REINFORCEMENT OF THE EGYPTIAN VULTURE POPULATION IN BULGARIA

Integrated report on the release of captive-bred and wild Egyptian Vultures in the Eastern Rhodopes, Bulgaria in 2025



Photo: Veselin Toskov

BSPB/BirdLife Bulgaria

2025

Prepared by:

Volen Arkumarev[1*], Vladimir Dobrev[1], Anton Stamenov[1], Ivaylo Klisurov[2], Rusko Petrov[2], Atanas Delchev[1], Dobromir Dobrev[1], Hristina Klisurova[2], Elitsa Ivanova[1] & Stoycho Stoychev[1]

[1]*Bulgarian Society for the Protection of Birds/BirdLife Bulgaria, Yavorov complex, bl. 71, vh. 4, PO box 50, 1111, Sofia, Bulgaria. www.bspb.org*

[2]*Green Balkans - Stara Zagora, 30 Boruygrad str., Stara Zagora 6000, Bulgaria www.greenbalkans.org*

**Corresponding author: volen.arkumarev@bspb.org*

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Photo on the cover page: The Egyptian Vulture named Luis accompanied by a Griffon Vulture and a Cinereous Vulture at the supplementary feeding station. Photographer: Veselin Toskov

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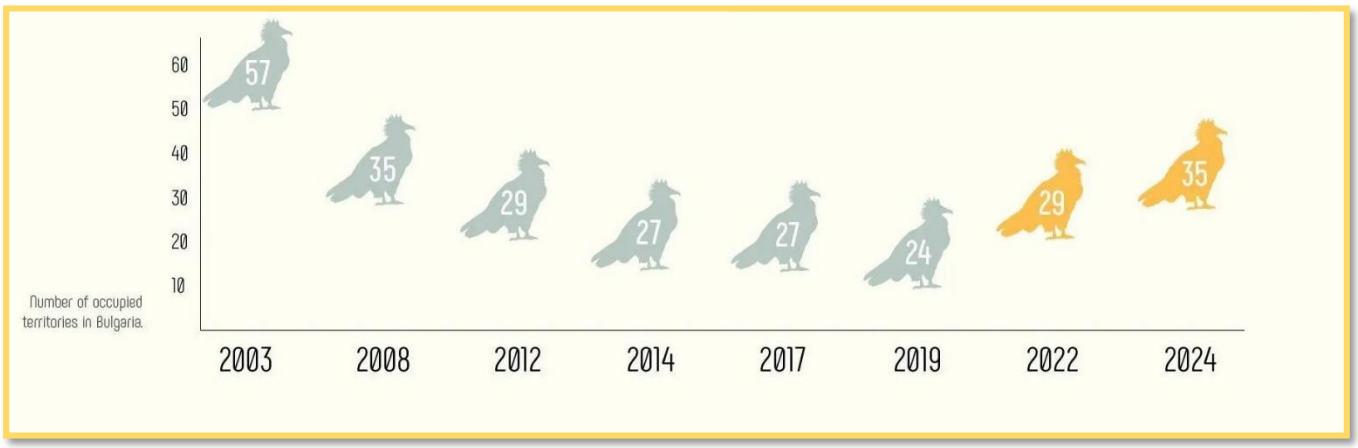
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Introduction

The Egyptian Vulture (*Neophron percnopterus*) is a globally Endangered species according to IUCN. The Balkan population of the species has dropped down to about 50 pairs with a calculated decline of about 4-8 % per year over the past three decades (Velevski *et al.* 2015). Among the main threats for the species are the illegal use of poison baits, electrocution, poaching and drowning of the juveniles during first migration. These threats operating along the entire flyway lead to the continuous reduction of the breeding territories across the Balkans (Oppel *et al.* 2015, Velevski *et al.* 2015). An integrated population model shows that reinforcement of the population with captive-bred individuals would reduce the probability of extinction by 2049 from 48% to < 1% if 12 or more birds are released every year for 30 years. The model and a Feasibility Study suggest that a 4% improvement in the survival of the wild individuals combined with the release of 9 birds per year for 20 years would lead to a stable population (Saravia *et al.* 2020, Oppel *et al.* 2021).

