

EXPANDING THE KNOWLEDGE OF RUDDY SHELDUCK (*Tadorna ferruginea* Pallas, 1764) DISTRIBUTION IN SERBIA: NEW FINDINGS AND IMPLICATIONS FOR CONSERVATION

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ABSTRACT. The Ruddy Shelduck (*Tadorna ferruginea*) is a vagrant passage and wintering species whose presence and distribution in Serbia have been inadequately studied. This study presents new findings of *T. ferruginea* in Serbia based on two sources of data: unpublished eBird checklists from 2014 to 2019 and new data collected from 2020 to 2023. Observations were conducted at various localities across Serbia, including Jezero Čelije, Begečka Jama, Smilovci Lake, Aleksandrovačko Lake, Sava shipyard, fish farms of Novi Kneževac, Bečej, and Čenta, as well as the Special Nature Reserve Slano Kopovo. These sightings contribute to our understanding of the species' distribution within Serbia and underscore the importance of ongoing monitoring efforts. The potential impacts of these results on upcoming research and conservation initiatives, which are focused on safeguarding the populations of *T. ferruginea* within the area, are examined.

Keywords: bird distribution, eBird, monitoring, conservation, Anseriformes, environmental changes

INTRODUCTION

The Ruddy Shelduck (*Tadorna ferruginea* Pallas, 1764) inhabits various wetland habitats and commonly nests throughout southeastern Europe (DEL HOYO *et al.*, 1992; SCOTT and ROSE, 1996). The breeding range of European populations primarily includes the Caucasus and Black Sea regions, with the largest populations in Turkey and the European part of Russia, extending to Armenia and Azerbaijan. Small populations are also present in other southeastern European countries (Ukraine, Moldova, Romania, Bulgaria, Greece), as well as in Spain (Canary Islands) and the United Kingdom to the west (BIRDLIFE INTERNATIONAL, 2021a). Their

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mainly favor habitats such as lakes, salt lagoons, and marshes, as well as high plateaus or even mountainous regions, while they avoid wetlands near urban agglomerations or any disturbance (NOUIDJEM *et al.*, 2015). Their presence is a vital part of European biodiversity, highlighting the role of wetland ecosystems in supporting bird populations and maintaining ecological balance (SCOTT and ROSE, 1996).

Despite being classified as "Least Concern" globally and in Europe by the IUCN and BirdLife International (2021b, 2024), the overall trend of the Ruddy Shelduck population remains uncertain, with some populations in decline and others' statuses unknown. The species commands a relatively small breeding population in Europe, estimated between 17,000 and 26,500 pairs (BIRDLIFE INTERNATIONAL, 2021b; 2024).

In Serbia, however, the Ruddy Shelduck is insufficiently studied and is considered a vagrant passage and wintering species (ŠĆIBAN *et al.*, 2015). Since 1950, there have been only eight recorded sightings (MIKUŠKA, 1963; LUKAČ and LUKAČ, 1992; DEVIĆ, 1995; POPOVIĆ and CECIĆ, 1995; LAKATOŠ, 1999; SIMIĆ, 2002), signaling a gap in comprehensive data regarding its distribution and abundance within the country.

Understanding the status of the Ruddy Shelduck in Serbia is of paramount importance for the conservation of this species and the protection of the wetland habitats it depends on. This study aims to fill the knowledge gap, offering insights into the species' distribution, behavior, and habitat preferences within Serbia. By doing so, it contributes to the broader goals of avian conservation and habitat protection, ensuring that future generations may continue to witness the beauty and ecological significance of the Ruddy Shelduck and its environments.

MATERIALS AND METHODS

Data from the field was collected from four different localities between 2020 and 2023. Observations were made at Čelije Lake (central Serbia) and Begečka Jama (Autonomous Province of Vojvodina) during random visits to the area. The Čelije Lake is located near the city of Kruševac. It was formed in 1979 on the Rasina River, and since 1984, the lake has been used for water supply purposes for the city of Kruševac and its surroundings (ĆIRIĆ and PETROVIĆ, 2004). In total, 132 bird species have been recorded here (MEDENICA, 2021).

