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LONG TERM CHANGES IN THE POPULATION SIZE OF THE EURASIAN MARSH HARRIER BREEDING ON MAIN WATER BODIES OF ZAMOSC REGION, EAST POLAND

Ignacy Kitowski, Grzegorz Pitucha

Abstract. In the years 1993–1997 and 2006–2007, number of Eurasian Marsh Harriers breeding on 35 water bodies in Zamosc region (E Poland) was studied. 76–88 breeding pairs nested there in 1993–1997 and 79–80 pairs in 2006–2007. The obtained results show a stabilization in the number at a level of about 80 pairs, after a very clear increase in that place in late the 1970's and 1980's. The paper also presents the number dynamics of Eurasian Marsh Harriers which arose in the late 1990's in the water reservoir in Nielisz. In the 1990's in the Zamosc region, the role of fish ponds clearly decreased on behalf of river valleys covered with extensive reedbeds. Presently, however, as a result of a very strong number increasing of the Red Fox, the role of the reedbeds in water bodies has newly increased for the Eurasian Marsh Harrier population.

Key words: Eurasian Marsh Harrier, *Circus aeruginosus,* Poland, number dynamics, breeding habitat.

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Многолетние изменения популяции болотного луня, гнездящегося на основных водоемах Замостского региона, Восточная Польша. - И. Китовский, Г. Питуха. - Беркут. 16 (2). 2007. - Исследования проводились в 1993–1997 и 2006–2007 гг. на 35 водоемах. В 1993–1997 гг. здесь гнездились 76–88 пар луней, в 2006–2007 – 79–80 пар. Полученные результаты показывают стабилизацию численности на уровне около 80 пар после выраженного ее роста в 1970–1980-х гг. Приводятся также данные по динамике численности на созданном в конце 1990-х гг. водохранилище на р. Вепш у Нилиша. В 1990-х гг. роль рыборазводных прудов для болотного луня в Замостском регионе заметно уменьшилась из-за того, что в долинах рек появились обширные тростниковые за-росли. В настоящее время она опять возросла в связи со значительным ростом численности лисицы.

Introduction

The Eurasian Marsh Harrier (*Circus aeruginosus*) belongs to the most numerous predator birds in Poland and Europe (Heath et al., 2000). Its number in Poland is estimated at 4–5 thousand breeding pairs, even though it is considered that this number is inestimable (Tomialojc, Stawarczyk, 2003).

In Zamosc region (East Poland) in the 1990's the number of the population of the species was estimated at a maximum of 102–116 nesting pairs (Kitowski, 2000). The presented paper is the second of a series of works dedicated to the population of the Eurasian Marsh Harrier nesting in Zamosc region. The first work (Kitowski, 2000) presented a general sketch of the situation in all the most important nesting habitats of the region based on data collected by the author in the years 1993–1997 and data that was previously published (Blazejewski et al., 1972; Profus et al., 1992).

The goal of the following article is to present the details of results of the long-term changes in the number dynamics of Eurasian Marsh Harriers on the territory of Zamosc region based on a carried out survey on 36 water reservoirs in the years 1993–1997 and in 2006–2007.

Study Area and Methods

The research was done on the territory of the former Zamosc voivodship (approximately: 50° 42′ N, 23° 14′ E, East Poland, existed until the year 1998). The study area has an agricultural character and incorporates about 6900 km^2 consisting of the territory of the former voivodship. Meadows comprise about 10 %, forests – 22 % and plowing fields – about 60 %