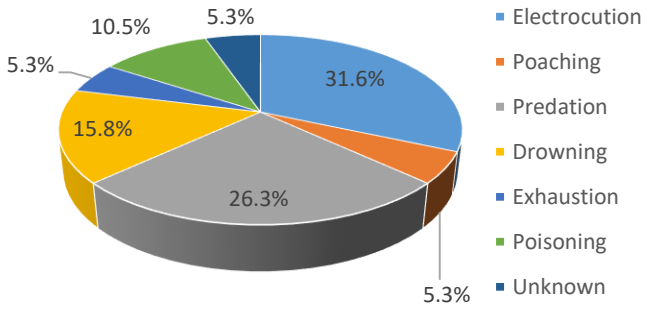
In 2018 in the frame of the 'Egyptian Vulture New LIFE' project (LIFE16 NAT/BG/874) a pilot Reinforcement program for the species started in Bulgaria. Three different methods for releases of captive-bred Egyptian Vulture were tested – delayed release, fostering and hacking. The results from the trial releases indicated that the most feasible and successful releasing technique is the delayed release. Based on these results a Reinforcement Strategy for the Egyptian Vulture in Bulgaria and Greece was developed (Arkumarev *et al.* 2022) and is currently under implementation. By delivering urgent conservation measures towards eliminating major known threats in the breeding grounds and along the entire flyway we aim to increase the survival of the wild and released individuals which is in line with the "Flyway Action Plan for the Conservation of the Balkan and Central Asian Populations of the Egyptian Vulture *Neophron percnopterus* "(EVFAP), (Annex 4) of the CMS Vulture Multispecies Action Plan (Botha *et al.* 2017).

Our most recent study revealed that the population growth rate across the Balkans increased by 6.9% and the Egyptian Vulture population has remained stable for five years (2018-2022). In Bulgaria 35 occupied territories were found in 2024 and 36 in 2025 which is a 20% increase compared to 2023 and for the first time in 40 years the population shows steady increase. However, the ongoing management along the flyway and reinforcement are required to ensure that the Egyptian Vulture population on the Balkans can recover (Oppel *et al.* 2023).



Summary of the results (2016-2025)

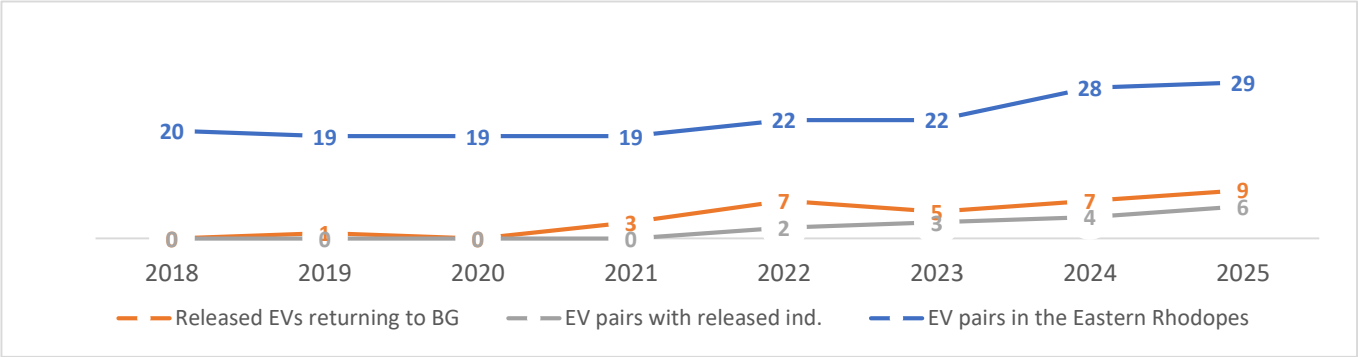
Over the course of the past 9 years (2016, 2018-2025) **34 captive-bred and 12 wild Egyptian Vultures were released in Bulgaria** (Arkumarev *et al.* 2018, 2019, 2020, 2021, 2022, Arkumarev 2023, 2024). A total of **46 vultures** were released using three different methods: 33 through the delayed release, 9 via hacking, and 4 through fostering. Since 2021, only the delayed release method has been applied, as monitoring results demonstrated that it ensures the highest post-release survival of the released individuals. We have recorded the mortality of 19 individuals released through delayed release. **Electrocution was the leading cause** (n = 6), **followed by predation** (n = 5) by terrestrial predators such as foxes and martens, and by raptors such as Bonelli's Eagle. Additional causes included drowning at sea (n = 3) and poisoning (n = 2) *(see the figure below)*.



The survival of the released individuals up to the end of the first autumn migration **is 71%**, while the survival until reaching adulthood is **46% (compared to only 14% of the wild fledglings).**

In 2025 six Egyptian Vultures (5 in their 2 cy and 1 in 3 cy) were released in the Eastern Rhodopes through the delayed release method. Two birds were raised in captivity and the other 4 were extracted from wild nests (1 in 2023 and 3 in 2024) (see next chapters for details). **This year 9 Egyptian Vulture** released previously have returned to Bulgaria (eight released through delayed release and one released through hacking). **Six of these vultures formed pairs** in the wild and occupied breeding territories with wild partners. Since the start of the Reinforcement program **in total 7 different released individuals have occupied breeding territories** – six females and one male.