Natural Monument "Begečka Jama" is a fluvial lake connected to the Danube River via the Begej Canal, ensuring a constant water presence. It serves as a significant spawning ground for numerous species of Danube fish and as a reproductive center for amphibians in the wider area. Therefore, it is characterized by a great diversity of bird species, with approximately 150 species recorded here (PZZP, 2011).

The Smilovci Lakes locality (Southeastern Serbia) is situated in the "Odorovsko polje" area. The system consists of two lakes: Savat I and Savat II, formed in 1979 and 1985, respectively (ĐOKIĆ, 2015). The lakes are located at an altitude of approximately 700 m and were initially intended for irrigation and drainage purposes in the fertile fields in this area. However, they are currently not utilized for this purpose but rather for recreational activities, primarily sport fishing (ĐOKIĆ, 2015). Data from the Smilovci Lakes locality were collected during ornithological field research conducted by the Institute for Nature Conservation of Serbia for the purpose of creating a study on the protection of the "Odorovsko Polje" area with total of 113 bird species recorded (author's unpublished data).

The Aleksandrovačko Lake is an artificial reservoir constructed in 1964, with a dam height of 10 meters on the Aleksandrovačka River (Southeastern Serbia). It is located about ten kilometers south of the city of Vranje. It was initially intended for irrigating orchards and vegetable gardens in the valley of the Aleksandrovačka River, but over the past century, the lake has increasingly served recreational and fishing purposes, while its irrigation function has diminished alongside agricultural activities (ANONYMOUS, 2023). The Aleksandrovačko Lake locality was researched as part of the regular bird monitoring program in the area with a total

of 41 bird species recorded (author's unpublished data). The names of observers are listed alongside each species sighting (Tab. 1). If the observer did not solely identify the species, the name of the identifier is also provided. All field observations are supported by photographs.

New data were collected through a search of the eBird online database (SULLIVAN *et al.*, 2009; <https://ebird.org>), encompassing sightings of the species for the period between 2014 and 2019. Data retrieval was conducted directly on the eBird platform, considering all sightings of the species within the territory of Serbia. The retrieved data are credible, considering the species' easy recognizability and attractiveness, with the majority of sightings supported by photographs of the species. Additionally, eBird checklists of observers within which the species was recorded are listed alongside each sighting.

RESULTS AND DISCUSSION

New data collected for the present study, including field observations and findings from eBird, reveal significant changes in the total number of known observations of *T. ferruginea* in Serbia.

Four new sightings of *T. ferruginea* were documented through field research conducted between 2020 and 2023 (Tab. 1).

Table 1. New findings of the species *Tadorna ferruginea* in Serbia collected during field research.

Locality	Date	Latitude and Longitude	Number	Observer(s) and identifier (if needed)
Ćelije Lake	1-Feb-2020	43.400160°N 21.159410°E	1	Zoran Rajičić, Željko Engelman, Goran Nikolić, Dragan Đolović
Begečka Jama	22-Feb-2022	45.223111°N 19.603489°E	1	Ljubica Ivić (Identification: Miroslav Dudok)
Smilovci Lakes	15-Nov-2022	43.070026°N 22.848035°E	1	Ivan Medenica, Aca Đurđević
Aleksandrovačko Lake	24-Jul-2023	42.490793°N 21.899947°E	1	Marko Nikolić

During a visit on February 1, 2020, at the locality Ćelije Lake one individual of the Ruddy Shelduck, among a flock of common shelducks (*Tadorna tadorna*), was photographed. Another individual was sighted at the Begečka Jama locality on February 22, 2022. In the same year, one individual was observed at the Smilovci Lake locality on November 15, 2022. Lastly, the species was observed at the Aleksandrovačko Lake site (Southeastern Serbia) on July 24, 2023 (Fig. 1).

A systematic review of published checklists on the eBird platform gathered data from ornithologists and birdwatchers between 2014 and 2019. The data from the eBird platform for Serbia have not been previously commented on in publications. According to the data from the eBird platform, the species was recorded at six locations (i.e. eBird hotspots) within 14 checklists:

- eBird hotspot name “Savsko brodogradiliste” - An observer recorded three individuals of released birds on January 11, 2014 (KARIĆ, 2014).

