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DIURNAL BIRDS OF PREY (AVES) FROM LETEA FOREST (THE DANUBE DELTA BIOSPHERE RESERVATION, ROMANIA)

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Abstract. Letea Forest has always represented a favorable place for the nesting of prey birds. In the past 3 decades, in Letea Forest, as well as in the entire Danube Delta, the number of species of birds of prey has fallen dramatically. In the current paperwork we tried to analyze the situation of the species of diurnal birds of prey identified in Letea Forest. During the study, that took place between November 2003 until September 2009, there were 24 species of prey birds observed, from which 6 are nesting species (*Circus aeruginosus*, *Haliaeetus albicilla*, *Falco vespertinus*, *F. subbuteo*, *F. tinnunculus*, *Buteo buteo* and *Pernis apivorus*), and the rest are winter guests, passing species and species with accidental presence in the study area.

Résumé. La forêt Letea a toujours représenté un endroit favorable à la nidification des oiseaux rapaces. Au cours des trois dernières décennies, dans la forêt Letea, comme dans tout le Delta de Danube, le nombre d'espèces d'oiseaux de proie a considérablement diminué. Dans ce travail, nous avons essayé d'analyser la situation des espèces de rapaces diurnes identifiés dans la forêt Letea. Après l'étude réalisée depuis Novembre 2003 jusqu'à Septembre 2009 dans la forêt Letea ont été observées 24 espèces de proie, dont 7 sont nidificatrices (*Circus aeruginosus*, *Haliaeetus albicilla*, *Falco vespertinus*, *F. subbuteo*, *F. tinnunculus*, *Buteo buteo* et *Pernis apivorus*), les autres sont des visiteurs d'hiver, des espèces de passage et des espèces accidentelles.

Key words: Letea Forest, ornithofauna, ecology, diurnal prey species.

INTRODUCTION

The diurnal birds of prey are a very important regulator factor for the ecosystem. Being situated on one of the last layers of the trophic pyramid, they are affected by any action made on the habitat. Thus these birds can be considered ecological indicators which are offering alarming signals in case of the appearance or persistence of problems that affect the biodiversity of the respective area. In order to detect these changes we need to know the situation and evolution at local level of this group of birds.

In Romania the diurnal birds of prey were studied little, while at local level the studies were fragmented and directed to the avifauna and not particularly on this group. Though, many times, the studies made on the avifauna, in general, can't cover all the species of diurnal birds of prey, because this group needs the application of some special work methods. Our study comes in completing the data obtained until now, offering an overview on the prey birds at local level, also trying to determine the causes of the disappearance on some species from the study area.

The data presented in this paper are not definitive, but represent a starting point for the following studies on the diurnal birds of prey, at the level of Letea sand bank as well as at the entire territory of the Danube Delta. The collected data will also help at a better estimation of the birds of prey effectiveness, locally as well as at national level.

The Danube Delta (Delta Dunării, in Romanian) was a shelter for nesting for the diurnal birds of prey for the species that nested in Dobrogea. Starting with the beginning of the past century many authors have pulled alarm signals about the disastrous situation of the preying species from Dobrogea, and from all over Romania. Letea Forest, as part of the Danube Delta, represents a place with conditions for the nesting of preying birds. According to the data from specialized literature, in the past century there were 16 species of birds of prey reported as being present in Letea Forest: *Neophron percnopterus* (Kiss, 1985), *Haliaeetus albicilla* (Cătuneanu, 1973; Klemm, 1973; Kiss, 1985; Stănescu et al., 1985; Ciochia, 1992), *Pandion haliaetus* (Linția, 1954; Radu et al., 1962; Stănescu et al., 1985; Cătuneanu, 1973; Ciochia, 2001), *Circaetus gallicus* (Stănescu et al., 1985; Tălpeanu, 1967; Ciochia, 2001), *Pernis apivorus* (Tălpeanu, 1967; Cătuneanu, 1973; Stănescu et al., 1985; Ciochia, 1992; Cuzic, 2004), *Milvus migrans* (Stănescu et al., 1985; Petrescu, 1988), *Falco cherrug* (Klemm, 1973; Kiss, 1985; Kiss & Rékási, 1991; Ciochia, 2001), *Aquila pomarina* (Cătuneanu, 1973), *Circus cyaneus* (Stănescu et al., 1985), *Circus aeruginosus* (Cătuneanu, 1973; Stănescu et al., 1985), *Buteo buteo* (Stănescu et al., 1985), *Falco vespertinus* (Cătuneanu, 1973; Stănescu et al., 1985; Papadopol & Tălpeanu, 1986; Patriche & Mancu, 2006), *Falco tinnunculus* (Cătuneanu, 1973; Stănescu et al., 1985; Papadopol & Tălpeanu, 1986; Patriche & Mancu, 2006), *Falco subbuteo* (Cătuneanu, 1973; Stănescu et al., 1985), *Accipiter gentilis* (Ciochia, 2001), *Accipiter nisus* (Stănescu et al., 1985; Ciochia, 2001).

The forest has suffered a lot along the time because of the damages made by the inhabitants, as well as the armies, which had an important quarter here, during the war of Crimea, therefore, only some virgin forest patches exist. After the war, the demands of the population becoming more insistent, Hasmacul Mare was exploited on a surface of 58 ha, from the most luxuriant part of the forest. This exploitation, which still threatens to go on, was stopped in 1922, after the intervention of the Naturalists Society, thus saving in time a rest of the most beautiful portion of Hasmacul Mare (Georgescu, 1928). The forestry cultures installed after 1932 had a big influence on the stabilization of mobile sands from Letea sand bank. Without their existence C. A. Rosetti and Letea villages, as well as the agricultural terrains would be subdued to sanding (Costin, 1964).