In 2025, three of these pairs laid eggs and successfully raised fledglings. One pair raised two fledglings, while the remaining two pairs each raised a single chick. Since the first successful breeding of released individuals in the wild was documented in 2024, **a total of seven fledglings** have been raised. **Currently, in 21% of breeding pairs** in the Eastern Rhodopes, one of the partners is a released vulture. This achievement represents an important milestone in the recovery of the species in Bulgaria and the Balkans.



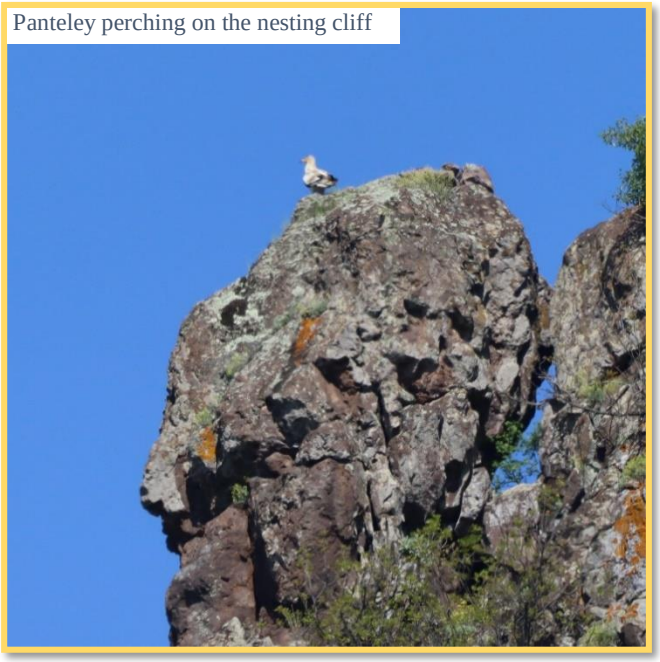
Movements of the Egyptian Vultures released in 2018 – 2024

Delayed release

Panteley (8 years old; released 2018)

Panteley spent the winter of 2024 in Chad, east of lake Chad, in the same area where he spent the previous winters as well. On 25 February his migration to the breeding grounds started. His pace through the Sahara was slow and he reached the Nile on 10 March. Panteley kept covering shorter distances until the 13th when he crossed Sinai and from this point on it took him only 8 days to swiftly travel the rest of the route reaching his breeding territory in the Eastern Rhodopes on 21 March (last year he reached it 10 days later). Thus, he was one of the first birds to return to their breeding grounds in Bulgaria.

Panteley perching on the nesting cliff



Panteley spent almost a month alone. He moved to another suitable breeding cliff which has been traditionally occupied by the species. It is located only 2 km away from the cliff which was a center of his activity last year. He was observed visiting the nest used by Egyptian Vultures on this cliff but was not observed to repair the nest and bring new nesting material. He was frequently perching on the top of the cliff and demonstrating territorial behavior. In the end of April he was eventually observed with a partner. The pair was showing strong territorial behavior in the area that Panteley holds for years now and is bordering three other Egyptian Vulture pairs and a Golden eagle pair. Unfortunately, Panteley and his partner didn't start breeding but they picked up a good cliff that could become their new home in the next season.

On 16 September Panteley started his journey back to the wintering grounds in Chad. As an adult and experienced migrant it took him only 11 days to reach the wintering grounds in Chad without long stops along the route.

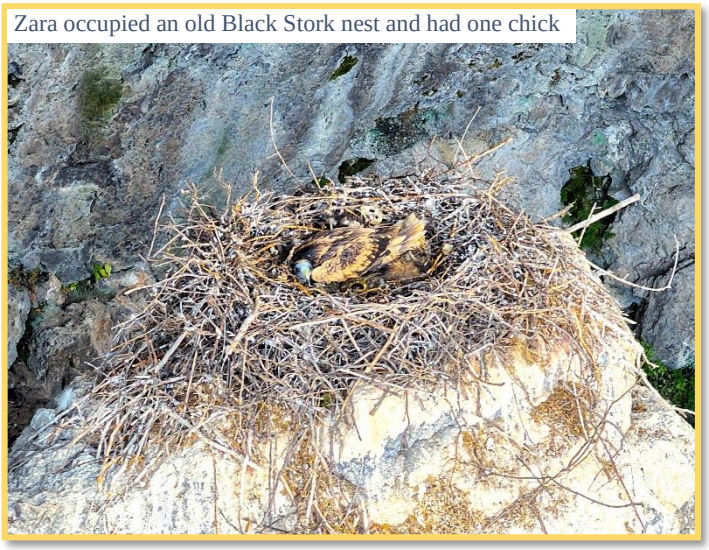


Panteley's migration route

Zara (7 years old; released in 2020)

Zara spent the winter in eastern Sudan in the same area where she wintered in 2022/2023 and 2023/2024. On 14 February she started her way back to the breeding territory in the Eastern Rhodopes. A week later she flew over Suez and continued further north. For a day she stopped in Jordan probably for feeding. Making no further stops except for roosting she crossed the Dardanelles on 05 Mach and became one of the very first adults to return from the wintering grounds in Bulgaria. On the same day she stopped to feed at the feeding station where she was released back in 2020.

