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BREEDING BIRDS OF PETROVA GORA: FOREST SONGBIRD DENSITIES AND AN OVERVIEW OF OTHER RECORDED SPECIES

Ptice gnjezdarice Petrove gore: gustoće šumskih pjevica i pregled drugih zabilježenih vrsta

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ABSTRACT

During the springs of 2014 and 2015, and the winter of 2014/15, bird survey was conducted in the forests of Petrova gora. Overall, 35 bird species were registered. Songbird breeding densities were assessed using the point-count method. The most numerous species recorded were the Great Tit *Parus major* and the Eurasian Chaffinch *Fringilla coelebs*. The Stock Dove *Columba oenas*, categorised as vulnerable in Croatia, was for the first time recorded in this area. An overview of all bird species recorded at Petrova gora, in this and previous studies, is provided.

INTRODUCTION

A large part of Petrova gora was protected in 1969 as “Petrova gora – Biljeg” significant landscape for its preserved forest habitats, landscape and historical values (PETRAK 2011). “Petrovac ornithological park” was founded in the area in 2008. A search of existing ornithological data from the area has yielded only one prior survey of mostly qualitative nature (D. RAĐOVIĆ, D. KRŠIĆ *in litt.*). The aim of this paper is to provide a fuller qualitative list of bird species of Petrova gora by integrating historical data with new ones, as well as to provide an estimate of densities of certain forest songbirds.

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MATERIAL AND METHODS

The study took place at Petrova gora as a part of two separate projects, “Common Bird Monitoring in Croatia” (CBM) and “EU Natura 2000 Integration Project” (NIP), during the springs of 2014 and 2015 and the winter of 2014/15. The position of the study area is approximately 45.28 – 45.35°N, 15.72° – 15.84°E. Less than 20% of forests are Sessile Oak *Quercus robur* while the rest are European Beech *Fagus sylvatica* forests. The highest peak of Petrova gora is Petrovac (512 m a.s.l.) (PETRAK 2011). Forest songbirds densities were assessed using the point transect method. A list of recorded species of Petrova gora forests was supplemented by anecdotal observations.

The point transect methodology follows the one described in BIBBY *et al.* 1992 and GREGORY *et al.* 2004. Estimation of number of breeding pairs was mostly, but not exclusively, based on singing males; visual observation and other bird sounds were used in the absence of song. The methodology differed somewhat between the two projects: the inner band radius of point transects was 30 m in the CBM project and 50 m in the NIP project. Furthermore, the transect of the NIP project consisted of 10 points, each at a distance of at least 250 m, and 6 minutes of the counting time was used on each point. Transects of the CBM project consisted of 9 points, each at a distance of at least 300 m. Six minutes were spent on each point as well, but birds were counted during the last 5 minutes only. All transects were completed before 9:30 AM. Three point transects were completed (one by the NIP methodology and two by the CBM methodology; 28 points altogether), and each transect was surveyed two times –in the early spring (6 April to 12 April) and in the late spring (18 May to 13 June), with a minimum of 41 and a maximum of 62 days between the visits. All transects were surveyed during the spring of 2014. Breeding densities of certain songbird species were assessed following BIBBY *et al.* 1992. As most of the points were located in beech forests (23 points), songbird densities were assessed for beech forests only, thus excluding 5 points located in the sessile oak forests. The total number of observed breeding pairs for each species was determined as the greater number of recordings per point between the visits. Species with only one observed breeding pair were excluded from the analysis, as well as woodpeckers and larger birds (such as the Eurasian Jay *Garrulus glandarius* and the Eurasian Golden Oriole *Oriolus oriolus*), which have relatively large territories (BWPi 2006).

Sound lures were used between 9:30 and 11:30 PM on four points: two during the early spring period and two during the late spring. Scops Owl *Otus scops*, Long-eared Owl *Asio otus*, Tawny Owl *Strix aluco*, Ural Owl *Strix uralensis* and Eagle Owl *Bubo bubo* songs were played in succession from a car radio, lasting 1.5 minutes each and with 1 minute listening breaks between species.

Birds were also recorded between the points of transects and throughout the area during midday in order to extend the bird species list of Petrova gora.

