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BEHAVIOUR OF HEN HARRIER ON COMMUNAL ROOSTS IN EAST POLAND

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Abstract. Behaviour of Hen Harriers on three communal roosts in south-east Poland were observed. It is strongly related to the weather conditions. Birds arriving at the area with empty crops frequently hunt there. At days of heavy weather harriers tend to arrive at the roost area and drop on vegetation earlier. The place once selected is rarely changed, after dropping in vegetation the birds tend to stay there roosting. Pre-roosting activities are dominated by lonely gliding and soaring flights. Social pre-roost such as sitting on the ground was not observed. Brown birds (adult females and "ringtails" birds) are more frequently involved in hunting in the roost area. Birds arriving at the roost area frequently perform "talon presenting behaviour" most likely against terrestrial mammals.

Key words: Hen Harrier, *Circus cyaneus,* Poland, behaviour, roost.

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Поведение полевого луня на коммунальных ночевках в Восточной Польше. - И. Китовский. - Беркут. 14 (2). 2005. - Исследования проводились на трех местах ночевки на юго-востоке Польши в 1988–1991 гг. Поведение полевых луней зависело от погодных условий. Птицы, прилетавшие с пустыми зобами, часто охотились здесь. В облачные дни луни старались прилетать и садиться в растительность раньше. Выбранное однажды место изменялось редко. Из предночевочной активности преобладали одиночное скольжение и парение. Такой элемент социального предночевочного поведения как сидение на земле не наблюдался. Коричневые птицы (взрослые самки и молодые особи) чаще вовлекались в охоту в местах ночевки.

Introduction

Hen Harrier (*Circus cyaneus*) is a raptor species whose population in Europe has been dramatically decreasing (Etheridge, Hustings, 1997; Potts, 1998; Heath et al., 2000). In Poland the species was included into both editions of "Polish Red Data Book of Animals" (Witkowski, 1992, 2001), and its status was determined as "a very scarce breeder" with 50–80 breeding pairs (Tomialojc, Stawarczyk, 2003). Under such complex conditions for the species protection all the ecology data are of special importance. Thus, not only the data on breeding ecology, but also on ecology during migration and wintering period shall be collected since spring and autumnal migrations, as well as the wintering period have their share in shaping the population dynamics of many species of raptors (Newton, 1979; McCollough, 1986; Village, 1990; Bohall-Wood, 1992).

Harriers (*Circus* spp.) during out of breeding can form communal roosts there, usually in high vegetation groups of birds spend nights on the ground (Cramp, Simmons 1980; Piccozi, Cuthbert, 1982; Clarke, Watson 1990; Kitowski, 2004; Kitowski, Pienkosz, 2004). Communal roosts have been recognised in many species of birds as places facilitating gathering food, helping to avoid predators. Mating behaviour has been also observed on communal roosts (Gurr, 1968; Eiserer, 1984; Richner, Hebb, 1995; Buckley, 1996). The paper has been aimed at presenting selected factors influencing Hen Harriers behaviour on the communal roosts localised in SE Poland.

Study area and methods

The studies were performed from 1988 till 1991. Although in the area of south-east Poland, in Lublin region, at that time 12 communal roosts were known (Kitowski, 1993; Kitowski et al., 2003), the research was focused on Harriers behaviour at three places (Fig.). The first site was "Bloto Serebryskie" reserve (Koza Gotowka, Chelm) where in Saw Sedge

