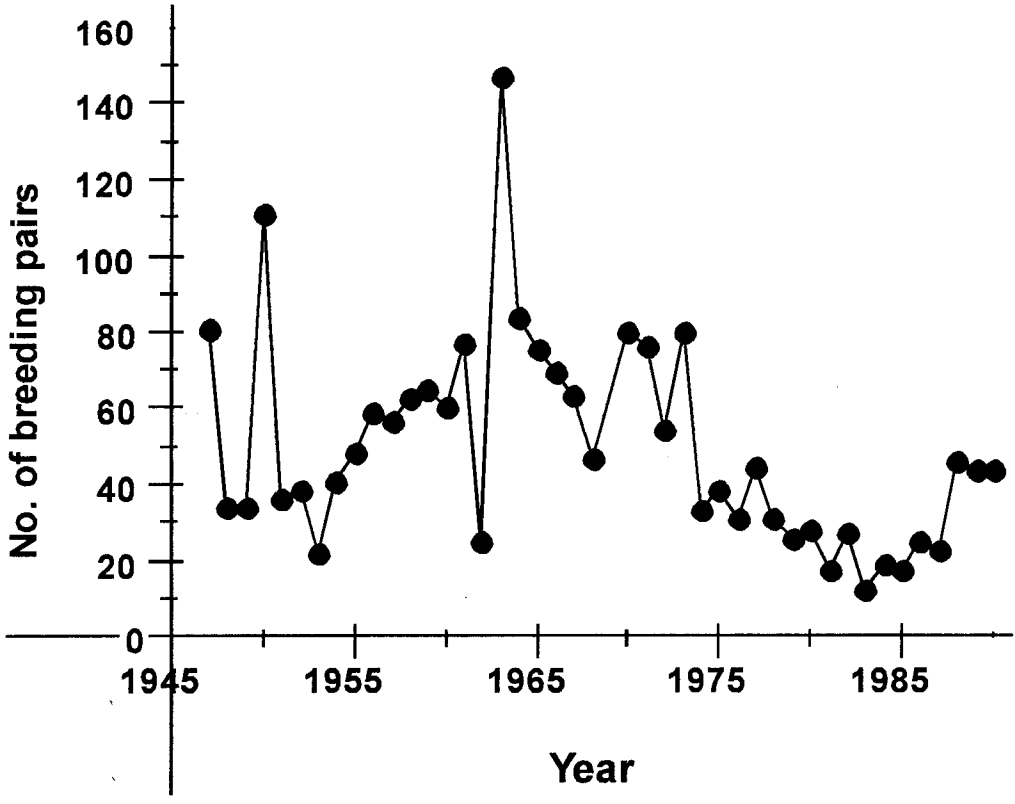

Fig. 1. Number of breeding pairs in Southern Hungary including Vásárhelyi-puszta (based on Sterbetz 1963, 1992, Tajti 1992).