The technology of plantation of the white poplar has evolved as follows: in 1967-1968 the white poplar was planted in intercalated rows with box-thorn and oleaster; in 1971-1972 the white poplar was planted in intercalated rows with red box-thorn, on higher levels acacia being planted, in the disposition of 2x2. In 1973 the poplar was planted in the disposition of 3x3m (1100 trees/ha), with acacia on higher areas and tatarian maple on lower areas (Filip, 1974).

All the plantations that took place in this period had a beneficial role on the birds of prey. *Haliaeetus albicilla* prefers to build its nest in top of high poplars, in the case of the individuals inside the forest. *Falco vespertinus* prefers to occupy the nests of Magpie built on red box thorn or willow trees, more rarely on poplars, for nesting. *Falco tinnunculus* prefers to occupy the nests of Crow built in poplars.

MATERIAL AND METHODS

The ornithological observations from the protected area Letea Forest, the Danube Delta Biosphere Reservation (Fig. 1), were made from November 2003 to September 2009. For carrying on this study, field trips extended up to 15 days per month were made, mainly consisting of all aspects that characterize the periodical changes of a biocenosis.

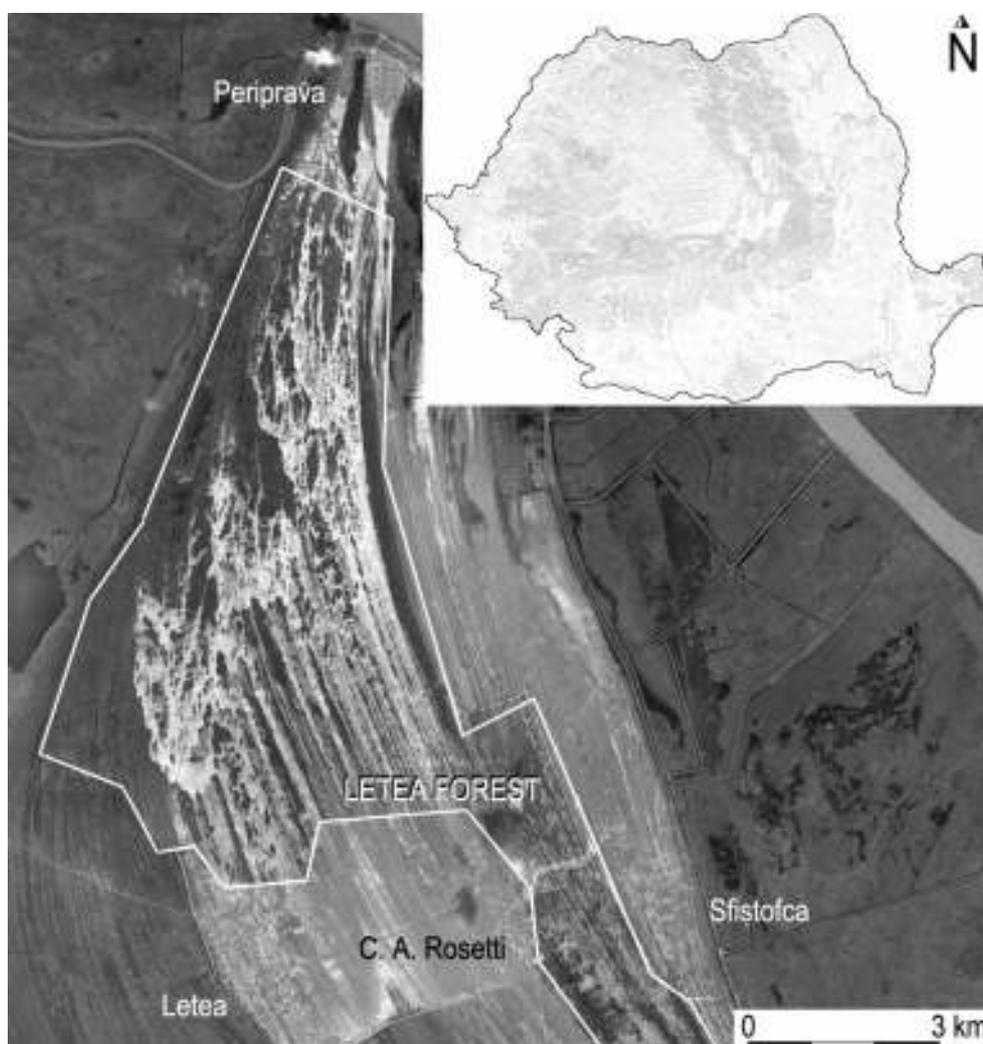


Fig. 1 - Letea sand bank, study area.

The observation methods used in doing this study were the method of transects and the method of observations from fixed point. The transects were made by crossing the forest in length from south to north. The method of transects was used to estimate the species of diurnal birds of prey which spend the winter in the study area. For carrying on this objective there were made transects monthly, during October – April. The observations from fixed point were made in the highest point from the center of the forest (“Dunele de nisip” or “Dunele lui Omer”) and the southern border of the forest in the field between Letea and C. A. Rosetti localities, for the estimation of the populations of birds in migration. The observations were made regularly, 1 week per month during 15th of August – 15th of November for the autumn migration, and the 15th of March – the 15th of May for the spring migration. For qualitative and quantitative observations we used binoculars (8x40; 10x50;

15x50) and a field glass (15-45x60). The location of the nests was set with the help of GPS Garmin Legend HCx, and later, with the help of the coordinates, the distances between nests was settled, mainly for the white-tailed eagle.