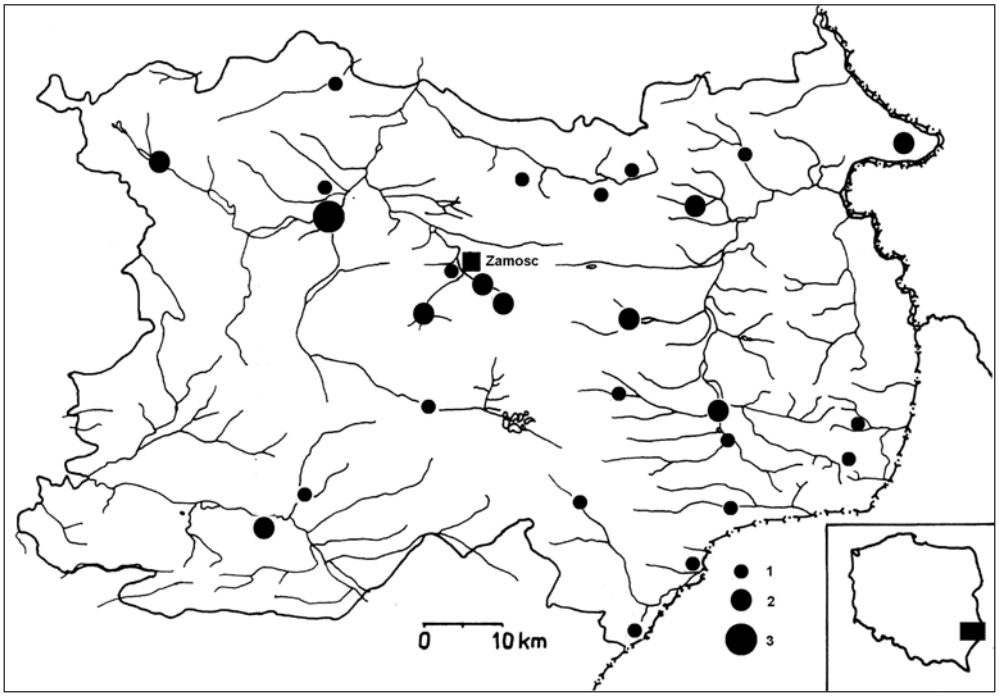

Fig. 1. Number of breeding pairs of Eurasian Marsh Harrier nesting on main water bodies of Zamosc Region in 2007. 1 – 1–3 breeding pairs , 2 – 4–9 breeding pairs, 3 – 17 breeding pairs.
Рис. 1. Число гнездящихся пар болотного луня на основных водоемах Замостского региона в 2007 г.

of the surface of the territory on which the research was carried out. About 500 thousand people live on the study area (data of the former Zamosc Statistical Department, ZSD). It is an unusually poor territory in wetlands, and this is proved by the presence of only a few natural water bodies near villages: near Horodlo, the Hrubieszow district and Srednie Duze (Zamosc district) with somewhat greater dimensions of a natural character. The greater water reservoirs in the region are fish ponds principally related with river valleys such as the Huczwa, Tanew, and Wieprz. However, the biggest (about 900 ha) in the region water reservoir appeared at the end of the 1990's as a retention reservoir on the Wieprz river near the area of Nielisz. Zamosc region is counted into the inflow basin of the Vistula river (Kondracki, 1987).

The undertaken research on water reservoirs in the years 1994–1997 and 2006–2007 was based on mapping and observing the behavior of birds on the territory covered by the reedbed (*Pharagmites australis*), maces (*Typha* spp.), rushes (*Juncus* spp.), in the period of the second half of April to the end of July. On the sites of larger dimensions, rich in nesting pairs which were vast pond complexes covered with reedbeds of greater dimensions, 4–6 territory control checks were done. Due to threats on the broods, nests were more rarely searched. In other places, 3–4 control checks were made depending on the specifics of the studied reservoir. In the case of checking the control region, up to 50 ha for mapping sessions were not shorter than 3 hours, and on greater regions, these were prolonged to even 4–5 hours, as Ranoszek (1983) recommended.

The goal of carrying out effective mapping was the investigation of particular changes in the behavior of adult Marsh Harriers with the passing of breeding cycles. From the beginning of April to mid May, the following points

were carefully investigated and indicated on the map: a) events in diving, chasing and mobbing of other diurnal raptors (Falconiformes) and Corvids (Corvidae), b) instances of "sky dances" of adult males in the presence of other birds, c) instances of aerial and other prey transfers from males to females. Places were also noted on the map where there were the vegetation where nest materials were carried by adult birds, and the places of females landing with prey from males.

