

Recent wintertime observations of parrots from the genus Psittacula in Bulgaria

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Abstract. Climate change, characterized by rising winter temperatures and decreasing snow cover in Bulgaria, facilitates the adaptation and overwintering of exotic parrots of the genus *Psittacula* – the Alexandrine Parakeet (*Psittacula eupatria*) and the Rose-ringed Parakeet (*Psittacula krameri*), which have been released from private collections or aviaries in urbanized and park environments. Observations since 2020 have registered a total of 8 Alexandrine Parakeets (Stara Zagora - 2, Veliko Tarnovo - 2, Valchi Dol - 2, Montana - 1, Plovdiv - 1) and 4 Rose-ringed Parakeets (2 in Varna and 2 in Stara Zagora). They utilize local tree species (e.g., plane trees, maples, hackberries, cherry laurels) for food, shelter, and roosting, similar to their invasive establishment in neighboring Europe. These changes highlight how milder winters allow tropical species to expand northward, potentially threatening the local fauna.

Key words: Climate change adaptation, Alexandrine Parakeet, *Psittacula eupatria*, Rose-ringed Parakeet, *Psittacula krameri*, Bulgaria.

Introduction

Parrots of the genus *Psittacula*, known as Alexandrine parrots, belong to the family Psittaculidae and are long-tailed species of medium to large size, naturally distributed in South and Southeast Asia, as well as parts of Africa. The Alexandrine Parakeet (*Psittacula eupatria*) and the Rose-ringed Parakeet (*Psittacula krameri*) have been considered to be closely related as they share morphological traits such as green plumage and a red beak, and have a similar diet, but differ in size, ecological plasticity, and adaptability (Groombridge et al., 2004).

The Alexandrine Parakeet is the largest in the genus, with a length of 58–62 cm (the large tail accounts for a significant part) and a weight of 200–300 g. The plumage is green with a grey-blue tint on the cheeks and nape, a reddish-brown

patch on the wing, and a bright red beak; males have a characteristic black ring with a pink band around the neck. It inhabits tropical forests, river valleys, and orchards, feeds on seeds, fruits, and buds, and lives socially in pairs or small groups. The Rose-ringed Parakeet is significantly smaller with a length of 38–43 cm and a weight of 95–143 g, it has bright green plumage and similar sexual dimorphism with a black-pink ring in males. Its high adaptability allows for natural distribution in Africa and Asia, in addition to introduced stable free-living populations in Europe. The Alexandrine Parakeet is rarer and more demanding of its habitat, while the Rose-ringed Parakeet demonstrates high adaptability to an urbanized environment. Both species are distinguished by highly developed intelligence, social behavior, and vocal imitation ability. Differences in size, weight, life-

span, and appearance, facilitating the distinction between the two species.

Exotic parrots of the genus *Psittacula* appeared in Europe primarily through the release or escape of pet birds from pet shops, private collections, and amusement parks from the 1960s (Ancillotto et al., 2015; Clergeau et al., 2015; Pârâu et al., 2016; Braun et al., 2018; Çalışkan, 2018; Sahin and Arslangündoğdu, 2019; Giuntini et al., 2021; Hernández-Brito et al., 2022; Drăgan and Murariu, 2024).

In the UK, the first individuals of Rose-ringed parakeets were recorded around 1969, and by the 2000s, their population had grown to thousands of individuals (Butler et al., 2013). The forming of the population was most likely the result of repeated releases and introductions throughout the years (Heald et al., 2020). In Turkey the invasion had begun in the 1970s - stemming from illegal trade with exotic birds. Since then, parrots were competing with local species for tree cavities and fruits in urbanized zones (Çalışkan, 2018). Rose-ringed parakeets have established colonies in parks and green spaces across Greece for over three decades. Their population in the country is supposed to be more than 1000 individuals (Christodoulopoulos et al., 2025). In the Netherlands initial cases date from the mid-70s, when escaped specimens of Rose-ringed parakeets from tropical greenhouses, zoos, and contraband took advantage of the urban dendroflora and mild winters to form stable populations through their rapid breeding (CLO, 2023).