Study area (Fig. 1). On the surface of Letea sand bank, from the forestry background area of 5395.7 hectares, an area with integral protection regime was delimited – Letea with 2825 hectares. The integral protected area Letea is located on the sand bank with the same name, one of the oldest sand banks of the delta, being delimited at north by the southern limit of Nebunu Lake, at east by the communal road Periprava – C. A. Rosetti, up to 1.5 km north of C. A. Rosetti locality, at south, from the communal road Letea – C. A. Rosetti, on a straight line north – east – south west, with a distance of about 2 km and then on west, on a distance of about 2 km up to the southern limit of Hasmacul Ivancencu, at west by the western limit of forestry formations of the Letea sand bank. This area is neighbored by the tampon areas: Matita – Merhei – Letea in a surface of 22,260 hectares and the economical area Popina II, natural forests and forests planted from U.P.I. Letea located at south of C. A. Rosetti locality up to Cardon and by the area with agricultural use on the Sulina, Cherhanoiu, Şchiopu, Pocora and Mahomed sand banks, etc. Thus, the surface of forestry background Letea Forest represents 1.56% from the surface of the delta which is located on Romanian territory between the channels of the Danube (Petrescu, 1975).

The natural vegetation is formed of very different associations, starting with the ones of semi-desert, with elements of dry steppe on the top of the dunes, to the mixed deciduous forests and swamp associations. These associations vary a lot on very small surfaces, based on the relief, the level of phreatical water, the edifice conditions and micro-climate (Costin, 1964).

The forest appears under the form of stripes wide of 10-250 m, approximately oriented in north-south direction. They develop on the flatten coasts of the dunes to which they correspond in direction. Such a forest stripe in the delta is called “hasmac” in Romanian. Hasmacul Mare, located at the east of the forest, has a length of 10 Km, covering a surface of 130 ha and it is the largest hasmac. Other hasmac, smaller, are Târta Popii, Schiopul, Cruşina, Ivancencu, Grădina lui Omer and others. In the floristic specter of these hasmac we mention species of trees as: oak (*Quercus robur*, *Q. pedunculiflora*), ash (*Fraxinus angustifolia*, *F. palissae*), elm (*Ulmus foliacea*), white poplar (*Populus alba*), gray poplar (*Populus canescens*), aspen (*Populus tremula*); shrubs such as: sloe (*Prunus spinosa*), common hawthorn (*Crataegus monogina*), dog rose (*Rosa canina*), barberry (*Berberis vulgaris*), wild privet (*Ligustrum vulgare*), sea buckthorn (*Hyppophae rhamnoides*), french tamarisk (*Tamarix gallica*); hanging plants such as: wild grape (*Vitis sylvestris*), common ivy (*Hedera helix*), common hop (*Humulus lupulus*), old man’s beard (*Clematis vitalba*), and the most interesting liana with a length of 25 m (*Periploca graeca*).

An extension of the liana *Periploca graeca* is observed in the areas of high dunes, through seed (Ciocârlan, 1996).

The trees that grow in the hasmac don’t have a linear form given by the concurrence, the trunk being curved, sinuous with many calluses coming from wounds and more layers are observed:

- the first layer is located in deeper depressions formed of penduculate oak with lower raise, black alder (*Alnus glutinosa*) and sometimes willow;
- the second layer is made of ash and oak;
- the superior layer is made of poplar, which reaches 30-40 m height.

RESULTS AND DISCUSSIONS

The research periods were chosen such that they'll cover all seasons and, as much as possible the most diverse meteorological conditions. Most often during migrations, we oriented during some observation days also after some meteorological conditions (sudden cooling of the air, excessive warming, strong storms) that appear in Europe and especially in the northern or southern areas of the study area. Taking into account the seasonal variations we tried to identify in each year, practically, the optimal periods of observation, and also to follow the effects that some delays in the climatic change might have, we tried to obtain data also in the periods of minimal activity of the birds. Under these circumstances, we acted at doing some long tracks of observation, which generally included a large area along the forest. We walked the entire way and made identification using binoculars, after the sing or calling of existent species. A numerical evaluation also was made.

Using a thermometer we obtained the temperatures during the most important parts of the day (at the beginning, the middle and at the end of the track), we determined the direction and speed of the wind, we also wrote down other meteorological aspects such as the nebulosity, precipitations, etc. The tracks and obtained results allowed us to trace the most important moments of the diverse fenological aspects following, linked to this, to apply, adequate to the studied area, the method of finding of some more detailed avicenological elements.

As a results of the study made within period November 2003 to September 2009, we identified 24 species of diurnal preying birds, out of which 7 were nesting in the study area (*Haliaeetus albicilla*, *Buteo buteo*, *Pernis apivorus*, *Circus aeruginosus*, *Falco subbuteo*, *F. vespertinus*, *F. tinnunculus*), 4 species of winter guests (*Circus cyaneus*, *Buteo lagopus*, *Accipiter nisus*, *A. gentilis*), 5 species are present during migration period (*Milvus migrans*, *Falco cherrug*, *Accipiter brevipes*, *Aquila pomarina*, *Buteo vulpinus*), and 6 species are present in the study area accidentally (*Pandion haliaeetus*, *Circaetus gallicus*, *Hieraeetus pennatus*, *Buteo rufinus*, *Aquila chrysaetos*, *A. clanga*). *Falco peregrinus* and *Falco columbarius* are present sporadically in Letea Forest during winter, but don't stay too long in the study area.

Haliaeetus albicilla (Linnaeus, 1758) (white-tailed eagle)

Data about the nestling of this species in Letea Forest are provided by: Cătuneanu (1973), Stănescu et al. (1985) and Ciochia (1992). In Letea Forest the white-tailed eagle is nestling only in very high poplars, of about 25-30 m height. The nest is massive and can have a diameter of 160-240 cm, and the depth of 80-100 cm. It is kept for long periods of time and consolidated each year. Because of this the nest can reach amazing dimensions, some nests can collapse because of the weight. That was the case of nest no 5, which we found in January 2007, in the north-eastern part of Hasmacul Ivancencu. A supporting branch has torn down, and the nest has dropped away, ready to fall.

