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The Tawny Owl (*Strix aluco* L., 1758) Population in Belgrad Forest, Istanbul – Turkey

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Abstract

In Belgrad Forest near Istanbul-Turkey we surveyed the Tawny Owl's distribution, population density and habitat preferences. The study area was divided into 18 sample areas, which are 2x2 km. We located a total of 93 tawny owls (*Strix aluco* L. 1758): 34 pairs, 14 single males, 6 single females and 5 juveniles. Tawny Owls preferred deciduous old forest stands near streams and dams in Belgrad Forest. Also, their diet consisted mainly of Rodentia (93%) and a small percentage of birds, amphibian and insects (7%).

Keywords: Tawny owl, *Strix aluco*, Belgrad Forest, population, Istanbul, vocalization.

Istanbul-Belgrad Ormanı'ndaki Alaca Baykuş (*Strix aluco* L. 1758) Populasyonu

Kısa Özet

Bu çalışma Belgrad Ormanı'nda yaşayan Alaca Baykuş (*Strix aluco* L. 1758)'ların yayılış alanları, habitat tercihleri ve populasyon yoğunluğunun tespit edilmesi amacıyla yapılmıştır. Çalışma alanında 2x2 km'lik 18 örnek alan belirlenmiştir. Belgrad Ormanı'nda 34 çift olmak üzere, 14 yalnız erkek, 6 yalnız dişi ve 5 genç birey toplam olarak 93 alaca baykuşun yaşadığı tespit edilmiştir. Alaca baykuşların, Belgrat ormanındaki gölet ve dere kenarlarındaki yaşlı meşcerelerde etrafında yoğunlaştıkları saptanmıştır. Ayrıca besinlerinin büyük çoğunluğunu (%93) kemirgenler (Rodentia), küçük bir kısmını ise kuşlar, kurbağalar ve böcekler (%7) teşkil etmektedir.

Anahtar Kelime: Alaca Baykuş, *Strix aluco*, Belgrad Ormanı, populasyon, Istanbul, seslendirme

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1. Introduction

The Tawny Owl is found across temperate Eurasia from Great Britain and the Iberian Peninsula eastwards to Korea and south to Iran and the Himalayas (Snow and Perrins, 1998). They have a large geographical range of at least 10 million km² and a large population including estimated 970,000 – 2,000,000 individuals in Europe (Anonymous, 2004). Typically they prefer open and semi-open forest, woodland and open landscapes with wooded patches, deciduous and mixed forests, and mature conifer plantations near water. The Tawny Owl usually occupies lowlands in the colder parts of its range but breeds to 550 m in Scotland, 1600 m in the Alps, and up to 2350 m in Turkey (Snow and Perrins, 1998; Cramp, 1998; Voous, 1998.).

Their diet typically consists of a large percentage of small mammals (Cramp, 1985; Romanowskil and Zmihorski, 2009). Prey is typically swallowed whole, with indigestible parts regurgitated as pellets. Pellets, also called castings, are usually grey in color and odorless. Since owls do not completely digest their prey these often contain prey remains such as rodent fur and bones. Pellets are found under perches used for roosting or nesting (Brown et. al., 1987). Then prey species can be determined from the remains in these pellets.

The Tawny Owl (*Strix aluco* L) is the most commonly researched owl species in the world, but in Turkey, there was no detailed research on Tawny Owls. This study is the first comprehensive survey of Tawny Owls in Turkey and also of any other owl species in this country. Tawny Owls have been shown to increase density and productivity in spatially diverse forest habitats (Petty, 1989). With the daily increase of pressures on Istanbul's forests due to urbanization, industrialization and deforestation we believe that monitoring Tawny Owls with their role as an apex predator can be a good indication of forest health. Many wildlife species including owls and their population density have been under risk. This study represents the first insights to determine the Tawny Owl's distribution, population density, diet and habitat preferences in Belgrad Forest.