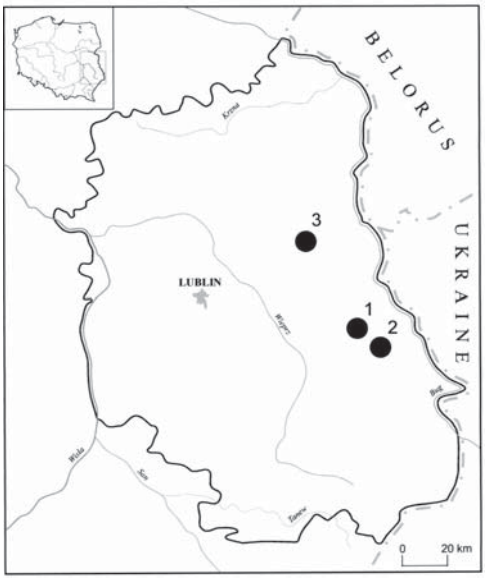

Fig.1. Distribution studied communal roosts of Hen Harriers in east Poland.
Рис. 1. Размещение мест общественной ночевки полевых луней, на которых проводились исследования.
1 – "Bloto Serebryskie" reserve;
2 – "Rozkosz" reserve;
3 – "Laki Stawiska" meadows.

(*Cladium mariscus*) fields roosted 2–7 birds. The second was located in "Rozkosz" reserve (Plawanice, Chelm) where in also Saw Sedge fields roosted 2–13 birds. The third roost were open neglected meadows "Laki Stawiska", the area covered with rushes (*Juncus* sp.) near fish ponds of Brus (Brus, Wlodawa), where regularly 2–7 Hen Harriers used to spend nights. Observational session (n = 38) were performed from 14^{00} till 17^{30} of the winter CE time (see also Table 1). A 10 x 60 binocular and 60^{x} telescopes were applied to observe (n = 133 hours) birds from a distance of 250–350 m to the communal roosts. Duration behavioral events was timed with an electronic stopwatch.

Since the beginning of the 90's in Poland an effective method of distinguishing females from young individuals of Hen Harriers (Lontkowski, Skakuj, 1994) was not applied widely, thus following other researchers while observing the observers used terms: grey birds and brown birds for adult males and females, respectively, and juvenal or immatural birds ("ringtails") for the young ones (Lontkowski, Jermaczek, 1988; Serentino, 1989; Clarke, Watson, 1990). In field condition of south-eastern Poland another serious constraint in distinguishing individuals and their behaviour on roosts are very difficult weather conditions such as frequent snowfalls and rainfalls, as well as early getting dark. For these reasons the birds in this paper were, according to the terms, divided into grey and brown birds. For the places where particular Hen Harrier individuals roosted, Watson's (1979) term "bed forms" is used. Main hunting area of the wintering harriers was assessed during research by penetrating the neighbourhood distanced up to 8 km from the roost. At the moment when the first Hen Harrier appeared on the roost, the overcast sky was assessed in a 10-degree scale from 10 % to 100 %. A day was classified as a "bad weather" day if either for at least 1 hour still precipitation, snow or rain, occurred on the communal roost, or for the same time in the middle of the day fog was registered. An electronic stopper was used for time measurements.

A χ^2 test with Yates correction was used to compare the difference in frequencies, while Mann-Whitney U test was used to compare medians (non-parametric data). Correlation was calculated with a Spearman rang correlation. The results were given as means ± standard deviations (Fowler, Cohen, 1992).

Results

Arrival time on the roost and dropping on vegetation

The first birds (n = 38) were observed to arrive at the communal roost at 14^{50} ± 3066 sec. while the last (n = 38) tended to arrive on average at 15^{39} ± 3474 sec. of the winter Central European Time. Among the birds first to arrive on the roost (n = 38), Hen Harriers individuals dropped in vegetation on average at

Table 1

Frequency of some behaviour patterns observed on communal roosts in SE Poland. Number of observational sessions are given in brackets
Частота некоторых типов поведения, наблюдавшихся на коммунальных ночевках на юго-востоке Польши. Число сессий наблюдений указано в скобках

Behaviour	October (6)	November (6)	December (7)	January (6)	February (7)	March (6)	Total (38)
Hunting on roost	0	1	7	9	6	1	24
Wind soaring of 2 birds	1	3	2	4	9	13	28
Presenting talons	0	2	3	6	6	0	17

$14^{59} \pm 31244$ sec., while the last ones at $15^{42} \pm 3450$ sec. Central European Time.