In the period 2004-2009 there were inventoried 5 nests of white-tailed eagle, from which 4 are in good condition, and one is mostly destroyed. Comparing the data from literature we noticed that the nesting areas preferred by white-tailed eagle are the same as 40 years ago (west border of the forest – Burduja Brook, Dunes of sand – Hasmacul Târla Popii), all of them being located in the western part of the forest. Besides the old locations, now there are 2 new locations as follows: Hasmacul Bercea and near Cardon village, in the hermitage area.

From the information got from the workers from Silvic Canton Letea, and from the natives, many of the white-tailed eagle nests present in the forest in the period 1970-1990 were destroyed by natural causes (falling of trees because of old age). The current nests are approximately built in the same areas where the old ones were. Most of the white-tailed eagle nests are built in the western part of the forest, near the lake complex Matița – Merhei. Nest no 3 is uncommon because it's layered. The first nest is at 5 m under the top of the tree, and the second is 2 m under the first one. We've closely analyzed these 2 nests; the nest that is lower is degraded, and the material from which it's composed is old and rotten, and the one on top is in good condition. Taking this into account we're considering that the lower nest is old, and the one on top was built when the old one could not be used anymore. Looked from different points it seems to be a layered nest, but in reality it is a degraded nest under and a good one above. The distance from the nests varies from 1073 m to 10046 m (Tab. 1).

Table 1

The distance from white-tailed eagle nests from Letea Forest.

	Nest 1	Nest 2	Nest 3	Nest 4
Nest 1		2077 m	3003 m	10046 m
Nest 2	2077 m		1073 m	9042 m
Nest 3	3003 m	1073 m		8041 m
Nest 4	10046 m	9042 m	8041 m	

The brooding is formed of 2-3 eggs and is laid at the end of February – the beginning of March. We noticed that, if the birds were disturbed from the nest during the breeding period, they left the nest. Such a case took place in 2008 in nest no 1; the pair of white-tailed eagle stood in the nest during February and March, and at the end of March they left the nest and it's possible that they occupied nest no 2, which was free until that time. We believe that the birds left the nest because of the woodcutting in the nearing. In 2009 we controlled the white-tailed eagle nests at the end of March, and the nests 2, 3 and 4 were occupied by adults that were breeding. On the 25th of April 2009 we controlled the white-tailed eagle nests and found that nest no 3 was abandoned by the adults. This was caused because a poplar near the nest fell over the poplar in which the nest was built. The old nest from lower level was destroyed and only the one from above was left, that is the one that was used by adults for nestling. In the table from below we present the white-tailed eagle nests situation during 2004-2009.

Table 2

The situation of white-tailed eagle nests from Letea Forest.

No nest/ year	nest 1	nest 2	nest 3	nest 4
2004	Occupied	unused	Occupied	Occupied
2005	unused	Occupied	Occupied	unused
2006	Occupied	Occupied	Occupied	Occupied
2007	Occupied	unused	Occupied	unused
2008	unused	Occupied	Occupied	Occupied
2009	unused	Occupied	unused	Occupied

From the table 2 we can see that there are nests that are not occupied each year; an explanation could be the avoiding of parasites (Petrescu, 1988). The number of nestling in each nest was of 2, only in 2007 in nest 3 there were 3 nestling (Tab. 3). Near the nest there were 3 dead cows, and at the beginning of April we noticed how one of the adults was feeding from one of the bodies. All 3 nestling left the nest at the beginning of June. We don't have any information if the nestling survived after leaving the nest. In 2008 the pair from nest no 2 only had one nestling, probably because it began to breed later, at the middle of March. We noticed that within the study area perimeter these white-tailed eagle prefer to feed in the slop area during spring, summer, autumn and sometimes during gentle winters, when the lakes are not frozen.

Table 3

White-tailed eagle nestling situation during 2004 – 2009.

nests	Number of nestling per year					
	2004	2005	2006	2007	2008	2009
Nest 1	2	0	2	2	0	0
Nest 2	0	2	2	0	1	2
Nest 3	2	2	2	3	2	0
Nest 4	2	0	2	0	2	1

The white-tailed eagle is a predator, good hunter, it feeds mostly on aquatic birds (bald coots and herons), also attacks large bird colonies, mammals (rabbits, muskrats, etc.), and sometimes feeds on dead bodies (Petrescu, 1988). The pellets that we found near the white-tailed eagle nests are large and of irregular forms. Their length varies from 75 mm to 110.5 mm, and the height between 60.3 mm and 72 mm. We've analyzed the leftovers found near the nest and the ones from the pellets. They belonged to the species: *Fulica atra*, *Phasianus colchicus*, *Platalea leucorodia*, *Egretta* sp., *Columba* sp., *Lepus europaeus*, *Capreolus capreolus*, but we also found fish remains belonging to the species: *Cyprinus carpio*, *Stizostedion lucioperca*, *Exos lucius*. Sometimes they can feed on dead animals. In 2007, we noticed an adult from nest 3 feeding on a dead horse near the nest. They hunt fishes mostly during spring; this can be explained that during April-May the carps go to shallow waters to lay the roe, this way becoming an easy prey. The white-tailed eagle usually fishes in shallow waters, either by walking in the water, or by catching fishes from the surface with the claws from flight (Petrescu, 1988). On May 2008 we noticed a white-tailed eagle adult that was carrying a grey heron nestling. On April 2009, near nest no 3, we found the remains from 10 individuals of *Fulica atra*, one *Phasianus colchicus*, one *Columba oenas*, one *Lepus europaeus* and from one *Cyprinus carpio*.