Materials and methods

Field observations were conducted using 8 x 42 binoculars and high-magnification spotting scopes. Species identification and behavioral documentation were supported by digital photography using DSLR cameras equipped with telephoto lenses. The summarized weather data was based

on information from the National Institute of Meteorology and Hydrology’s website (NIMH, 2026).

Results and Discussion

In recent years, individuals of the Alexandrine Parakeet and the Rose-ringed Parakeet have been observed in Bulgaria, demonstrating pronounced ecological plasticity and high ability to adapt to urbanized and park ecosystems.

In Table 1 we present data on the period of observation, the parrot species, as well as the location of the established individuals in Bulgaria. The earliest data we have is from 2020, with part of the observations continuing to the present moment, suggesting a permanent presence or repeated encounters of these species. Registered locations include several Bulgarian cities - Stara Zagora, Varna, Veliko Tarnovo, Montana, Valchi Dol, and Plovdiv. The observed individuals most likely originate from private collections, having been intentionally released or accidentally escaped from their owners.

In 2020, two Alexandrine Parakeets were released in Stara Zagora. They managed to adapt to the urban environment and for 6 years now have inhabited the area of the University Hospital “Prof. Stoyan Kirkovich” during the winter - a 13-story building that provides them with suitable places for roosting and shelter. The birds often use the linden trees in the vicinity for feeding and resting. An interesting fact is that they gather in this area around the tall and large building only in winter; during the rest of the time, they are absent from this urban area. They appear only when the weather gets cold. In 2024, a Rose-ringed Parakeet was supposedly released. For a second winter, this bird has also managed to acclimatize, and it is also in the area around the University Hospital “Prof. Stoyan Kirkovich” during the winter. Another individual has been observed in Chayka park since 2025.

Table 1. Registered encounters of parrots of the genus *Psittacula* in Bulgaria for the period 2020-2026.

No	Year	Species	Location
1	2020 - 2026	<i>Psittacula eupatria</i>	Stara Zagora (2 birds)
2	2022 - 2024	<i>Psittacula krameri</i>	Varna (2 birds)
3	2022 - 2026	<i>Psittacula eupatria</i>	Veliko Tarnovo (2 birds)
4	2023 - 2026	<i>Psittacula eupatria</i>	Montana (1 bird)
5	2024 - 2026	<i>Psittacula krameri</i>	Stara Zagora (1 bird)
6	2025 - 2026	<i>Psittacula krameri</i>	Stara Zagora (1 bird)
7	2025 - 2026	<i>Psittacula eupatria</i>	Valchi Dol (2 birds)
8	2025 - 2026	<i>Psittacula eupatria</i>	Plovdiv (1 bird)

In 2022, an individual of the species Alexandrine Parakeet was observed in Marno Pole Park in Veliko Tarnovo. The bird exhibited typical vocal behavior, with loud screams throughout the city park, and fed on buds from the tops of trees. During the observations, interspecies interactions with magpies (*Pica pica*) were noted, which actively harassed and chased it away. According to available data and multi-year observations, the individual is present in the area for a fifth winter, which testifies to the successful adaptation of the species to the urban environment and local climatic conditions.

In 2023, an Alexandrine Parakeet was observed all winter in Montanesium Parkin Montana, chasing pigeons. It often perched on a terrace on the top floor of a building near the park. The bird is well adapted to the area, having spent four winters now.

In 2022, two Rose-ringed Parakeets were observed in the Sea Garden park in Varna. However, they were shot at the end of March 2024 following noise complaints.

Since the beginning of 2025, one Alexandrine parakeet has been observed in the park of Valchi Dol town. The bird regularly utilized the park's trees for perching, feeding, and resting, often interacting with local Western jackdaws (*Corvus mo-*

nedula), which chased it away or followed it during feeding. For a certain period, a yellow Budge-rigar (*Melopsittacus undulatus*) - most likely also an escaped pet - was spotted in the same area. The two parrots inhabited the park simultaneously and roosted in neighboring trees, providing an interesting example of temporary coexistence between species atypical for the region, within an urban environment.