The time between arrival on the roost area and dropping on the vegetation was filled with different pre-roost activities. During 11 (29,7 %) observation sessions the last birds arrived at the roost on average 393 ± 350 sec. after the sunset (range 60–1020 sec.).

Arrivals of the first birds on the roost area in 26 events were arrival of a lonely bird, while in 12 cases the first birds arrived in groups. The number of 12 cases was registered for the last individuals of Hen Harriers to arrive on the roost after sunset, while 3 others arrivals took place in absolute darkness. For the birds first to arrive at the communal roost a strong tendency of arriving from the direction of the main hunting areas of harriers was noted 31 (81,6 %, n = 38) ($\chi^2 = 15,1$, df = 1, $P < 0.001$). For the birds arriving last only 20 (52,6 %, n = 38) individuals arrived from the direction of the main foraging areas ($\chi^2 = 0,10$, df = 1, n.s). Birds arriving at the roost in general dropped on vegetation directly from a cruising flight (n = 30). Only 7 (3,7 %, n = 191) cases of leaf-like dropping on vegetation were recorded. A major part of birds chose the roost as the final place for the night 79 (93,7 %, n = 191). Only in the remaining 12 cases (6,3 %, n =191) the birds decided to change the place after the first drop on vegetation. Similarly, only during 12 (32,4 %, n = 37) evening observation sessions pre-roost sitting on the ground performed by a few individuals were recorded. Social pre-roost sitting on the ground has been not observed.

Budget time

Only for 7 birds having a plumage feature making them individually recognisable budget time was measured, in total 224 minutes (13440 sec., in the scope). The time between arriving at the roost area and definitive dropping on vegetation was devoted to: a) antagonistic social activities with other Hen Harriers (diving on, presenting talons, escorting flights – 0,5 %), b) antagonistic activities with other species of birds (diving on, escorting flights – 0,5 %), c) foraging in terms of crusing flights (21 %), d) pre-roost sitting on the ground (7 %), e) no-antagonistic social activities with the other (common flights or soaring with 1–3 conspecifics (11 %), f) individual gliding or soaring flights over the roost and its direct surrounding (59 %), g) other activities (1 %).

Hunting on the roost area

In 184 cases the degree of crops fullness at the moment of arriving at the roost was clearly determined. A major part of the individuals with a determined crop fullness (n =146, 79,4 %) arrived at the roost with full crops ($\chi^2 = 63,3$, df = 1, $P < 0,001$). From all the birds that undoubtedly arrived at the roost with an empty crop (n = 38), such as high a number as 24 (63,2 %) attempted hunting in the roost area (at least one dive on a potential prey was observed). Among the hunting birds

18 had brown plumage. Events of foraging old males (grey birds) were incidental (n = 6). Most of Hen Harriers hunting session (n = 17) took place prior to sunset, whereas only 7 after it. In majority of the cases hunting Hen Harriers dived on flocks or single individuals of passerines (n =19). For 14 events the species was determined, the rest escaped identification due to poor visibility (Table 2). Less frequently (n = 5) hunting was small mammals-oriented, namely targeted at Common Voles (*Microtus arvalis*) (concluded from pellets analysis, I. Kitowski, unpubl. data). Only 3 (12,5 %) hunting sessions were completed successfully.

Table 2

Prey targeted by Hen Harriers on communal roosts in SE Poland
Добыча полевых луней на коммунальных ночевках на юго-востоке Польши

Prey	n	Context	Hunter	Success
Lanius excubitor	1	PRE	G	–
Fringilla coelebes	1	POST	B	?
Parus major	1	POST	B	–
Parus major	3	PRE	B	–
Parus caeruleus	1	POST	G	+
Parus caeruleus	1	PRE	G	–
Parus caeruleus	3	PRE	B	–
Turdus pilaris	1	PRE	B	–
Eritacus rubecula	1	PRE	G	–
Eritacus rubecula	1	PRE	B	?
Passeriformes sp.	5	PRE	B	–
Micromammalia	1	POST	B	+
Micromammalia	1	PRE	G	+
Micromammalia	1	POST	G	–
Micromammalia	2	POST	B	–
Total	24	–	–	–

PRE – pre-sun set hunting, POST – post sun set hunting; G – grey birds, B – brown birds.