Haliaeetus albicilla was more numerous during autumn migration period, so on 27th November 2004 we noticed 22 individuals that were moving from north to south-west, and on 2nd October 2006 we noticed 9 individuals.

We believe that the situation of the 4 nests of white-tailed eagle from Letea Forest is good, at least for the 2 nests (nests 2 and 3) from the strictly protected area. For the other 2 nests from the tampon area, the situation is a little more difficult because during the period when the birds are beginning to breed there are days in which the wood exploitation is made near the nests. Even if the qualified persons for

bird protection from the area are declaring that during the breeding period all activities are interrupted, we had the opportunity to see how trees were cut near the nests.

Circus aeruginosus (Linnaeus, 1758) (western marsh harrier)

It is a sedentary species, a breeding species during summer. Inside the forest, for breeding and hunting, it prefers the peripheral areas where there is reed, as it is in the western part near Merhei Lake, or in the north, north-eastern part near the former piscicultural basins Popina II and in Nebunu Lake area near Periprava locality. During the study period, on Letea sand bank surface, there were localized 22 nests (Tab. 4), from which 6 were situated near the forest as follows: 4 nests in the western part of the forest, near Merheiul Mic lake, and 2 nests in the north-eastern part of the forest, near the former piscicultural basins Popina II. Taking into consideration that the area covered by reed from Letea sand bank is very large, we believe that the number of nestling pairs of this species is bigger.

Buteo buteo (Linnaeus, 1758) (common buzzard)

It can be met in different types of habitat, from small forest areas to large forests, with open areas with small vegetation and even in forest areas with small glades. It can also be found in large agricultural areas, but with trees used for breeding (Hagemeijer & Blair, 1997; Forsman, 2003). In Letea, the common buzzard is breeding in trees, usually in the third superior part of them. It mostly breeds in the areas of Hasmacul Mare, Hasmacul Ivancencu and other large hasmac from inside the forest. During the study period (2004-2009), the number of breeding pairs was constant; we managed to find, each year, 3 occupied nests, only in 2009, we identified 4 nests (Tab. 4). Also 3 breeding pairs were observed during 1980 period (Petrescu, 1988).

Falco tinnunculus Linnaeus, 1758 (common kestrel)

Usually, for breeding, they occupy crow nests, but we also found them, more rarely, using magpie nests. They use the nests from the periphery of the forest, located at heights (12-15 m), which offer a good visibility. The nests can be found rather easily; especially that one of the parents is always in the adjacent area, even if the nestling is larger. In the past, the common kestrel was also using the nests from high voltage poles between the localities Sfiștofca - C. A. Rosetti – Letea (Petrescu, 1988); we haven't found any nests on high voltage poles in the present time. We noticed that the distance between the nests is big (minimum 1000 m), but it can also nestle near other species of preying birds, as *Falco vespertinus*. In the adjacent area of C. A. Rosetti locality, we noticed a nest of common kestrel located on box thorn, at 5 m away from a red-footed falcon nest. During the study period we identified 38 nests belonging to the species (Tab. 4). In 2007, we localized 6 nests, from which 4 were situated on poplars in crow nests, one was situated on box thorn in a magpie nest and one was located on box thorn in a crow nest, both at 5 m height. In 2008, we localized 8 nests; 4 were situated on poplars, in hooded crow nests, one was on box thorn in a hooded crow nest, and 3 were on box thorn in magpie nests. In 2009, we identified 11 nests; 5 nests were located on poplars, in hooded crow nests, 4 were on box thorn, in hooded crow nests, and 2 were on box thorn in magpie nests. For Letea Forest, *Falco tinnunculus* is partially migratory species, because during winter only males can be seen, these also being in a smaller number, approximately 2-5 individuals.

Table 4

The nests situation for the diurnal sedentary and partially migratory preying species from Letea Forest during 2004-2009.

Species name	2004	2005	2006	2007	2008	2009
<i>Haliaeetus albicilla</i>	3	2	4	2	3	2
<i>Circus aeruginosus</i>	2	4	3	5	4	4
<i>Buteo buteo</i>	3	3	3	3	3	4
<i>Falco tinnunculus</i>	4	5	4	6	8	11

Pernis apivorus (Linnaeus, 1758) (honey buzzard)

In the past, it was quoted in more lines as breeding species in Letea Forest (Tălpeanu, 1967; Stănescu et al., 1985; Petrescu, 1988; Ciochia, 1992). During the study we noticed that the honey buzzard was present in Letea Forest during the autumn migration period. During summer, the honey buzzard can be observed very rarely: on the 27th of June 2007, 3 young individuals that were flying above the sand dunes; on the 9th of July 2007, 2 individuals; on the 9th of May 2008, one individual and on the 11th of June 2008 one adult near Cardon hermitage. As breeding area, it prefer the level of columbidaes, rich in leaf-bearing forests, with many clearings and arid terrains, where it can easily find food (Ciochia, 1992). We haven't managed to identify any nest because this species builds them at big heights, and during incubation, as well as during the growing of the nesting, the couple is providing the camouflage of the nest with green twigs with leaves. We're mentioning that, in the present, the honey buzzard has an uncertain breeding, because we haven't identified any nests or sure information to confirm the breeding.

A big number of individuals was noticed during the autumn migration, on 4th of September 2006 a migration front of 526 individuals around 3.30 p.m., were flying at low altitudes, and on the 5th of September 2006, 160 individuals, noticed during an observation day. In 2007, between the 2nd of September and the 17th of September period, we noticed 735 individuals, the largest number being of approximately of 400 individuals on the 12th of September, and during the 10th – 12th of September 2008 we noticed 43 individuals.

Petrescu Eugen sustains that the honey buzzard is still breeding in Letea Forest, because on June 2004, he noticed an adult individual that was feeding on a bee nest near Hasmacul Hudacov (pers. com.).