Since the beginning of 2025, one Alexandrine parakeet has been observed in Plovdiv, frequenting the Yuzhen (South) district near Studenets Park and Malkiyat Park. The bird utilized the trees in both urban parks for feeding and roosting, demonstrating strong adaptation to the city environment. During observations, the individual has displayed characteristic defensive and maneuverable behavior when facing potential threats from other birds, most commonly members of the crow family (Corvidae). The parakeet frequently chased away pairs of Eurasian collared doves (*Streptopelia decaocto*) and exhibited distinct territorial behavior, treating the park spaces as its established habitat zone.

In Table 2, we summarized the weather data on minimum winter temperatures in the five towns, based on information from the National Institute of Meteorology and Hydrology (NIMH, 2026).

Table 2. Registered minimum winter temperatures in five Bulgarian cities – Stara Zagora, Varna, Plovdiv, Veliko Tarnovo, and Montana – for selected years in the period 1990–2025.

Year	Stara Zagora	Varna	Plovdiv	Veliko Tarnovo	Montana
1990	about -18°C	about -12°C	about -19°C	about -20°C	about -22°C
2000	about -17°C	about -11°C	about -18°C	about -18°C	about -20°C
2010	about -19°C	about -13°C	about -21°C	about -21°C	about -23°C
2020	about -11°C	about -6°C	about -9°C	about -10°C	about -12°C
2025	about -14°C	about -8°C	about -12°C	about -13°C	about -15°C

From the presented values, a clearly expressed trend towards an increase in minimum winter temperatures over the last decades is observed. While in 1990, 2000, and 2010, significantly lower minimum temperatures were reported in most of the examined cities, reaching about -20°C and lower, after 2020 these values were noticeably higher. In 2020–2025, the minimum temperatures in none of the examined cities dropped to the extreme values, characteristic of earlier periods. This change in the temperature is indicative of warming winter conditions in Bulgaria, which creates a more favo-

rable environment for the survival of species atypical for the local fauna. The reduction of prolonged periods of severe cold and extreme temperatures contributes to their easier adaptation of heat-loving species, including exotic birds such as Alexandrine parrots.

The indicated values in Table 3 are approximate and derived based on long-term climatic norms of the National Institute of Meteorology and Hydrology, annual climate summaries, as well as summarized data from meteorological stations and scientific publications (NIMH, 2026).

Table 3. Annual snowfall (in centimeters) in the cities of Stara Zagora, Varna, Plovdiv, Veliko Tarnovo, and Montana for selected years in the period 1990–2025.

Year	Stara Zagora	Varna	Plovdiv	Veliko Tarnovo	Montana
1990	~45 cm	~30 cm	~40 cm	~65 cm	~90 cm
2000	~40 cm	~28 cm	~38 cm	~60 cm	~85 cm
2010	~55 cm	~35 cm	~60 cm	~80 cm	~110 cm
2020	~18 cm	~10 cm	~15 cm	~25 cm	~40 cm
2025	~25 cm	~15 cm	~22 cm	~35 cm	~55 cm

The data show a clearly expressed trend towards a decrease in annual snowfall amounts over the last decades. While in 1990, 2000, and 2010 significantly higher values of snow accumulation were reported in most of the examined cities, after 2020 snow amounts are noticeably lower. This is particularly clearly expressed in lowland and coastal regions such as Varna, Plovdiv, and Stara Zagora, but the trend is distinct in higher and continental regions like Veliko Tarnovo and Montana as well.

Another factor contributing to the adaptation of parrots of the genus *Psittacula* in Bulgarian cities seemed to be the availability of suitable tree species - providing food, roosting sites, shelter, and potential nests. The Oriental Plane (*Platanus orientalis*), naturally distributed in Southern Bulgaria, provided buds and young leaves serving as food, and cavities in old trunks - for roosting, especially in parks like Marno Pole in Veliko Tarnovo. The Norway Maple (*Acer platanoides*) provided sama-

ras (seeds), buds, and early flowers for feeding. The Southern Hackberry (*Celtis australis*) along the Black Sea coast (Varna) provided fleshy fruits during the autumn-winter period. The Cherry Laurel (*Prunus laurocerasus*) gives evergreen shelter, fruits, and leaves, safe for birds despite their toxicity to humans. The Douglas Fir (*Pseudotsuga menziesii*), introduced in city parks, offers buds, needles, and insects from the bark, and protection with its dense crown, while the Silver Birch (*Betula pendula*) served for roosting. Cypresses (*Cupressus* spp.), cultivated along the Southern Black Sea coast, provided high roosting sites, buds, and needles in a mild microclimate. Local species such as Lindens (*Tilia* spp.) in Stara Zagora provided buds, flowers, and twigs for feeding and roosting.