2. Material and Methods

2.1. Study area

Belgrad Forest is located northwest of Istanbul, Turkey; between 41° 09' - 41° 12' N and 28° 54' - 29° 00' E. Belgrad Forest covers an area of 5.800 ha. The elevation of the area ranges from 40 to 230 meters. Dominant vegetation includes *Quercus frainetto*, *Q. cerris* and *Fagus orientalis* tree species mixed with varying amounts of *Acer campestre, A. trautvetteri, Alnus glutinosa, Carpinus betulus, Castanea sativa, Populus tremula, Sorbus torminalis* and *Ulmus campestris* with a normal crown closure (Yaltirik, 1966). The oak species (*Quercus sp.*) cover 75 % of the forested area. There are seven small man-made lakes in the forest (Arslangundogdu, 2010).

Mean annual precipitation is reported as 1161.0 mm and the mean annual temperature as 13.2°C. The region, according to the Thornthwaite climate classification system of the watersheds and surrounding area is described as "humid, mesothermal oceanic with a moderate soil-water deficit in summer". The soils are shallow to deep, gravely, loamy clay in texture, rich in organic matter with medium to good permeability rates (Kantarci, 1980; Karaoz, 1988; Ozyuvaci et. al., 2004).

2.2. Methods

The study area was subdivided into 18 sample plots (2x2 km). Two observation points were randomly selected within a sampling plot. The distance between these two observation points was a minimum of 500 m apart. At each observation point vegetation and stand types were noted. The diameter and age classes of trees were taken from management plans of Belgrad forest.

Since Tawny Owls become the most territorial from winter to the beginning of the spring, the survey was carried out between 26.12.2007 and 29.03.2008 to locate territorial pairs as suggested by Avotinš, (2004). The playback census method was used to provoke vocalization of Tawny Owls to determine their number and population density (Zuberogoitia and Campos, 1998). As suggested by Lengagne and Slater (2002) we did not perform playback during wet weather and only conducted our surveys during clear and dry weather for optimal acoustics. The census activity was done between

dusk and sunrise once every two weeks for each location. The male vocalization "Huuu, hu-hu-hu-huuu" was broadcasted for one minute every five minutes during a 30 minute total period as suggested by Redpath (1994). According to reaction of Tawny Owls, their distributions, sexes and habitat types were determined. Locations were digitized using a GIS mapping program.

During this study, 28 pellets were randomly collected in the study area. The dried pellets were measured and carefully dissected by hand, using a binocular microscope. Then, the remains were screened out by a 0.1 mm sifter, to recuperate even the smallest pieces. The number and the prey species were determined on the basis of the skulls, mandibles, teeth and other significant remains.

3. Results

In Belgrad forest, 93 tawny owls (*Strix aluco* L. 1758) responded to playback. These are believed to represent 34 pairs, 14 single males, 6 single females and 5 juveniles. In the study, it was found that the Tawny Owls preferred living respectively in QC-CP c3 stands (26,88 %), FG-QC d3 stands (21,51%) and FG-QC-CP cd3 stands (16,13 %) (Figure 1 and Table 1). The ages of these stands were 40% c, 30% d and %18 cd (Figure 2 and Figure 3). Crown closure degree was found above 3 (71 % ≤) for all Tawny Owls (Table 1). The majority of Tawny Owls (n=88%) preferred living in old forest stands (c and d age classes).

Analyzed pellets represented 15 *Apodemus* sp. (53,6%), 9 *Microtus* sp. (32,1%) (Muridae, Rodentia, Mammalia), 2 *Glis glis* (7,1%) (Myoxidae, Rodentia, Mammalia), 1 Carabidae (Coleoptera, Insect) family (3,6%) and one pellet Turdidae (3,6%) (Passeriformes, Aves). Though amphibians were absent in pellet analysis, we observed owls eating 1 *Pelophylax ridibundus* (Anura, Amphibia) (3,6%) and 1 *Lissotriton vulgaris* (Urodela, Amphibia) (3,6%).

During playback surveys 78% of females and 71% of males responded within the first 5 minutes. The slowest reactions were 38 minutes for a male and 29 minutes for a female.