Falco subbuteo Linnaeus, 1758 (hobby)

Nowadays, this species is well represented in the bird fauna of the forest. The hobby arrives in the nestling area at the end of April, beginning of May. The earliest was noticed on the 23th of April 2009, and the most belated arrival was on the 2nd of May 2007. It leaves Letea area in the first decade of October (10.X). It breeds in other bird nests (crows, magpies). Usually, it uses the nests from poplars at high altitudes (15 m), with good visibility. We identified the bird breeding in nests from low altitudes (6 m), on willow or box thorn. The nests occupied by the hobby were located at the periphery of small hasmacs or at the edge of tree groups from outside the forest. During the study, we localized 45 nests occupied by this species (Tab. 5). In 2007, we identified 14 nests which were distributed as follows: 9 nests were placed on poplars at high altitudes (above 18 m), 2 nests on ash tree, 2 nests on

willow tree and one on box thorn, at 6 m altitude, in a magpie nest. In 2008, we identified 12 nests, from which 10 were located on poplars, one on ash tree and one on willow tree, all in hooded crow nests. In 2009, we identified 15 nests, from which 9 were placed on poplars, 3 nests on ash tree, 2 nests on willow tree and one on box thorn at about 8 m height.

Falco vespertinus Linnaeus, 1766 (red-footed falcon)

In the present it's a breeding species in the area, being a summer guest. It arrives in Letea Forest in the last decade of April (20.IV) and leaves it in the second half of September (24.IX). We noticed that in Letea Forest is a gregarious species, breeding in the old colonies of crows or magpies; it mostly uses for breeding the peripheral areas of the forest, usually near the agricultural terrains and plains. It likes to breed in the area between C. A. Rosetti and Cardon, this being surrounded by large plain areas rich in food. In C. A. Rosetti – Cardon area, it breeds in a very limited area, sometimes the distance between nests being of maximum 4 m. It also breeds inside the forest, but in a smaller number, and the nests are much more isolated from one another. We localized 3 nests inside Letea village, in the agricultural terrains area near the farms; all of them were located on acacia trees. In 2007, a pair of *Falco vespertinus* tried to take hold of a nest of magpie located in the middle of Letea village, but because this happened during the 1st of May celebration, the phonic disturbance caused by tourists has driven away the birds from the nest. This falcon hunts along with *Falco tinnunculus*, without any territorial disputes being noticed.

In the study period (2004-2009), we identified 108 nests of red-footed falcon (Tab. 5). From the 21 nests found in 2007, 11 nests were made on box thorn in magpie nests, 5 nests were on box thorn in crow nests, 3 were in crow nests on poplars, one was in a crow nest on acacia tree and one was in a magpie nest on acacia tree. In 2008, from 16 identified nests 8 were located on box thorn in magpie nests, 3 were placed on box thorn in hooded crow nests and 5 were located on poplars in hooded crow nests. The height at which the nests were located varies from 2.5 m up to 12 m, but most of them were located at 5 m height, those being the ones on box thorn. In 2009, from 17 identified nests, 8 nests were located on box thorn in magpie nests, 4 were placed on box thorn in hooded crow nests, 5 were on poplars in hooded crow nests. In 2008, we noticed that the birds have changed the place of the colony. The colony was located by the road that links the localities C. A. Rosetti and Sulina. We believe that because of the large number of cars on the road in 2008, the birds preferred to leave the old breeding area and occupied the abandoned nests from the poplars inside the hasmac. In 2009, the number of cars grew up, and the birds changed the place of the colony, once again, this time taking over the nests located far away from the road.

During spring migration period, large flocks of *Falco vespertinus* were noticed, on 28th of April 2004, from 8⁰⁰ to 16⁰⁰ o'clock we noticed 440 individuals; on 5th of May 2007 we noticed a flock of 140 individuals; on 2nd of May 2008 we noticed 180 individuals at 18³⁰ o'clock, and on 5th of May 2008 we noticed 45 individuals that spend the night in the forest near the sand dunes. During the autumn migration period, on 24th of September 2009 we noticed 47 individuals, on the southern edge of the forest, near Letea locality.

Table 5

The nests situation for summer guests preying species from Letea Forest during 2004-2009.

Species name	2004	2005	2006	2007	2008	2009
<i>Falco subbuteo</i>	8	12	11	14	12	15
<i>Falco vespertinus</i>	18	17	19	21	16	17
<i>Pernis apivorus</i>	?	?	?	1?	1?	1?

Circus cyaneus (Linnaeus, 1766) (hen harrier)

It was identified during 1979-1981 as an uncertain breeding species for Letea Forest (Stănescu et al., 1985). After our observations this species is a winter guest for Letea Forest; the migrating individuals can be observed in this area starting with the first half of October (15.X), and stay here until the last decade of March (24.III). *Circus cyaneus* can be observed while hunting, in the opened areas between hasmac, in the agricultural terrain areas near the localities, in Sărăturile Letea area and the salt areas near the formal piscicultural basins Popina II. It was noticed, most of the time, hunting at low altitudes, at 2-6 m above the ground. The number of individuals observed during the study period is presented in table 6.

Buteo lagopus (Pontoppidan, 1763) (rough-legged buzzard)

Until now the specie hasn't been quoted as being present in Letea Forest. The rough-legged buzzard arrives in the study area starting with the second half of November (20.XI), leaving the area in the last decade of March (25.III). In the last 2 years the species was observed in the area later, around the beginning of December. Thus, in 2007, the first individual observed was on the 6th of December. We consider that the late presence of this species in the study area is due to high temperatures that were recorded in the entire country at the beginning of winter. The rough-legged buzzard can be met, while hunting, in the western part of the forest, in the reed areas. We noticed the species as being present inside localities as well.

Table 6

The number of observed individuals belonging to *Circus cyaneus* and *Buteo lagopus* species during cold period.