The latest period, the end of May, when the behavior of adult females changed as a result of the abandonment of their brooding of nestlings, apart from the above mentioned behaviors, attention was paid to the instances of perching of adult female birds among the reedbeds. From the beginning of July, the feeding places of flying fledglings by adults were investigated. At that time also the places of perching of the juveniles able to fly and their number were noted on the map.

Experience of presently undertaken research on Marsh Harriers by other authors and studies in Zamosc region show a high intensity of parental care behavior in the morning hours (Witkowski, 1989; Fernandez, 1992; Kitowski, 2006). That is why the decided majority of observation sessions were done during the hours of 6^{00}–12^{00}.

The collected material, in accord with Krol's (1985) recommendations, incorporated the territories which were certainly and probably occupied. The category of territories occupied probably related to the cases where one or several nests being built were noted, or when a built nest was found, but without broods and it did not accompany the observations of adult birds of both sexes. In this case the territories were considered do not occupied by them. An analysis of the collected material from particular water bodies during the course of the entire breeding season taking into account simultaneous states of birds comprised the only and primary criterion determining the number of breeding pairs in particular sites and indicated the above division of various types of territories. In the analysis, cases of territories occupied by single males and occupied territories were excluded, but only those in which adult birds did not show any sign of starting to breed or preparing to breed.

Results

During the research, regular control checks were done on chosen 35 water reservoirs on which in the years 1993–1997 nested from 76 till 88 breeding pairs. In 2006–2007 at the indicated reservoirs nested 81 and 79 breeding pairs (Table 1, Fig. 1). Among the discussed reservoirs the most essential role for the breeding of harriers was fulfilled by fish ponds in: Dub-Swaryczow, Laszczow and Labunie (complex of fish ponds called "Blonka") where a respective 9, 8 and 6 breeding pairs of this raptor nested (Table 2). For the noticed number of studied reservoirs, the breeding pairs, despite the passing of years, were stable and did not change, or fluctuated by 1–2 pairs, which indicates for the majority of locations an increase or drop no surpassing 50 %. However for 14 locations (40.0 % of all sites) a 50 % or greater drop in the number of pairs in comparison with the period of 1993–1997 was noted. This was in contrast to 21 locations (60.0 % of all sites) where stability was noted and an increase in numbers gave a general picture of the stability in the number of Eurasian Marsh Harriers on main water bodies of Zamosc region.

These data does not include the presently most important place for the occurrence of the Eurasian Marsh Harrier in Zamosc region, built at the end of the 1990's, the water reservoir in Nielisz. There, in 2005–2007 nested 16–17 breeding pairs, while in the years 1998–2002 only one breeding pair appeared on the reservoir (Fig. 2). This indicates that the mentioned reservoir was the site at which birds unusually powerfully increased their population and after exhausting their capacity of habitats stabilized their population (Fig. 2).

Discussion

The first more precise data on the topic of the occurrence of Eurasian Marsh Harrier on

Table 1

Number of breeding pairs of Eurasian Marsh Harrier in studied water bodies in Zamosc region.
Число гнездящихся пар болотного луня на обследованных водоемах