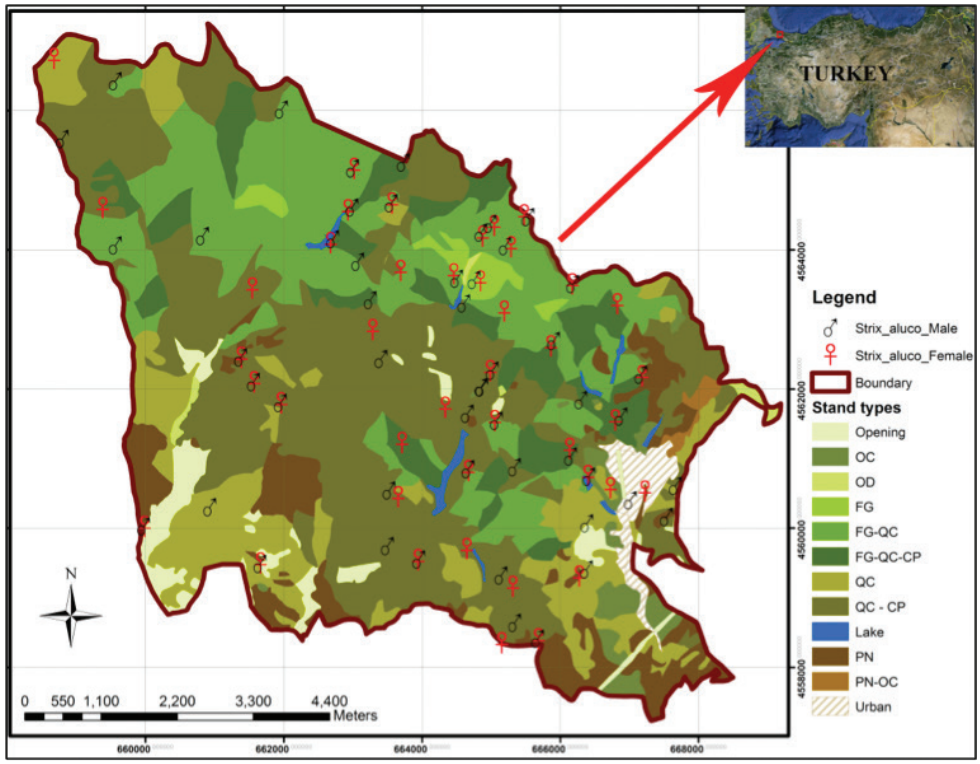

Figure 1. Tawny owls' distribution and stand types in the study area
Şekil 1. Araştırma alanında Alaca Baykuş'un yayılışı ve meşcere tipi

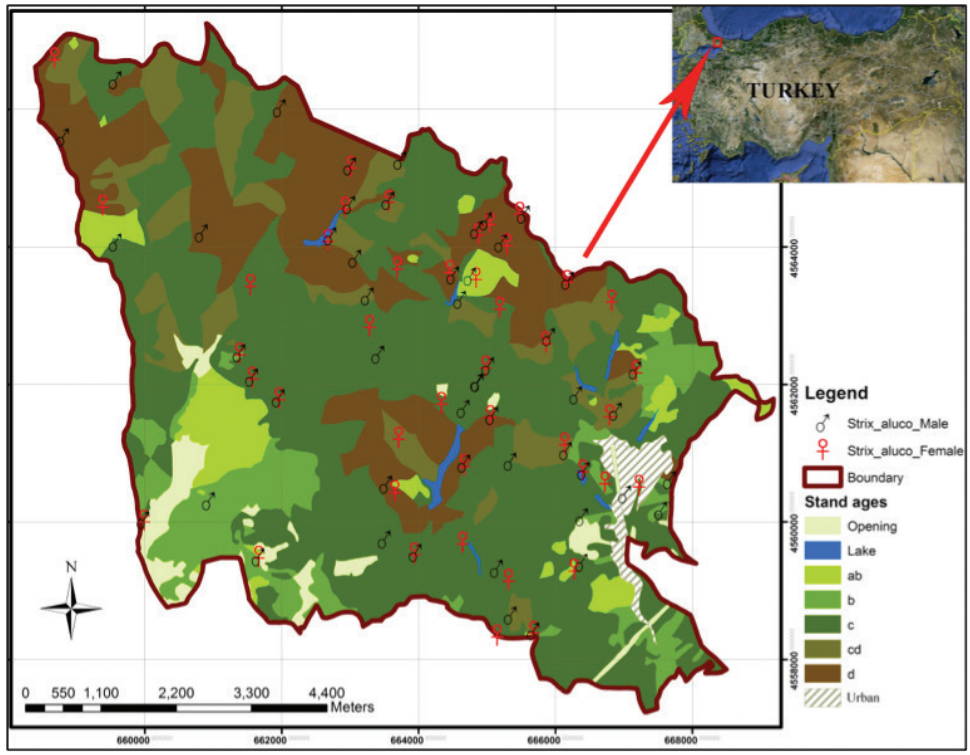

Figure 2. Tawny owls' distribution and stand ages in the study area
Şekil 2. Araştırma alanında Alaca Baykuş'un yayılışı ve meşcere çağı