- eBird hotspot name “Čenta--ribnjak Veliki Alas” - A total of three same individuals were recorded by different observers within the following dates: October 2, 2014 (SIMIĆ, 2014), October 4, 2014 (PANJKOVIĆ, 2014), October 9, 2014 (VUČKOVIĆ, 2014a; 2014b), and October 10, 2014 (VUKOVIĆ, 2014).
- eBird hotspot name “Slano Kopovo specijalni rezervat prirode (Special nature reserve)” - A total of three same individuals were recorded by different observers within the following dates: November 14, 2015 (ČUTURILOV, 2015; PAUNOVIĆ, 2015), and November 15, 2015 (PANJKOVIĆ, 2015).
- eBird hotspot name “Novi Kneževac ribnjak (fish farm)” - One individual was observed on May 14, 2016, by two observers (AGOŠTON, 2016; RANKOV, 2016).
- eBird hotspot name “Bečej ribnjak (fish farm), Bečej” - A total of nine individuals (the biggest flock of this species recorded in Serbia) was observed on May 12, 2018 (ČUTURILOV, 2018).
- eBird hotspot name “Ušće Rasine u Čelije” - One individual in flock with common shelducks (*Tadorna tadorna*) was observed on December 29, 2019, by two observers (NIKOLIĆ, 2019; VUKIĆEVIĆ, 2019)



Figure 1. Ruddy Shelduck at Aleksandrovačko Lake locality (photo by M. Nikolić)

The map represents observations of the species using unique symbols, including those known from the literature, as well as data collected from the eBird platform and new data gathered through field research.

According to CRAMP and SIMMONS (1977), *T. ferruginea* is a migratory bird in the Balkan Peninsula, with small numbers of wintering birds in Romania, Bulgaria, Greece, and Serbia (BIRDLIFE INTERNATIONAL, 2021a; SHURULINKOV *et al.*, 2020). The previously known findings of this species in Serbia were compiled in the “Birds of Serbia - Critical List of Species” by ŠCIBAN *et al.* (2015), where authors believe that the sightings of individuals after 1980 most likely originate from wild populations of escaped birds in Europe, with one of the sightings confirmed as a case of escape from captivity (SIMIĆ, 2002).

As evidence for this assertion, the authors cite the increased frequency of sightings in Hungary after 1980 (HADARICS and ZALAI, 2008). Also, an increase in the breeding population after 1980 was documented in the European part of Russia (KRIVENKO and VINOGRADOV, 2003). The rise in breeding numbers and the expanding distribution of the Ruddy Shelduck across the Eastern Balkans can likely be linked to recent environmental changes, as highlighted

by SHURULINKOV *et al.* (2020). The milder and snowless winters experienced in the region over the last two decades likely facilitate local birds to remain in proximity to their breeding grounds, leading to an evident rise in wintering populations within the Balkan countries. Also, the reduction in migration distances due to these shorter winters could contribute to decreased mortality rates among birds during migration routes (SHURULINKOV *et al.*, 2020). Furthermore, a potential increase in breeding population likely affects the migratory patterns of the Ruddy shelduck, leading to increased use of the Balkan migration routes and may also be associated with more frequent sightings of the species in the region. New findings of this species complement existing literature on its presence in Serbia and the Balkan Peninsula (ŠĆIBAN *et al.*, 2015; SHURULINKOV *et al.*, 2020).