Name of village	Biotopes	District	1993	1994	1995	1996	1997	2006	2007
Chmielek	A	BILG	5	4	4	4	4	5	5
Dub-Swaryczow	A	ZAM	9	8	9	8	10	9	9
Dyniska	A	TOM	3	2	4	4	4	2	2
Gorzkow	D	KRAS	1	–	1	1	2	3	3
Grabowiec	A	ZAM	6	4	6	3	5	3	3
Hajowniki	A	ZAM	–	–	–	1	–	–	–
Hrebenne	A	TOM	1	1	1	1	1	1	1
Kacapka	C	HRU	1	3	2	3	3	5	4
Kosciaszyn	A	HRU	–	–	–	1	1	1	1
Krasnobrod	A	ZAM	–	–	–	–	–	1	1
Kozaki Osuchowskie	A	BIL	–	2	2	3	1	1	1
Lubycza Krolewska	A	TOM	–	1	–	–	–	–	–
Labunie-“Has”	A	ZAM	3	4	4	3	3	5	5
Labunie-Blonka	A	ZAM	3	4	3	4	3	6	6
Laszczow	A	TOM	7	7	9	9	7	8	7
Laziska	B	ZAM	2	1	–	2	–	2	2
Machnow Stary	A	TOM	–	1	1	1	1	–	–
Majdan	A	HRU	–	–	–	1	1	–	–
Maszow	B	ZAM	–	–	1	1	1	–	–
Nieledew	A	HRU	3	4	2	4	3	2	1
Pniowek	A	ZAM	3	3	4	2	2	3	3
Radostow	B	HRU	2	2	2	2	2	1	1
Rogow	A	ZAM	2	1	2	3	3	2	2
Rogozno	A	TOM	1	1	–	–	–	–	–
Ruda Woloska	A	TOM	1	–	1	1	1	1	2
Srednie Duze	C	ZAM	3	2	2	3	2	2	2
Tarnawatka	B	TOM	3	4	3	3	3	–	–
Topornica	A	ZAM	1	2	1	2	3	4	4
Wielobycz	A	KRAS	1	–	–	–	–	–	–
Wierzbica	A	TOM	3	3	4	4	3	2	2
Wozuczyn	B	TOM	1	2	2	2	2	1	1
Zaborce	A	HRU	4	5	4	5	6	4	4
Zakrzew	E	BIL	2	5	3	4	4	5	5
Skokowka	D	ZAM	1	–	–	–	–	–	–
Zimno	A	TOM	4	3	4	3	3	2	2
Total			76	79	81	87	83	81	79

Codes of districts: Bilgoraj – BILG, Hrubieszow – HRU, Krasnystaw – KRAS, Zamosc – ZAM, Tomaszow Lubelski – TOM. **Biotopes:** A – fish ponds (intensive management), C – lakes, D – recreational water bodies, E – ponds and wetlands in river valley.

water bodies of Zamosc region were given by Blazejewski et al. (1972). Blazejewski's team undertook a control check of all larger water reservoirs in the region (Table 2) in the years 1971–1972, presuming the presence there of only 3–4 breeding pairs of the species. The entire population of the raptor was estimated at that time to be only at 5–6 pairs, among which only 2 pairs were related with area covered of reedbeds in river valleys.

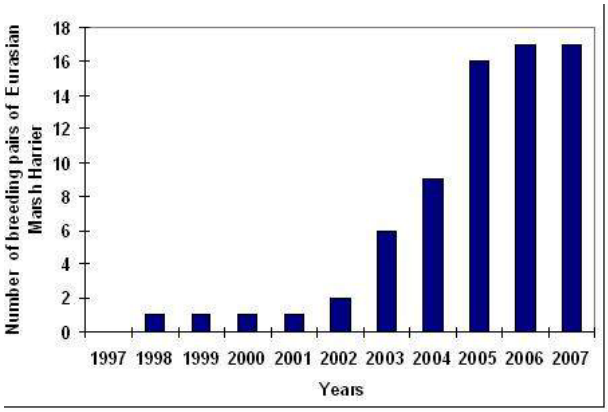

Fig. 2. Number dynamics of Eurasian Marsh Harrier on Nielisz reservoir in 1997–2007.
Рис. 2. Динамика численности болотного луня на Ниличском водохранилище в 1997–2007 гг.

Despite reported doubts as to this estimation (Buczek, 2005), much indicates that at that time most likely the entire population of breeding Eurasian Marsh Harrier on this territory encompassed by research was related with the reed beds covering the fish ponds. The above thesis can be based on the two following premises: at that time farming in the Zamosc region was characterized by very intense stock breeding with a large stock which contributed to taking advantage of the broad river valleys with the goal of pasturing or producing hay (Statistical Yearbook, 1975). Intense agricultural farming (particularly stock breeding) at that time did not favor the upkeep of either inter-pond or inter-field reed beds. In such a situation, only on fish pond complexes larger areas were maintained which were covered by high reed beds. These most likely remained in Zamosc region as the only places available for breeding for the Marsh Harriers.