Antagonistic and no-antagonistic interaction

In the period between the arrival at the roost and the final dropping in vegetation 4 aggressive interaction between Hen Harriers and 24 interaction between Hen Harriers and other birds were observed (Table 3). In the course of the research 17 "presenting talons" events were observed, 11 (58,8 %) of which were performed by the birds that arrived at the roost first. The highest number of presenting talons took place at the marshes (Table 1) in January and February when water froze. Four cases at the studied roosts, and two cases at other communal roosts in SE Poland Hen Harriers presenting talons against Foxes (*Vulpes vulpes*) were observed. Due to high vegetation in the area it is hardly possible to exclude that terrestrial mammals were present during the events. During daily controls of the roosts many tracks and droppings of foxes in the communal roost area (Kitowski, Wojtak, 1998) were detected. Occasionally before dropping in the vegetation close soaring flights were performed by grey and brown birds (see Table 1, soaring two birds). Out of 24 observed events 46.4 % took place in March.

The impact of weather on behaviour of harriers

Visibility was revealed as the basic factor limiting activities of Hen Harrier. Out of 38 days of the research, during 17 precipitation (snow, rain) occurred. During "bad weather days" controls 12 events of Hen Harriers present on the roosts were recorded. At days with favourable weather (n = 21), only 4 short lasting events of Hen Harrier individuals present on the roost were observed. Precipitation influenced on frequency observation on the roost: $\chi^2 = 4{,}95$, df =1, $P < 0.03$. At "good weather days" the duration of pre-roost activities of the individuals first arriving at the roost

Table 3

Aggressive interaction of Hen Harriers with birds observed on communal roost in SE Poland
Агрессивные взаимодействия полевых луней с птицами, наблюдавшиеся на коммунальных ночевках на юго-востоке Польши

Hen Harriers as attackers			Hen Harriers as victims		
Victims	N	Number of dives	Attackers	N	Number of dives
Accipiter gentilis	1	1	*Corvus frugilegus*	3	4
Vanellus vanellus	2	2	*Corvus cornix*	1	2
Pica pica	2	2	*Vanellus vanellus*	3	3
Corvus cornix	2	2	*Accipiter nisus*	1	1
Corvus corax	1	1	*Circus cyaneus*	4*	4
Accipiter nisus	1	1			
Buteo buteo	4	6			
Buteo lagopus	2*	3			
Haliaetus albicilla	1	6			
Total	16	24	Total	12	14

* – interaction birds who previously dropped in vegetation and up again.

tended to be longer (803 ± 830 sec., n = 21, range: 238–1317 sec.) when compared to the ones performed under "bad weather" condition (219 ± 146 sec., n = 17, range: 57–536 sec.; Mann-Whitney U test:, $Z = -2{,}93$, $n_1 = 21$, $n_2 = 17$, $P < 0{,}004$). Such relation, however, was not found for the duration of pre-roost activities of the birds arriving last (197 ± 190 sec., n = 21, range: 28– 840 sec. *vs* 172 ± 139 sec., n = 17, range: 30– 476 sec.; Mann-Whitney U test : $Z = -1{,}61$, $n_1 = 21$, $n_2 = 17$, n.s). It can be concluded that weather conditions not only affected the presence of birds in the roost area, but also their behaviour while being on the roost. There was also strong correlation between the duration of pre-roost activities performed by the birds arriving at the roost first, and the sky overcast degree at the moment of the first bird arrival ($r = -0{,}74$, n = 37, $P < 0{,}001$). For birds arriving late, it was much lower ($r = -0{,}43$, n = 37, $P < 0.01$).

