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Research article

Extraordinary occurrence of Pallas's leaf warbler (*Phylloscopus proregulus* Pallas, 1811) in Bulgaria and the Balkan Peninsula in the autumn and winter of 2022/2023

Peter Shurulinkov[1], Patrick Bergkamp[2], Nikola Alexandrov[3], Ivaylo Tonev[4], Rosena Tomova[5], Pavel Simeonov[6], Biliana Konakchieva[7], Stela-Teodora Trendafilova[8], Boris Hotinov[9]

(1) National Museum of Natural History, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd, 1000 Sofia, Bulgaria, p.shurulinkov@gmail.com; https://orcid.org/0000-0002-6586-8690
(2) Havikshorst 12,1083TT Amsterdam, The Netherlands, pybergkamp@hotmail.com
(3) 11 Bozhko Ivanov Street, 3900 Belogradchik, Bulgaria, ndaleksandrov@gmail.com
(4) 18 Vardar Street, Nadezhda 2, Sofia, Bulgaria, ivaylo.tonev@gmail.com
(5) 36 Angel Kanchev Street, 7000 Ruse, Bulgaria, rjtomova@gmail.com
(6) Foundation "Le Balkan – Bulgaria", Branta Birding Lodge and Conservation Centre, 9670 Durankulak, Bulgaria, lebalkan@lebalkan.org
(7) Strelbishte Housing Estate, Block 27, 1404 Sofia, Bulgaria, biliana.konakchieva@gmail.com
(8) Balkani Wildlife Society, 8 Dragan Tzankov Blvd, 1164 Sofia, Bulgaria
(9) SRTI – Bulgarian Academy of Sciences, 1 Georgi Bonchev Street, Block 1, 1113 Sofia, Bulgaria, bmh@space.bas.bg

Abstract: Four Pallas's leaf warblers (*Phylloscopus proregulus*) were captured at Durankulak ringing camp, NE Bulgaria, in frames of four days between 12 and 16 October 2022. The species is a rare vagrant in Bulgaria and neighbouring Balkan countries. It has not been captured and ringed neither at Durankulak nor elsewhere in Bulgaria until now. Annual population fluctuations and weather conditions are discussed as possible explanations for that influx.

Keywords: Durankulak, migration, Pallas's leaf warbler, vagrancy, weather

Introduction

During recent decades the number of records of vagrants of Siberian origin in Europe increased substantially (De Juana, 2008; Dufour et al., 2022). Vagrancy can have intrinsic or/and extrinsic causes (Dufour et al., 2022). Among the extrinsic causes weather conditions or magnetic anomalies are often involved (Alestam, 1991; Zawadski et al., 2019). Mutations of the genes coding migratory orientation are pointed as the main intrinsic cause of vagrancy although the wrong use of inherited cues for orientation during the ontogeny of a bird could also have a similar effect (Thorup, 1998; Akesson & Helm, 2020; Dufour et al., 2022). The results in some cases are mirror-image navigational errors of migrants which were first described in North America (Diamond, 1982; De Sante, 1983). Even the creation of new migration routes of these birds, or the "pseudo-vagrancy" and "reverse migration" hypotheses has been discussed (Gilroy & Lees, 2003). Reverse migration itself can be the reason for vagrancy in some birds (Thorup, 2004). In some studies, the vagrancy of these birds was linked to climate change through predicted changes in the climatic suitability of their breeding ranges (Jiguet et al., 2013).

In the present article, we discuss an extraordinary influx of a Siberian vagrant – Pallas's leaf warbler

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(*Phyllloscopus proregulus* Pallas, 1811) in Bulgaria and neighbouring Balkan countries.

Pallas's leaf warbler is a rare vagrant in Bulgaria and neighbouring Balkan countries (Sciban et al., 2015; Ivanov et al., 2019; Marton, 2020; AOS, 2020). Its breeding range lies in Central and Eastern Siberia, Mongolia, Central and Northeastern China, and Sakhalin Island. Normally the species spends the winter in Southern China, Thailand, Laos, India, and Vietnam (Cramp, 1992). As a vagrant Pallas's leaf warbler is much more common and numerous in NW and W Europe – in Britain, Ireland, Denmark, Netherlands, Finland, Sweden, etc. and the number of records there increased notably after the 1960s (Cramp, 1992). After the mid-2000s the number of observations decreased in the UK and Germany (White & Kehoe 2015).