Table 1. Tawny owls' habitat preferences in Belgrad Forest based on 93 observations. **Tree species:** PC = Corsican Pine, OC = Other coniferous, QC = Oak, FG = Birch, CP = Hornbeam, OD = Other deciduous Crown closure: 1 = 0.11–0.40, thinly closed; 2 = 0.41–0.70, moderately closed; 3 = 0.71 ≤, normally closed.

Tablo 1. Alaca Baykuş'un Belgrad Ormanı'ndaki 93 gözlem noktasına göre habitat tercihi. **Ağaç türleri:** PC = Karaçam, OC = Diğer iğne yapraklı, QC = Meşe, FG = Kayın, CP = Gürgen, OD = Diğer yapraklı. Tepe kapalılığı: 1 = 0.11-0.40, gevşek kapalı; 2 = 0.41-0.70, orta kapalı; 3 = 0.71 ≤ normal kapalı.

Tree Spp.	Tree Age Class	Crown closure	No. of owls	Owl Preference %
PN	ab	3	1	1.08
PN	b	3	3	3.23
PN	c	3	4	4.30
OC	c	3	3	3.23
Opening			1	1.08
FG	ab	3	3	3.23
FG-QC	c	3	4	4.30
FG-QC	d	3	20	21.51
FG-QC-CP	cd	3	15	16.13
QC	b	3	3	3.23
QC	c	3	1	1.08
QC	d	3	1	1.08
QC-OD	c	3	1	1.08
QC-CP	c	3	25	26.88
QC-CP	d	3	8	8.60

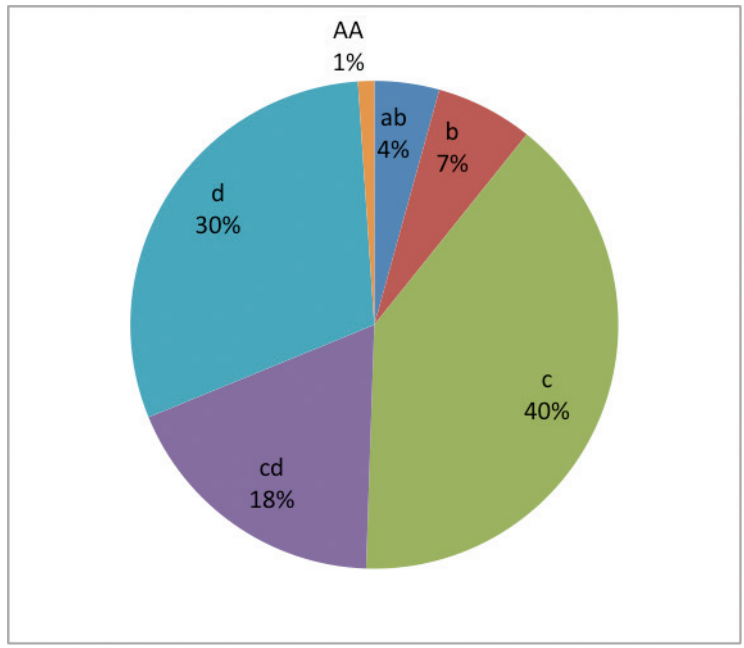

Figure 3. Tawny Owls' habitat preferences according to Stand Development age: the diameter of the tree trunk (with bark) at breast height (1.30 m). Diameters given in cm: a = 0.1-7.9; b = 8.0–19.9; c = 20.0–35.9; d = 36.0–51.9; e = 52 ≤.