Discussion

The research performed at the beginning 1990-ties (Kitowski, Wojtak, 1998), and at the end of 1990-ties (Kitowski et al., 2003; I. Kitowski, unpubl. data) revealed that the communal roosts of harriers were intensively penetrated by foxes. In the early spring 2000 the remains of an adult bird were found on the roost in "Rozkosz" reserve (Kitowski et al., 2003). Similarly, in Great Britain on area of communal roost cases of mortality in the roosted Hen Harriers were reported to have been caused by foxes (Clarke, Watson, 1990). It seems then obvious why at the communal roosts of Hen Harriers, in contrast to Montagu's Harrier (*Circus pygargus*) (Kitowski, 2004), no pre-roost sitting on the ground was observed apart from incidental events which involved single birds. Such a behaviour has no adaptive value in SE Poland. On the contrary, regularly observed foxes (tracks, droppings, direct observations) both on the roosts and in their proximity suggest that sitting on the ground could be dangerous for birds.

Most of the birds arriving at the roost with empty crops were brown birds, whose foraging effects were poor in comparison to adult males. It seems reasonable to conclude that for these birds, especially for the first year birds,

participating in the communal roosts may be adaptive in terms of the exchanged information about the optimal foraging area. It is typical for the wintering period that the food is significantly deficient and hardly unavailable to Hen Harriers due to climatic reasons and hunting techniques (crusing flights, depth of snow) (Rice, 1982). Arriving at the roost from one main direction indicates that birds keep returning from one preferred foraging area. It was also observed that in the morning (n = 6) when birds leave the roosts, the same direction is preferred (I. Kitowski, unpubl. data). Such observations confirm the role of communal roosts of Harriers in finding food (Watson, 1979; Beauchamp, 1999; Kitowski, 2004).

The place for roosting was selected once only – only incidental cases of changing the first "bed forms" in response to the need were noted. It can be contributed to the fact that harriers, including Hen Harrier, roosting places were covered by fields of vegetation for many subsequent wintering seasons tend to be were exploited by roosted individuals (Watson, 1979). It seems likely that birds by experience are able to detect that selected "bed forms" can be optimal in terms of micro-climate factors and protection against penetration by predators. Such an assessment results in choosing one "bed forms " once only, while the other for several times or even more frequently (Kitowski, Wojtak, 1998) that was proved by pellets and feathers, droppings accumulated there. It can also explain that "bed forms" on roosts are rarely changed and can be linked to flushing brown birds (ringtails) by adult grey males who arrived late. On the other hand, the observed aggressive behaviour between the brown birds (ringtails) and adult males can suggest existing differences in the "bed forms" quality. In the context of assessing the quality of "bed forms" on communal roosts and the threat posed by terrestrial mammals, the role of the individual first arriving at roost shall be noted. Most likely their behaviour such as talons presenting against terrestrial mammals can be observed from a significant distance which makes the other birds to recognise potential danger, i.e. terrestrial mammals.

The selected by Hen Harriers sites seem attractive in the long run if the vegetation is not burnt out. It was proved by conservatively choosing the same roosts over several years (Watson, 1979; Christiansen, Reinert, 1990; Kitowski, Wojtak, 1998; Kitowski et al., 2003) and by exploiting particular "bed forms" by roosting Montagu's Harrier at the time of prelaying and post-fledging periods (Kitowski, 2004; I. Kitowski, pers. unpubl. observation). Sometimes "bed forms" occupied by Hen Harriers in winter are selected for Montagu's Harriers nests (Kitowski, Wojtak, 1998). The research has proven a modifying impact of weather on Hen Harrier behaviour. Harrier's hunting activities during stormy and foggy weather are limited. Harriers do not hunt as frequently during periods of stormy weather and high relative humidity (Craighead, Craighead, 1956; Watson, 1979; Serrentino, 1989) when birds tend to decide to stay in the area of the communal roost, as it was observed in SE Poland.

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Вийшли з друку:

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