The species has not been captured and ringed neither at Durankulak nor elsewhere in Bulgaria until now. Up to December 2019, the species has been recorded 7 times in the country (Ivanov et al., 2019). Five of the records were supported by photographs. Six of these seven sightings came from the coastal Dobrudzha, NE Bulgaria – four at Cape Kaliakra (15.10.1996 – P. Oliver, P. Redman; 14.10.2013 – A.Williams; 28.04.2018 – George and Paul Gay; 19.10.2018 – S. Fischer), one at Shabla Lake (18–20.10.2016 – Steve & Pauline Fischer), and one at Durankulak (18.10.2015 – Pavel Simeonov). Only one observation was reported from Sofia, W Bulgaria (Nankinov & Dalakchieva, 1999). These observations were made during the period 1996–2018, all of them except one in autumn, in October and November.

Material and methods

Durankulak ringing camp operates every autumn since 2019. It is situated at the SE part of the Durankulak Lake, Dobrich Province, NE Bulgaria, at coordinates N43°39'38.49 and E28°33'56.8. In 2022 ringing activity started on 14 August and continued until 31 October. Vertical nets with a total length of approximately 220 m were placed at two habitats – reed massif and low broad-leaved forest with bushes. In 2022 a total of 13703 birds of 92 species were captured. Sound lures for attracting some species of migratory birds were used. Pallas's leaf warbler was included in the list of bird species attracted using lures in October 2022.

Results

Four Pallas's leaf warblers were captured at Durankulak ringing camp, NE Bulgaria, on 12, 14 and 16 October 2022 (Figs 1–2). On 16 October two individuals were captured. All these birds were captured in the forest nets. Measurements of the Pallas's leaf warblers are presented in Table 1.

Description of the Pallas's leaf warblers captured

Very small warblers with distinct yellowish supercilium and head stripe. Clear black eye stripe. The general colour of the upperparts is olive-greenish. Two distinct lemon-colored wing bars are clearly visible. The rump is lemon-coloured, the tail is greenish. Underparts greyish-white. The sex is determined by the wing and tail measurements (Cramp, 1992; Bozo & Heim 2016). Wing formulas are checked and determination is confirmed according to the wing formula presented by Svensson (1992).

During the period 12–16 October the weather was dynamic, partially cloudy, without rainfalls, with moderate to strong N-NE winds (8–30 km/h during the day) and temperatures between 7 and 20 °C.

Table 1. Measurements of captured Pallas's leaf warblers.

No. of individual	Date	Sex	Wing, mm	Tail, mm	Weight, g	Fat score
1	12.10.2022	male	52,5	39	5,4	3
2	14.10.2022	male	53,5	37	4,7	1
3	16.10.2022	female	48	34	4,7	3
4	16.10.2022	female	49,5	34	4,9	2

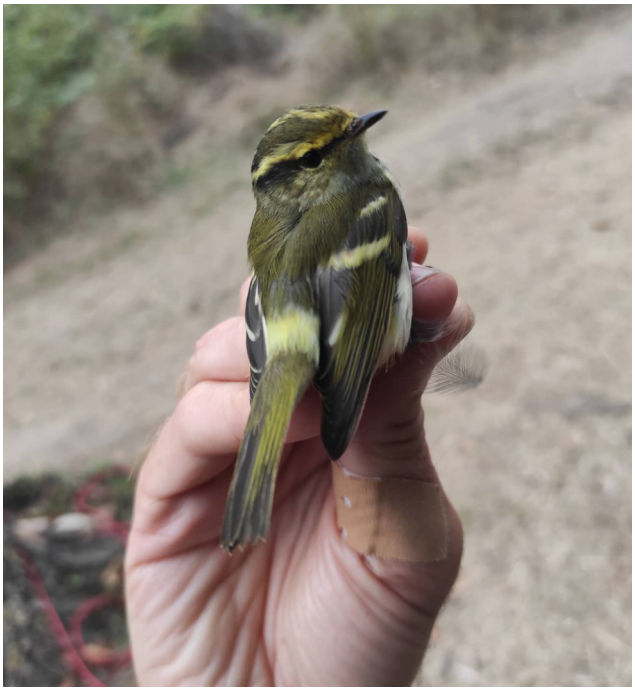

Fig. 1. Pallas's leaf warbler (*Phylloscopus proregulus*) captured on 12.10.2022, Durankulak, NE-Bulgaria, photo: Ivaylo Tonev.