The above phenomenon which organizes accessibility of nesting place for Eurasian Marsh Harriers has an additional lack of legal protection considered for raptors in Poland. All birds of prey, in this last of all: Eurasian Marsh Harriers in Poland were given legal protection only a few years later, after the survey undertaken by a team of Blazejewski (1972). Legal protection produced the reduction of the number of shot raptors, in this individuals of the studied species on a scale of the whole of Poland (Buczek, Keller, 1994). Only after the taking effect of this protection, at the end of the 1970's and 1980's, there was an increase in the number of Eurasian Marsh Harriers on reedbeds of fish ponds of Zamosc region, which lead to the indicated by Buczek (2005) stabilization in their number in SE Poland. This was an effect of reaching conditions meeting the capacity of the environment of fish ponds by the population. It was reflected in the data collected by local bird watchers and presented by Profus et al. (1992).

The end of the process of filling up of the ponds by breeding pairs of Marsh Harrier coincided with the period of social-economic changes in Poland at the end of the 1980's. At that time there took place a breaking up of the agricultural sector, which brought the appearance of small inter-field reedbeds and extensive reedbeds in river valleys covered with meadows till now. In the middle and end of the 1990's in the Zamosc region, as much as 1/3 of the population nested in such habitats (Kitowski, 2000). However, a very clear increase in the number of Red Foxes (*Vulpes vulpes*) (Kitowski, 2000; unpublished data of Polish Hunting Association – Zamosc Branch) brought a decline in the role of these habitats, bringing a new the dominating significance of fish ponds as the basic breeding habitat of Marsh Harriers in this part of Poland.

Studies done on many species of raptors point to the influence of availability of nesting places on population dynamics (Newton, 1979, 1989; Lohmus, 2004), and this also concerns the population of Marsh Harriers nesting in Zamosc region. Presently (the first decade of the 21st century), two contradicting processes come together. The first process is the distinct growth of the surface area of reedbeds (from the beginning of the 1990's) in river valleys, which previously were intensively used for the production of sweetmeats, and the appearance there of small plots of reedbeds which were not appropriate for breeding of the considered raptor. From the beginning of the 1990's there also began the process of intensifying fish production resulting from economic changes since the new private owners wanted to maximize profits in a short time. This process brought on some ponds desisting of production (an increase in the area of reedbeds), and on other ponds it brings intensification of the process of fish production, leading to the reduction of reedbed area, and cutting down reedbeds during breeding, which brought a destruction of bird nests, including those of the Harriers.

Apart from the availability of nesting places, the second factor must be discussed which influences the number of Harriers – it is the predation from the carnivore mammals. Former field study on Eurasian Marsh Harriers very clearly showed that increase in the population of the Red Fox can limited Harrier populations (Buczek , Keller 1994; Dijkstra, Zijlstra, 1997). This without a doubt took place and now, since Zamosc region lays in the territory of the sphere which stretches along the entire Eastern border of Poland on which there is a massively distributed vaccine against rabies. Rabies and hunting pressure were factors which for years very strongly limited Red Fox populations in Poland included Lublin region (Kitowski, 2000). In such a situation the population of Eurasian Marsh Harrier can not be used to its full potential for nesting places in extensive river valleys (Wieprz, Tanew, Bug, Wolica, Por) where exist large area covered by reedbed. On scale of all Poland, the process of increase in the number of Red Foxes found its reflection in the appearance of a drop in the number of Eurasian Marsh Harrier appearing during counting on a national scale (Chylarecki et al., 2006). On the other hand, a slow growth in the number of Otters (*Lutra*

Table 2

The comparison of number of breeding pairs of Eurasian Marsh Harrier on main fish ponds complexes in the Zamosc region
Сравнение числа гнездящихся пар болотного луня на основных комплексах рыборазводных прудов в Замостском регионе

Site	1971–1972 (Blazejewski et al., 1972)	1984–1990 (Profus et al., 1992)	1993–1997 (Kitowski, 2000; present study)	2006–2007 (present study)
Chmielek	–	3	4–5	5
Dub – Swarczow	1	3	8–10	9
Labunie*	–	5	6–8	11
Laszczow	1	4	7–9	8
Topornica	–	1	1–3	4
Tarnawatka	1–2	1–2	3–4	–
Total	3–4	17–18	28–39	37

* Pooled data from "Blonka" and "Has" complexes.

lutra) is being observed in the Zamosc region, whose appearance also shows the good condition of the population of this mammal on the Bug river and Wieprz and some fish ponds (I. Kitowski, G. Pitucha – unpubl. data). In the 1990's, despite the presence of reedbeds in some water reservoirs related to forests, they were not inhabited by Harriers (Kitowski, 2000) as in the ponds in: Krasnobrod, Bilgoraj, most likely caused by the penetration of carnivores. Among the indicated reservoirs, birds presently inhabit ponds only in Krasnobrod, and in the case of the last fish ponds, on account of intense economic activity (Bilgoraj).