Fig. 1 shows a Silver Birch, covered with snow, and Alexandrine parrots roosting on its branches. Figs. 2 and 3 show the two species documented in Bulgarian cities on plane and hackberry trees, respectively.



Fig. 1. Parakeets perched on a Silver Birch in Amsterdam, Netherlands. Photo: Keshav Narula, 2026.



Fig. 2. Parakeet perched on a Plane Tree in Veliko Tarnovo, Bulgaria. Photo: Petar Minchev, 2026.



Fig. 3. Parakeet perched on a Southern Hackberry in Varna, Bulgaria. Photo: Svetoslav Dimitrov, 2022.

Observations for the period 2020–2026 documented successful adaptation of parrots of the genus *Psittacula* in Bulgaria, with a total of 12 registered individuals: 8 Alexandrine Parakeets and 4 Rose-ringed Parakeets. The birds, released or escaped most likely from private collections, demonstrated seasonal behavior – they wintered in urban zones with tall buildings and trees seeking shelter, and during the summer they scattered to city parks seeking fruits, buds, and insects.

The summarised climatic data revealed clear warming in the five cities where the parrots have been observed. Besides reduced cold periods with snow, the freezing of their food (fruits, buds) was also rare – these freezings were no more than 2–3 days in recent years, which further facilitated their access to resources. These changes, combined

with urbanized habitats (civic dendroflora: planes, cherry laurels, firs, cypresses), allowed for the long-term survival of tropical species – individuals in Stara Zagora and Veliko Tarnovo survived 4–6 winters, with potential for future breeding with continued warming.

Climate change and global warming are having an increasingly strong influence on the distribution of a number of animal species, including parrots of the genus *Psittacula* – Alexandrine Parakeet and Rose-ringed Parakeet. The increase in average temperatures creates more favorable conditions for their survival outside their natural range, leading to the expansion of their populations northward. Over the last decades, there has been a permanent establishment of Alexandrine parrots in many parts of Europe. In some coun-

tries, they are already considered an invasive species, as they successfully breed and compete with local birds for food and nesting sites (Dodaro and Battisti, 2014; Menchetti and Mori, 2014; Peck et al., 2014; Viviano and Mori, 2021). In Italy, they have been described as a potential threat to threatened noctule bats (Giuntini et al., 2022). Such permanent and growing populations exist in the UK, Germany, Belgium, the Netherlands, France, Italy, Spain, Romania, Greece, Turkey (Ancillotto et al., 2015; Clergeau et al., 2015; Braun et al., 2018, Çalışkan, 2018; Sahin and Arslangünođdu, 2019; Giuntini et al., 2021; Hernández-Brito et al., 2022; Drăgan and Murariu, 2024; Thoma et al., 2026). The closest places to Bulgaria with a long-standing and stable population of Alexandrine parrots are Istanbul (Turkey) and Thessaloniki (Greece). The air distance between Istanbul and Stara Zagora (South Central Bulgaria) is 314 kilometers, and the distance between Thessaloniki and Stara Zagora is 301 km, which indicates that the natural spread of the species to Bulgaria is entirely possible under suitable climatic conditions.

Conclusion

This study establishes that climate change facilitated the adaptation of exotic parrots of the genus *Psittacula* (8 Alexandrine and 4 Rose-ringed parakeets) in urbanized environments of Bulgaria through milder winter temperatures, reduced snowfall, and use of urban dendroflora and tall buildings. Registered individuals, most likely released or escaped from private collections, demonstrated long-term survival (up to 6 winters), which creates a risk of invasive spread similar to Western Europe. Potential breeding could lead to the displacement of local birds through resource competition. Throughout Europe, these parrots have become invasive through high reproductivity, adaptability to human environments, and lack of natural enemies, allowing rapid expansion from single individuals to large colonies. Monitoring of populations by NGO organizations and/or the Ministry of Environment and Water is recommended to prevent such invasive effects. The control of trade and release of pet parrots is also recommended, combined with educational campaigns for owners. Upon formation of large populations – selective management measures and humane capture are recommended for the protection of local avifauna.