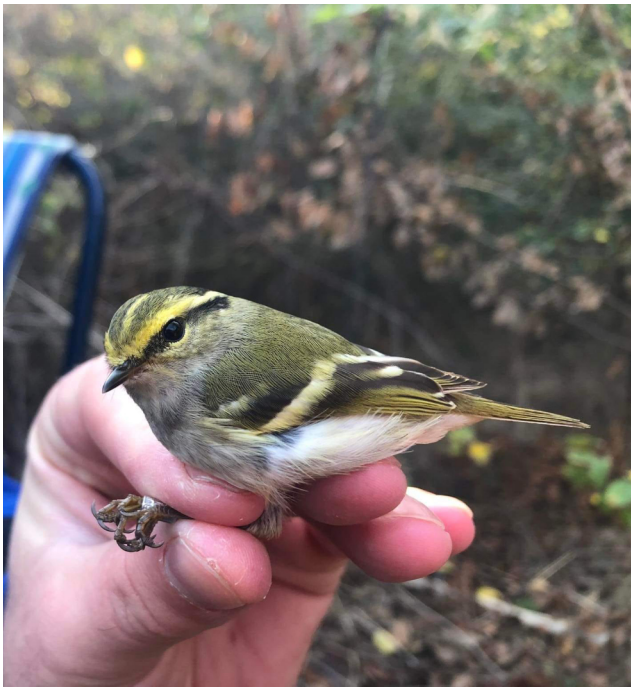

Fig. 2. Pallas's leaf warbler (*Phylloscopus proregulus*), captured on 16.10.2022, Durankulak, NE Bulgaria, photo: Pavlina Taseva.

Table 2. Records of Pallas's leaf warbler in Balkan region during 2022/2023 and in previous years.

Country	**Records during 2022/2023 autumn/winter**	**Records in previous years**
Bulgaria	4 ind. captured at Durankulak, present study 9.11.2022, Sofia (Georgi Kamov, ebird.org) 8.10.2022, Bolata, Dobrich District (Chris Day and Teodor Trifonov, pers. comm.)	7 records until 2019 (Ivanov et al., 2019)
Romania	October 2022, 3 ind. captured, Chituc ringing camp (https://www.facebook.com/chitucringingcamp/) 16.10.2022, Agigea ringing station (https://www.facebook.com/profile.php?id=100064458441581)	At least 13 records: Chituc ringing camp – 6 captured and 5 observed there and in Danube Delta (Droz, 2014; Marton, 2020). Agigea ringing station – 2 captured, 2018 and 2021 (https://www.facebook.com/profile.php?id=100064458441581)
Serbia	24–30.03.2023, Belgrade (https://macaulaylibrary.org/asset/551392801)	28 October 2008, Stanisic, Sombor (Sciban et al., 2015)
Greece	14.01–11.02.2023, Kerkini Lake, Northern Greece (ebird.org)	3–12.04.2011, Athens (ebird.org)
Turkey	1–3.11.2022, Istanbul (Cagan Abasoglu, https://www.facebook.com/photo/?fbid=429859789303749&set=pcb.909103303796111) 7.01–1.03.2023, Istanbul (ebird.org) 13.11.2022, Kocacay Delta (Alper Teydes, ebird.org) 2.11.2022, Aras ringing station (ebird.org)	3 records in 2010–2011 (Kirwan et al., 2014) 3 records in Kizilirmak River Delta – on 6.11.2014, 17.10.2017, and 26.10.2021 (ebird.org)
Albania	—	14.01.2020 (AOS, 2020)

High number of observations of Pallas's leaf warbler in 2022/2023 autumn–winter season was reported not only from Durankulak ringing station but also from other locations in the Balkan region (Table 2). We may speculate that there is a moderate influx of the species in that region with much higher number of records of the species than normally.

Discussion

Mass occurrence of Siberian vagrants and especially Pallas's leaf warblers has been explained by the westward movement in anticyclonic conditions (Baker 1977; Howey & Bell 1985). In another study, it was found that inter-annual variability in the westwards displacement of yellow-browed warblers (*Phylloscopus inornatus* (Blyth, 1842)) and Pallas's leaf warblers to Europe is not correlated with predominant easterly airflow (Van Impe & Derasse, 1994). Other explanations include the breeding population growth in the particular year combined with favourable weather conditions, including winds (Zawadski et al., 2019). In the same study, it was shown that population growth and indices have prevailing importance in the explanation of vagrancy compared to weather conditions. Thus in the case of Pallas's leaf warbler, presented by us, we consider that the dynamic weather with prevailing NE winds created good conditions but did not explain alone the observed influx. Obviously these the factors causing the observed phenomenon are much more complex – they include annual fluctuations in population offspring production and particular weather conditions.

Taking in account the numbers of existing records normally the main wave of Siberian vagrants, including Pallas's leaf warblers, cross Europe during autumn to the north from the Balkan Peninsula (Van den Berg & Bosman, 1999; De Juana, 2008). The observations of these vagrants made in N and NW Europe are much more numerous compared to SE Europe and that fact probably cannot be explained only by the much higher number of observers in the first region. Hopefully when we have a good long-term dataset of observations also in SE Europe we will see the real large-scale situation of eastern vagrancy in Europe. We can conclude that only in favourable years with good population growth and appropriate weather conditions in the period October–November we can expect a more evident presence of Pallas's leaf warblers in the Balkan region. The background of the observed phenomenon is not known exactly and further studies are needed.

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