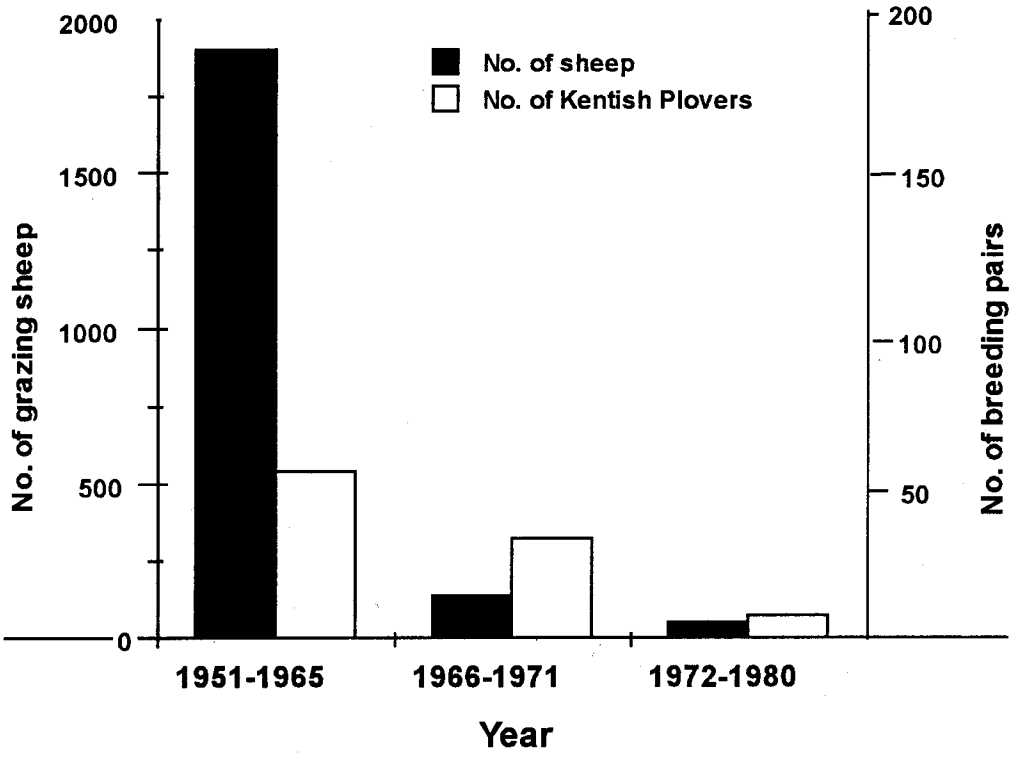

Fig. 2. The reduction in number of breeding Kentish Plovers coincided with the reduction in number of grazing sheep in Vásárhelyi-puszta (based on Sterbetz 1992).

3. Population trends

Several ornithologists have warned that the size of the breeding population has declined recently in Hungary (Bankovics 1984, 1989, Sterbetz 1992), and current evidence supports this view. For example, the number of breeding pairs declined between 1947 and 1990 in Southern Hungary (Fig. 1). Although these estimates are based upon casual observations and reports, they suggest a general decline over the investigated period (Tajti 1992). The first thorough counts were carried out in 1988; thus the increase between 1987 and 1988 could have been caused by the increased precision of surveys - rather than by a real increase in the number of birds. Sterbetz (1992) described a reduction in numbers of Kentish Plovers between 1951 and 1980 in Vásárhelyi-puszta (Fig. 2). In Eastern Hungary the stronghold of the Kentish Plover used to be the Hortobágy (Udvardy 1941). Whereas in 1965 25 pairs bred in Hortobágy, the number of breeding birds gradually declined (1969: 10-15 pairs, Sterbetz 1965) and since 1984 Kentish Plovers no longer breed there (Sterbetz 1965, Kovács 1984). Glutz von Blotzheim *et al.* (1975) estimated that in 1969-1971 150 pairs bred in Hungary, but this estimate did not seem to include the breeding population in Miklapuszta. Assuming that the number of breeding pairs have not changed in Miklapuszta since then (60-80 pairs), I

Tab. 1. Hatching success (% of nests or eggs that hatched) and fledging success (% of chicks fledged) of Kentish Plovers in Southern Hungary (Székely, T. unpubl. data). Successful nests hatched at least one chick. Only fresh clutches were included and only the ones which were known to hatch or fail. Disappeared chicks presumably died.

	Hatching success of nests			Hatching success of eggs		Fledging success		
Year	Hatched %	Predated or failed %	No. of nests	Hatched %	No. of eggs	Fledged %	Predated or disappeared %	No. of chicks
1988	37.5	62.5	8	37.5	24	13.6	86.4	22
1989	23.5	76.5	17	18.0	50	37.5	62.5	24
1990	31.6	68.4	19	31.6	57	34.8	65.2	23
All	29.5	70.5	44	27.5	131	29.0	71.0	69

estimate that the total number of breeding pairs was approximately 210-230 pairs in 1969-1971 in Hungary. Thus the number of breeding pairs could have been reduced from 210-230 pairs to 105-140 pairs over 20 years i.e. a reduction of 40-50 %. The negative trend coincided with the marked decline of Kentish Plover in several other European countries (Tucker & Heath 1994, Meininger & Arts 1997).