RESULTS

During ten field days in the area of Petrova gora, a total of 35 bird species (34 breeding) was recorded; added to 9 earlier findings (RADOVIĆ & KRŠIĆ *in litt*, SUŠIĆ *et al.* 1988), it brings the total number of birds recorded in the area to 44 (Table 1). Almost one third (~32%) of the recorded species are canopy-nesting, with half of those being non-passerines. Secondary hole-nesters represent one quarter (25%) of the recorded species, and these rely on the 14% of woodpeckers as primary hole-nesting species. The shrub- and ground nesting niches each holds 14% of the species.

Table 1: List of recorded bird species on Petrova gora, the status of their breeding population in Croatia (GN) (according to TUTIŠ *et al.* 2013), and nest site niche (according to SVENSSON *et al.* 2009, KIRIN *et al.* 2011, MITRUS & SOČKO 2004). Woodpeckers are marked as 1°hole - primary hole nesters. Species with * in front of the scientific name were not observed during the breeding season and species with ** were recorded only in earlier surveys

Tablica 1: Popis zabilježenih vrsta ptica na Petrovoj gori, status njihovih gnijezdećih populacije u Hrvatskoj (GN) (prema TUTIŠ *et al.* 2013) i niša izgradnje gnijezda (prema SVENSSON *et al.* 2009, KIRIN *et al.* 2011, MITRUS & SOČKO 2004). Djetlovke su označene kao 1°hole - primarne dupljašice. Vrste s * ispred znanstvenog naziva nisu zabilježene u sezoni gniježđenja, a vrste s ** zabilježene su samo u ranijim istraživanjima

Scientific name	English name	Croatian name	GN	Nest site niche
<i>Ardea cinerea</i>	Grey Heron	Siva čaplja	LC	canopy
** <i>Accipiter gentilis</i>	Northern Goshawk	Jastreb	LC	canopy
<i>Buteo buteo</i>	Eurasian Buzzard	Škanjac	LC	canopy
** <i>Hieraaetus pennatus</i>	Booted Eagle	Patuljasti orao	CR	canopy
<i>Columba oenas</i>	Stock Dove	Golub dupljaš	VU	hole
<i>Columba palumbus</i>	Common Woodpigeon	Golub grivnjaš	LC	canopy
** <i>Streptopelia turtur</i>	European Turtle-dove	Grlica	LC	shrub
<i>Cuculus canorus</i>	Common Cuckoo	Kukavica	LC	parasitic
** <i>Strix uralensis</i>	Ural Owl	Sova jastrebača	NT	canopy
<i>Strix aluco</i>	Tawny Owl	Šumska sova	LC	hole
<i>Dryobates minor</i>	Lesser Spotted Woodpecker	Mali djetlić	LC	1°hole
<i>Leiopicus medius</i>	Medium Spotted Woodpecker	Crvenoglavi djetlić	LC	1°hole
<i>Dendrocopos major</i>	Great Spotted Woodpecker	Veliki djetlić	LC	1°hole
<i>Dryocopus martius</i>	Black Woodpecker	Crna žuna	LC	1°hole