Şekil 3. Alaca Baykuş'un meşcere gelişim çağına göre habitat tercihi: Ağaçların 1.30 m'deki kabuklu çapları esas alınmıştır. Gelişme çağları (cm): a = 0.1-7.9; b = 8.0-19.9; c = 20.0-35.9; d = 36.0-51.9; e = 52 ≤.

4. Discussion

This study is the first comprehensive study about Tawny Owls in Turkey. Belgrad Forest was chosen based on the only pervious study recording an area of Tawny Owl density in Turkey (Arslangundogdu, 2005). By using the playback vocalization method to determine owl distribution, a total of 93 Tawny Owl (*Strix aluco* L. 1758) observations occurred. We observed 34 owls in pairs. Others were viewed alone and further effort must be taken to determine if they are part of a pair or not. Of these we estimated there were 14 males and 6 females. Additionally observations were made of 5 young owls. This appears to be a high percentage (n=22.7%) and further surveys are necessary to determine if this is due to limited nesting sites in Belgrad Forest (Avotins, 2004).

We noticed on a few occasions that two pairs responded at one time and we believed this to occur when on the edge of both territories. Sunde and Bolstad (2004) noted that both sexes vocalize more when on the edges of their territories than when in the center. Therefore we were able to identify where territory edges occur. We hope to use this data to determine territory size and to aid in nest searches for future studies.

Tawny Owls preferred older (c and d ages 88%) with 3 degree of crown closure (fig. 3). As forests mature they have been shown to cause a positive change in the density of this species. This is likely due to larger trees enabling more cavity availability for nesting (Wiacek et. al., 2010). Tawny Owls were determined to concentrate in riparian zones in agreement with a previous study by the lead author (Arslangündoğdu and Akkuzu, 2000) as rodent populations are believed to be higher here. Owls preferred stands of QC-CP c3 (26,88%), FG-QC d3 (21,51%) and FG-QC-CP cd3 (16,13%). Tawny Owl habitat preference in Belgrad Forest is in agreement with the most common generalization of this species being that they prefer mature deciduous trees with some access to water (Cramp, 1985).

After 75 observations, 32% males, 19% females and 49% as pairs responded to our

vocalization. In the first 5 minutes of broadcast the reaction rate to imitation calls was determined for males at 78%, females at 71% with a total average of 74%. Additionally, within the 30 minute waiting period (Redpath, 1994), 91 % of the owls responded. The other 9% were heard while in the process of leaving the site after ceasing the broadcast.

In our study, pellet collection was conducted from winter to early spring. A total of 28 pellets were collected and two tawny owls were observed during hunting. It was determined that %53 of pellets belong to *Apodemus* sp., %32,4 of pellets *Microtus* sp., %3,6 Carabidae- Insects, %3,6 Turdidae – Aves and 7,2% Amphibia. These results are comparable to studies of much greater volume (Baleiauskiene et al., 2006; Jædrzejewski and Jædrzejewska 1993). The most important diets for Tawny Owls in Belgrad forest were determined to be of the Muridae family (Rodentia) (%93). Other studies show that Tawny Owls choose the most common prey species and prey diversities that vary according to seasons (Petty, 1999). The Tawny Owl's food requirements in spring and summer are typically birds and mainly rodents in autumn and winter. Other authors also reported finding other prey items (bats, amphibians and arthropods) sometimes integrated in their diet in spring (Galeotti et al., 1991).

In conclusion, we found Tawny Owls to be common in older forest stands near dams and they prefer to feed on small mammals. No information was found about their nest sites and much research must be done to fully understand this species in Turkey.

From this study it is clear Belgrad Forest is a very important place for Tawny Owls in Turkey. Tawny Owls have long been known to be territorial and choose their habitats based on an adequate prey base and a sufficient number of perches from which they can hunt (Southern and Lowe, 1968). Tawny owls prefer intermediate sized woods >4 ha in size and in larger patches of woods are capable of higher productivity and density (Redpath, 1995). Dense plantations of evergreens are very poor habitats for this species (Jensen and Sunde, 2012) and therefore, it is important to preserve deciduous forests of this size in order to maintain healthy wildlife populations. This paper represents the first population study of any owl species in Turkey; we hope this effort will lead to more involvement from researchers and students in researching owls in Turkey.

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