4. Causes of decline

I suggest that a loss of breeding habitat and a reduced reproductive success are both re-

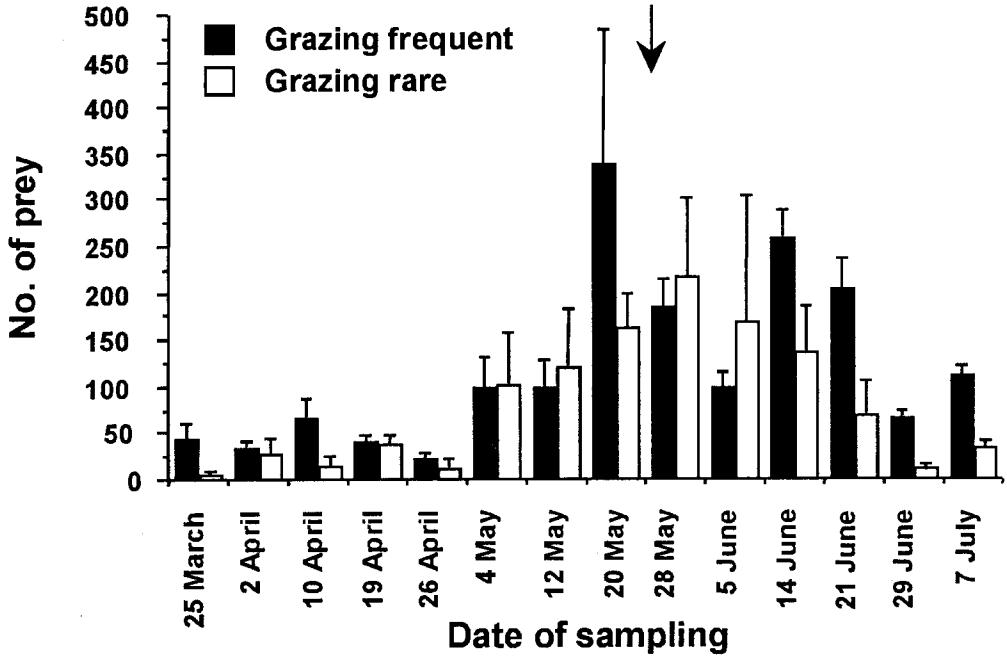

Fig. 3. The insect density (no. of prey items / 100 cm^2 of trap ± SE) is higher where sheep grazing pressure is high than where it is low (two-way ANOVA between 'grazing frequent' and 'grazing rare' areas with sampling date, $F_{1,112} = 37.94$, $p < 0.001$, Székely *et al.* 1993). The arrow indicates the mean date of hatching of Kentish Plover eggs.

sponsible for this decline in Hungary, although other potential explanations such as increased over-winter mortality can not be ruled out (Szép 1995). Kentish Plovers have lost several breeding grounds during the last 40 years or so. Before 1953 the most important breeding site was probably an alkaline lake in Southern Hungary (Fehértó, 9 km north of Szeged), which harboured more than 100 pairs of Kentish Plover (Weisz 1935, Sterbetz 1963). This lake was drained and converted into fishpond between 1953 and 1955. By 1955 most Kentish Plovers left Fehértó and some of them dispersed into neighbouring alkaline grasslands and lakes (Sterbetz 1963).

Another threat comes from fertilisers which are used to improve productivity of grasslands. Short vegetation and large patches of bare ground seem to be necessary for breeding Kentish Plovers; thus increasing density and height of vegetation by these chemicals destroys the suitability of such habitats for Kentish Plover breeding (Sterbetz 1992). Reduction in grazing livestock may also be a significant threat. Sterbetz (1992) showed in Vásárhelyi-puszta that as the number of grazing sheep declined so did the number of breeding Kentish Plovers (Fig. 2). Extensive sheep flocks may be important in maintaining habitat quality for Kentish Plovers. These flocks typically contain several hundred sheep and they are attended by a shepherd. First, grazing sheep leave short grass behind thus intensive grazing and trampling by sheep may prevent vegetation from covering bare patches of grasslands. As soon as grazing stops or the intensity of grazing reduces the plants overgrow bare ground patches (Sterbetz 1992). Second, Kentish Plovers often fed in sites which were grazed by sheep flocks several times a day. We found that the density of arthropods were higher in one such area than in less intensively grazed sites (Fig. 3). Insects may be attracted to sheep flocks, and/or they may use sheep and sheep dung to breed. These advantages of grazing are probably higher than the cost of sheep trampling nests (Székely 1992). Nevertheless, a specific study on the impact of sheep grazing on breeding birds would be most rewarding in the alkaline grasslands.