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References

- Ancillotto, L., Strubbe, D., Menchetti, M., & Mori, E. (2016). An overlooked invader? Ecological niche, invasion success and range dynamics of the Alexandrine parakeet in the invaded range. *Biological Invasions*, 18, 583–595. doi: [10.1007/s10530-015-1032-y](https://doi.org/10.1007/s10530-015-1032-y)
- Braun, M.P., Franz, D., Braun, N., Koch, E., Walter, C., Bresser, A., Ziegler, T., & Marcordes, B. (2018). Current census of Alexandrine Parakeets *Palaeornis eupatria* syn. *Psittacula eupatria* in Germany and Europe. *Vogelwarte*, 56(2), 383–385. [in German]
- Butler, C.J., Cresswell, W., Gosler, A., & Perrins, C. (2013). The breeding biology of Rose-ringed Parakeets *Psittacula krameri* in England during a period of rapid population expansion. *Bird Study*, 60(4), 527–532. doi: [10.1080/00063657.2013.836154](https://doi.org/10.1080/00063657.2013.836154)
- Çalışkan, O. (2018). Rose-Ringed Parakeets (*Psittacula krameri*) and geographical evaluation of habitats in Turkey. *International Journal of Geography and Geography Education*, 38, 279–294
- Christodouloupoulos, M.A.B., Cotou, E., Politakis, N., Tsekouras, N., Paraskeuas, V.V., Kotzamanis, Y., Christodouloupoulos, G., & Pappas, A.C. (2025). Urban Foraging and Plant Toxicological Risks for Rose-Ringed Parakeets (*Psittacula krameri*) in Athens. *Diversity*, 17(11), 801. doi: [10.3390/d17110801](https://doi.org/10.3390/d17110801)
- Clergeau, P., Leroy, O., & Lenancker, P. (2015). Population dynamics of the introduced Rose-ringed Parakeet *Psittacula krameri* in Île-de-France. *Alauda*, 83, 165–74.
- CLO. (2023). *Alien species in the Netherlands, 1990–2020* (indicator 1622, version 02, 4 December 2023), www.clo.nl. Statistics Netherlands (CBS), The Hague; PBL Netherlands Environmental Assessment Agency, The Hague; RIVM National Institute for Public Health and the Envi-