Scientific name	English name	Croatian name	GN	Nest site niche
<i>Picus viridis</i>	Green Woodpecker	Zelena žuna	LC	1°hole
<i>Picus canus</i>	Grey-faced Woodpecker	Siva žuna	LC	1°hole
** <i>Motacilla alba</i>	White Wagtail	Bijela pastirica	LC	ground
** <i>Motacilla cinerea</i>	Grey Wagtail	Gorska pastirica	LC	ground
<i>Troglodytes troglodytes</i>	Winter Wren	Palčić	LC	ground
<i>Turdus viscivorus</i>	Mistle Thrush	Drozd imelaš	LC	canopy
<i>Turdus philomelos</i>	Song Thrush	Drozd cikelj	LC	shrub
<i>Turdus merula</i>	Eurasian Blackbird	Kos	LC	shrub
<i>Erithacus rubecula</i>	European Robin	Crvenač	LC	ground
** <i>Phoenicurus ochrurus</i>	Black Redstart	Mrka crvenrepka	LC	ground
<i>Ficedula albicollis</i>	Collared Flycatcher	Bjelovrata muharica	LC	hole
<i>Ficedula parva</i>	Red-breasted Flycatcher	Mala muharica	LC	hole
* <i>Regulus ignicapilla</i>	Firecrest	Vatroglavi kraljić	LC	canopy
<i>Phylloscopus collybita</i>	Common Chiffchaff	Zviždak	LC	ground
<i>Sylvia atricapilla</i>	Blackcap	Crnokapa grmuša	LC	shrub
<i>Sylvia nisoria</i>	Barred Warbler	Pjegava grmuša	LC	shrub
<i>Parus palustris</i>	Marsh Tit	Crnoglava sjenica	LC	hole
<i>Parus major</i>	Great Tit	Velika sjenica	LC	hole
<i>Parus caeruleus</i>	Blue Tit	Plavetna sjenica	LC	hole
<i>Aegithalos caudatus</i>	Long-tailed Tit	Dugorepa sjenica	LC	shrub
<i>Sitta europaea</i>	Wood Nuthatch	Brgljev	LC	hole
<i>Certhia familiaris</i>	Eurasian Treecreeper	Kratkokljuni puzavac	LC	hole
<i>Certhia brachydactyla</i>	Short-toed Treecreeper	Dugokljuni puzavac	LC	hole
<i>Oriolus oriolus</i>	Eurasian Golden Oriole	Vuga	LC	canopy
** <i>Lanius collurio</i>	Red-backed Shrike	Rusi svračak	LC	shrub
<i>Garrulus glandarius</i>	Eurasian Jay	Šojka	LC	canopy
<i>Corvus corax</i>	Common Raven	Gavran	LC	canopy
** <i>Sturnus vulgaris</i>	Common Starling	Čvorak	LC	hole
<i>Fringilla coelebs</i>	Eurasian Chaffinch	Zeba	LC	canopy
<i>Coccothraustes coccothraustes</i>	Hawfinch	Batokljun	LC	canopy

In the forests of Petrova gora, the highest breeding density was estimated for the Great Tit *Parus major* with 295 breeding pairs per square kilometre. It is followed by the Eurasian Chaffinch *Fringilla coelebs* and the European Robin *Erithacus rubecula* with an estimate of 156.2 and 138.8 pairs/km², respectively, and by the Wood Nuthatch *Sitta europaea* and the Common Chiffchaff *Phylloscopus collybita* estimated to 112.8 pairs/km² each. The total breeding density of all assessed species was 1,266.9 pairs/km² (Table 2).

Two Stock Doves were observed on June 9th 2015 near the northeast border of the Petrova gora area. The pair was identified both visually and by voice in a wooden patch surrounded by pastures and cultivated land.

Table 2: Estimated breeding densities for certain songbird species (pairs/km²) in European Beech forests on Petrova gora

Tablica 2: Procijenjene gnijezdeće gustoće nekih vrsta pjevica (parovi/km²) u bukovim šumama Petrove gore

Scientific name	Estimated density
<i>Turdus merula</i>	95.5
<i>Erithacus rubecula</i>	138.8
<i>Ficedula albicollis</i>	69.4
<i>Phylloscopus collybita</i>	112.8
<i>Sylvia atricapilla</i>	69.4
<i>Parus palustris</i>	34.7
<i>Parus major</i>	295
<i>Parus caeruleus</i>	17.4
<i>Sitta europaea</i>	112.8
<i>Certhia familiaris</i>	43.4
<i>Certhia brachydactyla</i>	34.7
<i>Fringilla coelebs</i>	156.2
<i>Coccothraustes coccothraustes</i>	86.8
Total density	1266.9

DISCUSSION

A total of 44 bird species was recorded in the area of Petrova gora, including the Booted Eagle *Hieraetus pennatus* in 1952 (Sušić *et al.* 1988), which is today classified as a critically endangered species in Croatia (Turiš *et al.* 2013). Noteworthy are also the records of the Ural Owl *Strix uralensis* (Near Threatened) in 2009 (V. Turiš *pers. com*) and the Stock Dove *Columba oenas* (Vulnerable) in 2015.

The field research in 2014-15 was mostly concentrated on forest habitats of Petrova gora, and as a result 35 species were recorded there. The nine species from earlier surveys that were not recorded recently are mostly species of semi-

open or open habitats that were not included in this study (Starling *Sturnus vulgaris*, Red-backed Shrike *Lanius collurio*, Black Redstart *Phoenicurus ochruros*, White Wagtail *Motacilla alba*), and birds of prey which are difficult to observe through the forest canopy (Goshawk *Accipiter gentilis*, Booted Eagle). Furthermore, the Booted Eagle record is quite old and, given its status today, the species might not reside in the area any longer.