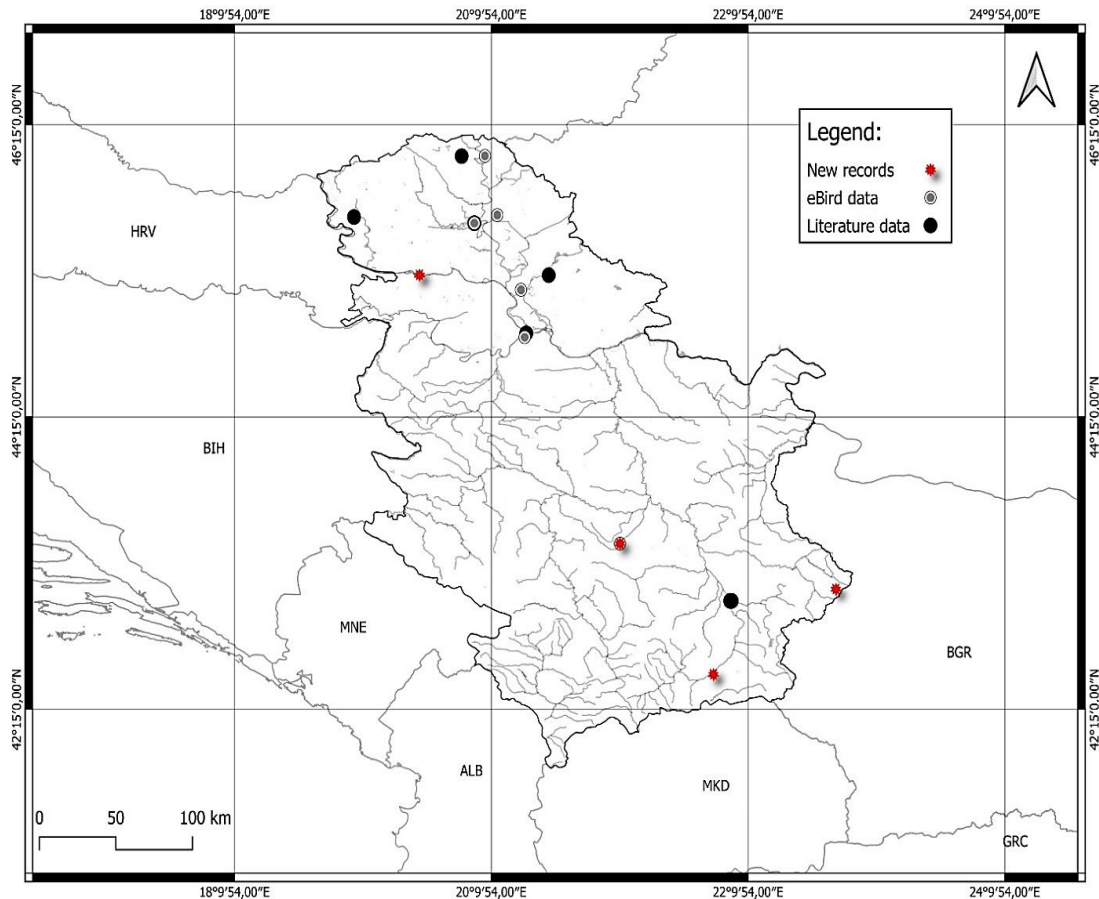


Figure 2. Combined overview of *T. ferruginea* sightings in Serbia (map by I. Medenica)

T. ferruginea holds significant conservation value across its European breeding habitats (SHURULINKOV *et al.*, 2020), recognized for its significance by inclusion in Annex I of the Rulebook on declaration and protection of strictly protected and protected wild species of plants, animals, and fungi (ANONYMOUS, 2010-2016) affirming its status as a species under strict protection. It is also listed in Appendix II of the Convention on Migratory Species (CMS), as well as Annex I of the EU Birds Directive (Directive 2009/147/EC) and Appendix II of the Bern Convention, underscoring its international conservation importance (RADIŠIĆ, 2018).

Key conservation efforts for this species involve safeguarding it from hunting in Southeast Europe, as well as conducting additional ringing studies to assess the status of individual populations and their migration routes (KEAR, 2005; POPOVKINA, 2006). It is crucial to secure the protection of essential habitats from threats posed by infrastructure projects, alterations in land use, and environmental changes. Research efforts like the present study enrich our understanding of the Ruddy Shelduck's sites' preferences throughout the seasons, thereby informing conservation strategies.

Engagement with conservation stakeholders - including practitioners, policymakers, and the broader public - is integral to transforming research outcomes into practical conservation actions. Sharing the insights gained from this study with these groups can foster collaborative efforts toward the preservation of *T. ferruginea* and its habitats.

Looking forward, future research should focus on detailed aspects of the Ruddy Shelduck's ecology, conservation needs, and distribution patterns. There is a particular need for studies exploring the effects of environmental change on their habitats, the genetic diversity within populations to inform conservation strategies, and innovative methodological approaches for monitoring distribution changes over time. This study not only contributes valuable knowledge to the existing body of research but also sets the stage for subsequent inquiries that will further illuminate the distribution, ecology, conservation status, and conservation requirements of *T. ferruginea* populations, guiding the development of targeted conservation measures.

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