- ronment, Bilthoven; and Wageningen University and Research, Wageningen
- Dodaro, C., & Battisti, C. (2014). Rose-ringed parakeet (*Psittacula krameri*) and starling (*Sturnus vulgaris*) syntopics in a Mediterranean urban park: evidence for competition in nest-site selection? *Belgian Journal of Zoology*, 144(1), 5-14. doi: [10.26496/bjz.2014.61](https://doi.org/10.26496/bjz.2014.61)
- Drăgan, F.D., & Murariu, D. (2024). Status of Rose-ringed Parakeet *Psittacula krameri* (Scopoli, 1769) (Psittaciformes: Psittaculidae) in Romania. *Acta zoologica bulgarica*, 76 (3), 431-436. doi: [10.71424/azb76.3.002747](https://doi.org/10.71424/azb76.3.002747)
- Giuntini, S., Ancillotto, L., Mori, E., & Viviano, A. (2021). The Alexandrine parakeet *Psittacula eupatria* as a naturalised breeding species in Italy: a proposal of integration to the national official checklist. *Avocetta*, 45(2), 177-179. doi: [10.30456/avo.2021202](https://doi.org/10.30456/avo.2021202)
- Giuntini, S., Ancillotto, L., Falaschi, M., Viviano, A., Palagi, E., & Mori, E. (2022). Alien parakeets as a potential threat to the common noctule *Nyctalus noctula*. *Biodiversity Conservation*, 31, 3075-3092. doi: [10.1007/s10531-022-02476-9](https://doi.org/10.1007/s10531-022-02476-9)
- Giuseppe, D., & Battisti, C. (2014). Rose-ringed parakeet (*Psittacula krameri*) and starling (*Sturnus vulgaris*) syntopics in a Mediterranean urban park: evidence for competition in nest-site selection? *Belgian Journal of Zoology*, 144, 5-14
- Groombridge, J., Jones, C., Nichols, R., Carlton, M., & Bruford, M. (2004). Molecular phylogeny and morphological change in the *Psittacula* parakeets. *Molecular Phylogenetics and Evolution*, 31(1) 96-108. doi: [10.1016/j.ympev.2003.07.008](https://doi.org/10.1016/j.ympev.2003.07.008)
- Heald, O.J.N., Fraticelli, C., Cox, S.E., Stevens, M.C.A., Faulkner, S.C., Blackburn, T.M., & Le Comber, S.C. (2020). Understanding the origins of the ring-necked parakeet in the UK. *Journal of Zoology*, 312, 1-11. doi: [10.1111/jzo.12753](https://doi.org/10.1111/jzo.12753)
- Hernández-Brito, D., Carrete, M., & Tella, J.L. (2022). Annual Censuses and Citizen Science Data Show Rapid Population Increases and Range Expansion of Invasive Rose-Ringed and Monk Parakeets in Seville, Spain. *Animals*, 12(6), 677. doi: [10.3390/ani12060677](https://doi.org/10.3390/ani12060677)
- Menchetti, M., & Mori, E. (2014). Worldwide impact of alien parrots (Aves, Psittaciformes) on native biodiversity and environment: a review. *Ethology Ecology & Evolution*, 26(2-3), 172-194. doi: [10.1080/03949370.2014.905981](https://doi.org/10.1080/03949370.2014.905981)
- NIMH. (2026). National Institute of Meteorology and Hydrology. Available at: <https://www.meteo.bg/en>
- Pârâu, L.G., Strubbe, D., Mori, E., Menchetti, M., Ancillotto, L., van Kleunen, A., White, R.L., Luna, A., Hernández-Brito, D., Le Louarn, M., Clergeau, P., Albayrak, T., Franz, D., Braun, M.P., Schroeder, J., & Wink, M. (2016). Rose-ringed Parakeet *Psittacula krameri* Populations and Numbers in Europe: A Complete Overview. *The Open Ornithology Journal*, 9, 1-13. doi: [10.2174/1874453201609010001](https://doi.org/10.2174/1874453201609010001)
- Peck, H.L., Pringle, H.E., Marshall, H.H., Owens, I.P.F., & Lord, A.M. (2014). Experimental evidence of impacts of an invasive parakeet on foraging behavior of native birds. *Behavioral Ecology*, 25(3), 582-590. doi: [10.1093/beheco/aru025](https://doi.org/10.1093/beheco/aru025)
- Sahin, D., & Arslangündoğdu, Z. (2019). Breeding status and nest characteristics of rose-ringed (*Psittacula krameri*) and alexandrine parakeets (*Psittacula eupatria*) in Istanbul's city parks. *Applied Ecology and Environmental Research*, 17(2), 2461-2471. doi: [10.15666/aeer/1702_24612471](https://doi.org/10.15666/aeer/1702_24612471)
- Thoma, C.T., Makridou, K.N., & Bakaloudis, D.E. (2026). Spatial and Temporal Trends in the Invasion Dynamics of the Ring-Necked Parakeet (*Psittacula krameri*) in the Urban Complex of Thessaloniki, Greece. *Animals*, 16(2), 224. doi: [10.3390/ani16020224](https://doi.org/10.3390/ani16020224)
- Viviano, A., & Mori, E. (2021). Population counts and potential impact of two successful invaders in a town of Northern Italy: the case of ring-necked parakeet and Alexandrine parakeet in Reggio Emilia. *Natural History Sciences*, 8(1), 35-40. doi: [10.4081/nhs.2021.518](https://doi.org/10.4081/nhs.2021.518)

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