In summary, these two processes on the scale of the Zamosc region produced stability in the number of breeding pairs of Eurasian Marsh Harriers on water bodies. However, it is certain that the observed in the 1980's and 1990's process of increase in population on water bodies (Profus et al., 1992; Kitowski, 2000) most certainly underwent a slowing down (Tables 1, 2). It seems that the above indicated processes in future years will determine the dynamics of the population of Eurasian Marsh Harriers on the area of Zamosc region. Every appearance of extensive safe reedbeds (on water reservoirs) will be used by the birds, which is what took place on the reservoir in Nielisz, where in a period of 8 years the number increased by 16 times (Fig. 2). As to the future fate of the population of Marsh Harriers nesting on water bodies, one must see things through the prism of the Paneuropean nature conservation net "Natura 2000". In Zamosc region the most important breeding sites of Eurasian Marsh Harriers such as reservoirs in Nielisz, fishponds in Zakrzew, Dub-Swaryczow, Laszczow and Zimno were reported to enter the scope of this net (Boruchalski et al., 2004; Stachyra et al., 2004a, 2004b; Michalczuk, Tchorzewski, 2004).

Without a doubt the future fate of at least part of the birds will depend on the continually being resolved problem of the use of lead bullets by hunters in Poland. Studies done till present show a noticeable concentrations of lead in egg shells and bones of Eurasian Marsh Harriers and other wetland birds from east part of Poland where hunting practices are common (Komosa et al., 2007; A. Komosa and I. Kitowski – unpubl. data).

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Замітки	Беркут	16	Вип. 2	2007	220

НОВЫЕ НАБЛЮДЕНИЯ О ДОБЫВАНИИ РЫБЫ НАСЕКОМОЯДНЫМИ ПТИЦАМИ

New observations about prey of fishes by insectivorous birds. - I.R. Merzlikin, A.V. Sheverdyukova. - Berkut. 16 (2). 2007. - New cases of catching of small fishes by warblers and Bluethroat in Sumy (NE Ukraine) are described. [Russian].

В своем прошлом сообщении (Мерзликин, Шевердюкова, 2004) мы уже сообщали о добывании мальков рыб дроздовидными камышевками (*Acrocephalus arundinaceus*) и зарянкой (*Erithacus rubecula*). Дальнейшие наблюдения позволили нам установить еще случаи добывания рыбы дроздовидной камышевкой, а также камышевкой-барсучком (*Acrocephalus schoenobaenus*) и варакушкой (*Luscinia svecica*).

15.05 2005 г. на оз. Чеха, расположенном в г. Сумы, в период с 9^{14} по 9^{36} видели как кормившиеся в разных местах тростниковых зарослей камышевка-барсучок и самец варакушки ловили насекомых. Время от времени птицы спускались на лежащие на воде стебли тростника и склевывали с них беспозвоночных. Птицы, оказавшись у кромки воды, выхватили из воды по мальку предположительно верховки (*Leucaspius delineatus*) и проглотили его. Больше случаев добывания ими рыбы мы не наблюдали.

12.08 в 6^{55} наблюдали за парой дроздовидных камышевок, кормивших трех своих слетков. Одна из взрослых птиц собирала корм среди ветвей растущего на берегу высокого клена американского, а вторая – шныряла среди редкого тростника и периодически присаживалась на выступающие из воды корни деревьев и плавающие ветки и доски. Сидя на доске, она выхватила из воды малька рыбы и отнесла его слетку, после чего продолжила поиски корма, но рыба больше ей не попадалась.

ЛИТЕРАТУРА

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