The obtained data on community composition are similar to that from previous studies in similar habitats (KIRIN *et al.* 2011, DUMBOVIĆ 2007), but the species abundance has some interesting differences. The estimated population density of the Great Tit is more than three times larger than in previous studies, as well as that of the Hawfinch *Coccothraustes coccothraustes*, while density estimates for the Blue Tit *Parus caeruleus* and the Marsh Tit *Parus palustris* are significantly lower. This change might indicate a bias in observing the above mentioned species in the field (e.g. recording Blue and Marsh Tits as Great Tits). However, these results may also be due to the fact that as much as 10 of the 23 studied points were situated between patches of forest of significantly different age, and this apparent higher habitat diversity might have contributed to the higher abundance of some species. It is also probable that the lower sample size of only 23 points included out in this analysis (compared to around 50 in the previous ones) contributed to these variations.

Considering the different types of forests of Petrova gora, some species were observed mostly (the Lesser Spotted Woodpecker *Dryobates minor*) or only (the Red-breasted Flycatcher *Ficedula parva*) in the sessile oak forests. Furthermore, some species observed in beech forests of other Croatian mountains, like the Goldcrest *Regulus regulus*, Firecrest *Regulus ignicapilla* and Coal Tit *Parus ater* (KIRIN *et al.* 2011, DUMBOVIĆ 2007), were not observed in this study during the breeding season. Considering that these are all species commonly found in coniferous and mixed beech-fir forests (BWPi 2006, SVENSSON 2009), and that these types of forests are not present on Petrova gora, it is no surprise that the above mentioned species were not recorded in this study.

Although the data of 69.4 breeding pairs/km² might make it seem like the Blackcap was a relatively numerous forest species, it was mostly recorded in more open habitats like forest edges, thickets and near paths. It is among the most numerous species in those types of habitats, but cannot be considered a true forest species, as it was rarely recorded deeper in the woods.

The most abundant species are fairly evenly distributed across nesting niches, with the Great Tit and Wood Nuthatch being the most common hole-nesters, the Eurasian Chaffinch and Hawfinch as the most common canopy-nesting species and the European Robin and Common Chiffchaff representing the ground-nesters. In comparison to the previous studies (KIRIN *et al.* 2011, DUMBOVIĆ 2007, KRALJ & RADOVIĆ 2005), the relatively low abundance of the Blackcap and the

absence of Song Thrush *Turdus philomelos*, both shrub-nesting species, might be explained by the fact that on Petrova gora few bushes can be found on the forest floor. Most of the shrub vegetation is located on forest and road edges, where the abundance of shrub-nesting species was the highest. The total estimated density of all recorded breeding species is similar to the one from the previous studies in similar habitats (KIRIN *et al.* 2011).

Further bird survey of different open habitats of the Petrova gora area, as well as a more detailed survey of birds of prey of the area is necessary. It is also advisable to carry out a specifically designed and targeted survey of a larger extent in order to better estimate bird population densities, especially the population of the Stock Dove, a species which breeding population status in Croatia is classified as Vulnerable (TUTIŠ *et al.* 2013).

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SAŽETAK

Tijekom proljeća 2014. i 2015. godine te zime 2014/15. provedeno je deset terenskih izlazaka u šumama Petrove gore u sklopu kojih je zabilježeno 35 vrsta ptica. Ukupno su na Petrovoj gori, uključujući i prethodna istraživanja, zabilježene 44 vrste ptica. Korištena je metoda točkastog transeкта, a podaci su prikupljeni i slučajnim opažanjima i zvukovnim vabom. Podaci prikupljeni metodom točkastog transeкта iskorišteni su za izračunavanje procjene gustoće gnijezdećih populacija pojedinih vrsta, od kojih su najbrojnije velika sjenica *Parus major* i zeba *Fringilla coelebs*. Golub dupljaš, koji je u Hrvatskoj kategoriziran kao osjetljiva vrsta, prvi je put ovim istraživanjem zabilježen na Petrovoj gori.

Potrebna su daljnja istraživanja ptica otvorenijih staništa i grabljivica Petrove gore, kao i ciljano istraživanje veličine populacije goluba dupljaša *Columba oenas*, vrste čiji je status ugroženosti gnijezdeće populacije u Hrvatskoj kategoriziran osjetljivom (VU).