The other reason for the decline in numbers of breeding birds may be low reproductive success. Breeding success of Kentish Plovers is often low, even if their habitat quality does not deteriorate. 28% of eggs hatched and 29% of hatched young reached fledging age in Southern Hungary between 1988-1990 (Tab. 1). The major reason for nest failure was predation: 70.5% of failed nest were predated either by birds or mammals such as Marsh Harrier *Circus aeruginosus*, Montagu's Harrier *Circus pygargus*, Rook *Corvus frugilegus*, Hedgehog *Erinaceus europaeus*, Fox *Vulpes vulpes*, and stray dogs and cats (Székely 1992). It is likely that some of these predators took chicks as well, although the only chick whose predation was witnessed was taken by a Kestrel *Falco tinnunculus*.

Based on these values one may calculate whether the current rate of reproduction is sufficient to maintain population size. To maintain a stable population size the number of female young recruitment (r_f) should be at least as large as the number of adult females which die each year (μ_f) i.e. $r_f \geq \mu_f$. An offspring has a probability $0.28 * 0.29 * 0.53 = 0.043$ of surviving from the beginning of incubation until

reproducing approximately one year later (Tab. 1, Cramp & Simmons 1983). On average a female produces 2.96 eggs in a nest and lays 1.18 clutches in a breeding season; thus on average a female produces 3.49 eggs in a breeding season (Székely 1994, Székely, T. unpubl. data). Therefore a female is expected to produce 0.043 * 3.49 = 0.15 young each year which are recruited into the breeding population. Approximately half of these young will be male which leaves $r_f = 0.075$. The mortality of adult females is $\mu_f = 0.43$ based on local returning rate of females between 1988 and 1994 in Southern Hungary and Miklapuszta (Székely 1994). Thus the recruitment seems to replace only 17% of adult loss. Even if we consider that each of these estimates have large confidence intervals, the rapid decline of Hungarian Kentish Plovers seems inevitable.

The Hungarian population does not decline that fast (see 'Population trends'). The discrepancy between the estimated rate of reduction and recruitment rate may derive from several sources. First, female mortality was based on the local returning rate; thus the real mortality of adults may be overestimated. Second, females may change breeding site between renesting (Stenzel *et al.* 1994, Székely 1994), thus the production of 3.49 eggs in a breeding season probably underestimates the real number of eggs laid over a breeding season. Third, immigration may compensate for some of the losses. Kentish Plovers are known to move between breeding sites over hundred kilometres (Stenzel *et al.* 1994, Székely 1994). However, I do not know the whereabouts of a population that might provide the immigrants to the Hungarian breeding sites.

5. Recommendations for conservation

Kentish Plovers have been protected since 1901 in Hungary and their most important breeding sites such as Miklapuszta and Southern Hungary are also under protection. However, protecting the species or the habitat by law does not circumvent the major threats: the low reproductive success and habitat loss.

There are several ways to improve the reproductive success of Kentish Plovers. First, stray dogs and cats can be controlled on breeding sites. For example, in Makraszék (Southern Hungary) Kentish Plovers bred less than 100 m from farms; thus their nests could easily be preyed upon by dogs wandering away from the farm. It is illegal to let a dog or cat roam on its own in nature reserves such as Makraszék, but stricter pest control would probably help to eliminate some of the nest predators. Second, nesting success can be increased by fencing around nests. Nest protective exclosures have been successfully applied in several plovers (Nol & Brooks 1982, Rimmer & Deblinger 1990). Following Jönsson (1993) we surrounded eight nests of Kentish Plovers in 1994 by a garden fence (Castro, M., Noszály, G. & T. Székely unpubl. data). Plovers easily squeezed through the fence whereas most predators were unable to do so. The exclosures were successful in protecting the nests. Six nests out of eight fenced nests hatched 16 chicks, whereas three nests out of eight control (unfenced) nests hatched only seven chicks. One of the two fenced nests which failed was predated probably by a small mammal, and the other nest was abandoned by both parents.

The other important action should be a better management of breeding habitats (Molnár 1996). Maintaining or increasing current grazing pressures on breeding grounds of Kentish Plover is very important. According to some sheep owners sheep-breeding is no longer profitable in Hungary, and thus they have reduced the size and the number of their flocks. Conservation authorities should find the way to encourage sheep-breeding especially on the traditional breeding sites of Kentish Plovers.