Observation period	Number of field work	Individuals observed of <i>Buteo lagopus</i>	Individuals observed of <i>Circus cyaneus</i>
15.11.2003 - 24.03.2004	13	6	9
15.10.2004 - 24.03.2005	14	6	15
15.10.2005 - 24.03.2006	14	5	12
15.10.2006 - 24.03.2007	27	3	15
15.10.2007 - 21.02.2008	9	4	8

Accipiter nisus (Linnaeus, 1758) (sparrowhawk)

There are data on the species that bred 20 years ago in Letea Forest (Petrescu, 1988), but in the last years it has been quoted as being a winter guest (Ciochia, 2001). In the last 4 years we identified the species as being a winter guest. Comparing to the other preying species that are winter guests, the Eurasian sparrowhawk arrives early in the area. It can be observed starting with the last decade of August (30.VIII) until the first half of March (8.III). It can be met, while

hunting, as well as inside the forest, in open areas or inside the localities near the forest. The number of individuals that spend the winter in the forest is small (Tab. 7).

Table 7

The number of individuals belonging to *Accipiter nisus* species that were observed during winter field work.

Observation period	Number of field work	Observed individuals
15.11.2003 - 8.03.2004	13	7
30.08.2004 - 8.03.2005	29	14
30.08.2005 - 8.08.2006	28	12
30.08.2006 - 8.03.2007	38	19
30.08.2007 - 21.02.2008	15	18

Accipiter gentilis (Linnaeus, 1758) (goshawk)

During 1977-1980, in Letea Forest only one breeding pair was present (Petrescu, 1988). Kiss J. B. mentions the presence of the goshawk in Letea Forest in 1996 (Ciochia, 2001). Our observations show that the goshawk is met in the study area during wintry aspect, being present in the forest from the 18th of September to the 19th of March. During the autumn passage period, a large number of individuals can be observed, and during winter a small number of individuals can be seen.

Milvus migrans (Boddaert, 1783) (black kite)

During 1973-1980 it was quite a frequent species, about 15-18 breeding pairs living in Letea Forest. The number of breeding pairs began to lower, and in 1986 there were only 2 pairs left (Petrescu, 1988; Stănescu et al., 1985). Based on our observation, we consider that it's passage species for Letea Forest, because it was observed only during migration period. We first observed the species on the 29th of May 2004 (2 individuals flying above Hasmacul Mare) and another 2 individuals on the 6th of September 2006, over Omer Dunes. In 2008, we noticed an individual of black kite on the 10th of September, around 5.30 p.m.

Falco cherrug Gray, J. E., 1834 (saker falcon)

In 1981 and 1982, in Letea Forest, there was only one breeding pair each year (Kiss, 1985). It is believed that the disappearance of this species is linked to the disappearance of the white-tailed eagle and black kite nests, which they usually occupy (Botnariuc & Tatole, 2005). At present, this species is met during passage period. We observed it for the first time on the 7th of September 2006 while migrating, above the sand dunes from inside the forest, and after, on the 23th of April 2007 at the southern edge of Hasmacul Ivancencu, an immature who was flying grazing with the top of trees.

Falco peregrinus Gmelin, 1788 (peregrine falcon)

We met this species only twice during the study period; on the 12th of December 2006 in the northern part of Hasmacul Mare, when it was following a flock of 10 individuals of *Columba palumbus*, and the second time on the 28th of November 2007, near the southern part of C. A. Rosetti locality.

Falco columbarius Linnaeus, 1758 (merlin)

For the first time, we observed this species on the 26th of January 2007, near Letea village. The bird was resting in an acacia tree; when we got closer it flew and stopped in a poplar inside a housekeep. We have observed the species once more on the 28th of November 2007, in the southern part of Hasmacul Ivancencu; it was sitting on the top of an oak tree of about 15 m height.

Aquila pomarina Brehm, C. L., 1831 (lesser spotted eagle)

The first data on the presence of this species in Letea Forest dates from 1958, when it was observed in the western part of the forest, near the colony of pelicans (Cătuneanu, 1973). At present, it was observed during passage, on the 22nd of March 2004 near Cardon locality. Other observations are from autumn migration period. Above the sand dunes, on the 18th of September 2006, there were observed 11 individuals, on the 1st of October 2006: 2 individuals, and on the 2nd of October 2006: 5 individuals; in 2007, we observed 2 individuals on the 4th of September, above Hasmacul Mare. On the 9th of May 2008 we noticed an immature which was resting in a tree near Hasmacul Hudacov, and on 11th of September 2008 we noticed 10 individuals above the forest, being in migration.

Pandion haliaetus (Linnaeus, 1758) (osprey)

The first information about the presence of this species in Letea Forest are given by Dionisie Linția, which, in May 1923 observed an individual above the forest (Linția, 1954). Radu D. observed a individual at a time in August-September 1953, in September-October 1954, in May-June 1955, finding it, together with Tâlpeanu, breeding between 17-20 of June 1960 in Letea Forest (Cătuneanu, 1973). Stănescu et al., after the study made during 1979-1980, mentions the presence of the osprey as a breeding species in Letea Forest (Stănescu et al., 1985). Ciochia mentions in the paper-work *Aves Danubii, Păsările Dunării de la izvoare la vărsare*, that the species *Pandion haliaetus*, once bred in the Danube Delta, Letea Forest, but did not mention in which year, neither the source from which the information was taken (Ciochia, 2001). At present this species can be accidentally met in Letea Forest, we observed one individual on the 21st of May 2004 flying above Hasmacul Ivancencu and another individual on the 17th of April 2006 flying over Hasmacul Mare. In 2008 we observed the osprey during the autumn passage: on the 10th of September one individual, on the 11th of September one individual and on the 12th of September, 2 individuals.

Circaetus gallicus (Gmelin, 1788) (short-toed eagle)

During 1973-1986 it bred in Letea Forest (Stănescu et al., 1985; Petrescu, 1988; Ciochia, 2001). Currently the short-toed eagle can be observed on Grindul Letea only accidentally. We noticed, on the 28th of March 2004, one individual that was hovering above the sand dunes; another individual on the 5th of July 2004 was hovering above Hasmacul Ivancencu, and another individual, on the 14th of August 2006 that was flying above the acacia plantation from Cardon.

Buteo rufinus (Cretzschmar, 1829) (long-legged buzzard)

We have observed this species for the first time on the 26th of May 2004, on the plain between the localities Letea and C. A. Rosetti; 2 young individuals were feeding on the field. We've got closer to them for several times, but it didn't seem to

disturb them, when we've got closer for more than 30-40 m they were flying 100-200 m after which they placed on ground again. We've observed them in the morning at about 8.30 a.m., and in the evening around 6.00 p.m. they were in about the same place. On the 23rd of September 2009 we noticed an individual flying on the southern part of Hasmacul Ivancencu.

Buteo buteo vulpinus Gloger, 1833

We noticed the species for the first time during autumn migration period. It flies solitary, rarely forms flocks (maximum 5 individuals). First observation took place on the 17th of September 2007, 2 individuals passed through at a difference of 2 hours; on the 9th of September 2007 3 individuals passed in 7 hours, and on the 12th of October 2007 we observed 4 individuals that passed above Hasmacul Mare.

Aquila chrysaetos (Linnaeus, 1758) (golden eagle)

We noticed, on the 22nd of February 2008, one immature in second year that was hovering above Hasmacul Mare. After 2 hours the same individual was observed also above Hasmacul Mare, but more in the north, near Periprava locality, hovering above the forest, after which he was flying slowly to the north.

Aquila clanga Pallas, 1811 (greater spotted eagle)

We identified 2 adult individuals, on the 20th of February 2008, that were hovering above the former piscicultural area Popina II.

Hieraaetus pennatus (Gmelin, 1788) (booted eagle)

We observed only the species one time, on the 15th of May 2008, one adult individual, opened phase, in flight, near the sand dunes.

Accipiter brevipes (Severtzov, 1850) (levant sparrowhawk)

It is present during migration, usually in the first half of September. We observed one individual on the 3rd of September 2006, 2 individuals on the 7th of September 2007 and one individual on the 19th of September 2007. In 2008, the bird was observed during migration on the 8th of September (one individual), other 4 individuals on 9.IX and one individual on the 11th of September.

Conclusions

After the study did in Letea Forest, we identified 24 diurnal birds of prey. From the 24 species, 7 are breeding in the study area (*Haliaeetus albicilla*, *Buteo buteo*, *Pernis apivorus*, *Circus aeruginosus*, *Falco subbuteo*, *F. vespertinus*, *F. tinnunculus*), 4 are winter guests (*Circus cyaneus*, *Buteo lagopus*, *Accipiter nisus*, *A. gentilis*), 5 are present during migration (*Milvus migrans*, *Falco cherrug*, *Accipiter brevipes*, *Aquila pomarina*, *Buteo vulpinus*) and 6 species are accidentally present in the study area (*Pandion haliaeetus*, *Circaetus gallicus*, *Hieraaetus pennatus*, *Buteo rufinus*, *Aquila chrysaetos*, *A. clanga*). *Falco peregrinus* and *Falco columbarius* are sporadically present in Letea Forest, during winter, but they don't station for a long time in the study area.

According to the data from the specialized literature, during 1960 – 1985, in Letea Forest the number of breeding birds of prey species was of 14 (*Haliaeetus albicilla*, *Pandion haliaeetus*, *Circaetus gallicus*, *Pernis apivorus*, *Milvus migrans*, *Buteo buteo*, *Circus aeruginosus*, *C. cyaneus*, *Accipiter gentilis*, *A. nisus*, *Falco*

cherrug, *F. subbuteo*, *F. vespertinus*, *F. tinnunculus*), the present days we only identified 7 species (*Haliaeetus albicilla*, *Buteo buteo*, *Pernis apivorus*, *Circus aeruginosus*, *Falco subbuteo*, *F. vespertinus*, *F. tinnunculus*).

We consider that a deeper involvement is necessary, of local authorities in applying protection norms for the birds of prey from Letea sand bank.

The number of nests of white-tailed eagle has remained unchanged in the last 3 decades, but if no steps will be taken to stop uncontrolled tourism with auto vehicles inside the strict protected areas, we could assist at the abandonment of the nests by the white-tailed eagle.

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PĂSĂRILE RĂPITOARE DE ZI DIN PĂDUREA LETEA (REZERVAȚIA BIOSFEREI DELTA DUNĂRII, ROMÂNIA)

REZUMAT

Pădurea Letea a reprezentat întotdeauna un loc propice pentru cuibăritul păsărilor răpitoare. În ultimele trei decenii, în Pădurea Letea, la fel ca în toată Delta Dunării, numărul speciilor de păsări răpitoare a scăzut considerabil. În lucrarea de față am încercat să analizăm situația speciilor de răpitoare de zi identificate în Pădurea Letea. În urma studiului, realizat în perioada noiembrie 2003 până în septembrie 2009, în Pădurea Letea au fost monitorizate 24 specii de răpitoare dintre care 7 sunt cuibăritoare (*Circus aeruginosus*, *Haliaeetus albicilla*, *Falco vespertinus*, *F. subbuteo*, *F. tinnunculus*, *Buteo buteo* și *Pernis apivorus*), restul sunt oaspeți de iarnă, specii de pasaj și specii cu apariție accidentală în zona de studiu.

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