Kentish Plovers first bred on the bottom of drained fish ponds in 1970, and since then the number of breeding pairs appears to have increased in fish-ponds (Tajti 1992). Although hatching success of nests is lower in fish-ponds than in alkaline grasslands (Székely 1992), the fledging rates appear to be higher; thus the overall reproductive success appears to be higher in fish-ponds than in grasslands (Noszály *et al.* 1995). Fish-ponds which are drained in May and June attract several shorebirds such as Avocets *Recurvirostra avosetta*, Lapwings *Vanellus vanellus* and Little Ringed Plovers *Charadrius dubius*; particularly in Southern Hungary (Székely 1992). However, the bottom of drained fish-ponds are often cultivated and they may be filled up 2-4 weeks after drainage thus causing the loss of shorebird nests which are still being incubated. The interest of conservation is then to prevent or restrict the activity of fish-farms during the breeding season. Thus conservation authorities should pay attention not only to the alkaline grasslands and edges of alkaline lakes, but to fish-ponds as well. Perhaps grasslands and fish-ponds managed chiefly for conservation purposes would significantly improve the chance of this small plover surviving over the next century in Hungary.

Acknowledgements. The Hungarian Kentish Plover Project was started while I was employed by the BirdLife Hungary. Over the years the project was supported by the OTKA Foundation (T5492), the Ministry of Environmental and Regional Policy, the Association for the Study of Animal Behaviour and The British Ecological Society. Directors of Állampuszta State Farm (Gy. Schneider), Kiskunság National Park and Pusztaszeri Landscape Protection Area provided the licence for the field study. I thank G. Noszály, A. Liker, J. Kis, M. Castro, S. Kovács, Dr. Gy. Molnár, A. Széll and L. Tajti for their help in the field. I acknowledge the unpublished recommendations of Dr. P.E. Jönsson about the nest-protective fence. Drs. John M.C. Hutchinson, J. N. Webb and I. Sterbetz kindly commented an early draft of this paper.

Összefoglalás

A széki lile *Charadrius alexandrinus* természetvédelmi helyzete Magyarországon

A hazai széki lile populáció nagyságát, elterjedését és szaporodási sikerét foglalom össze ebben a dolgozatban. 1988 és 1992 között 105-140 pár széki lile fészkelt Magyarországon. A lilék két legfontosabb fészkelőterülete Miklapuszta (60-80 pár) és a Dél-Alföld volt (35-40 pár). A fészkelő párok száma erősen csökkent az utóbbi évtizedekben. A széki lilék eltűntek az egyik fő tradicionális fészkelőterületükről, a Hortobágyról, míg számuk alaposan megcsappant a Dél-Alföldön és a Vásárhelyi-pusztán. A csökkenés legfőbb oka a fészkelőterületek átalakulása és az alacsony szaporodási siker. A fészkelőterületek átalakulása nagyrészt a birkalegeltetés visszaszorulásának tulajdonitható. Véleményem szerint a birkák legelése jelentős a rövidfüvű, vakszikfoltokkal tarkitott puszták fenntartásában. A rövidfüvű, kopáros szikespuszták fontos feltételét adják a széki lile fészkeléséhez. Továbbá, a széki lilék jelentős táplálékát képezik a birkákat követő és a birkatrágyában fejlődő rovarok. További vizsgálatok szükségesek annak felmérésére, hogy a legelő lábasjószágok

hogyan befolyásolják a sziki madarak fészkelését. Azonban a széki lilék alacsony szaporodási sikere is hozzájárul a populáció csökkenéséhez. A liletojások csupán 28 %-a kelt ki, míg a kikelt fiókák csupán 29 %-a repült ki a Dél-Alföldön. Becslésem szerint a hazai lilepopuláció nem képes az önnfentartásra, mivel az évi szaporulat csupán egyötödét pótolja az éves pusztulásnak. Sürgős intézkedések szükségesek a széki lilék további csökkenésének megakadályozására, a szaporulat védelmére és az élőhelyek további romlásának megakadályozására.

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Received: Sept 14 1997, accepted: Dec 1 1997