In the early morning she returned straight to her breeding territory. Zara was likely unpleasantly surprised to find a Griffon Vulture already incubating in the nest where she had successfully bred the previous year. It took some time for her partner to return, after which the pair occupied a Black Stork nest on the same cliff. Zara laid eggs and hatched a single chick in the last week of May, which successfully fledged in August.



Zara occupied an old Black Stork nest and had one chick

Last year, Zara and her partner achieved the first successful breeding in the wild in Bulgaria of an Egyptian Vulture that had been raised in captivity and released as part of the Reinforcement Program. Although she breeds relatively close to the release site and the feeding station, Zara prefers to forage north of the Studen Kladenets dam, near her nesting area. She visited the central vulture feeding station only a few times before her partner arrived, and did not return again until the beginning of the autumn migration.



Zara at the vulture feeding station

The autumn migration for Zara started on 18 September (three days later than last year) and a week later she was already crossing the Sinai Peninsula in Egypt. There we lost signal from her transmitter. Nevertheless, we hope she made it safe back to the wintering grounds in eastern Sudan.



Zara's migration to Sudan

Izi (6 years old, released in 2020)

Izi is the younger sister of Zara and share similar life story. Izi spent the winter in Sudan, the same region north of Hartoum as last years. She started the spring migration on the 2nd March. Izi made no stops along the way except for roosting and reached her breeding territory in the Eastern Rhodopes, Bulgaria in just 17 days. Her partner – Lucky arrived 12 days later and the pair reunited. Thus, in the last days of March the pair started preparing the nest for the onset of the breeding season.



Izi in the wild in 2025

Since her release in 2020, this is her second breeding season as an adult. Like last year, Izi and Lucky laid two eggs at the end of April, which hatched during the first ten days of June. They successfully raised both chicks, which fledged around 20 August. On 23 August, the fledglings were observed near the nest, enjoying a sunbath.



Izi's migration route

On 9 September Izi started the autumn migration and only in a week she was already in Sinai. This time she experienced some difficulties there finding the way and for three days travelled back and forth between Abu Durba and Sharm el-Sheikh. At last, on 19 September Izi crossed the strait of Suez flying 30 km over sea between Abu Durba and Ras Shukeir. Then she entered the Nile valley and continued further south. We lost the signal of her transmitter on the next day west of Lake Nasser just before entering in Sudan where GSM coverage is poor. We hope that Izi safely returned to her wintering grounds north of Hartoum and her GPS transmitter will send data next spring when she starts her travel back to Bulgaria.

Siphera (4 years old; released in 2022)

Siphera is a wild hatched from northern Bulgaria that was released into the wild in 2022. She spent the winter of 2024 in a vast area between lake Fitri and lake Chad. She started her migration to the Eastern Rhodopes on 13 March. She was slowly progressing north and reached the Nile valley near Luxor on 29 March. From there on she increased her migration pace and on 08 April Siphera reached the Tuz Lake in Turkey where she stopped for two days. On 15 April she crossed the Dardanelles and on the next day returned in the Eastern Rhodopes. On 19 April she settled in a territory just 12 km away from the release site and the vulture feeding station. Only 5 days later the team of BSPB confirmed that she is together with a wild unmarked male and the young couple show territorial behavior. The territory they occupied is in area with high density of breeding territories and lacks good nesting sites. Anyway, the newly formed pair started building a nest.

Siphera with her partner in the newly occupied territory



The nest was situated on a steep slope with small rocks and placed under a rock cornice but easily accessible to predators and even people. The team of BSPB inspected the nest in June and found a layer of wool and some sticks but the nest was poorly arranged which is not surprising considering the young age of the partners.

The pair build a nest made of wool and sticks



Unfortunately, on 15 June, the GPS transmitter of Siphera began sending stationary signals, and a field inspection confirmed that she had died of electrocution in the vicinity of the nest. BSPB informed the authorities, and the electric company subsequently insulated the hazardous power line running through the newly established breeding territory to prevent further mortality, particularly of the male. Later in the summer, the male attracted a new female to the territory, and the two formed a pair.

Siphera electrocuted in her breeding territory



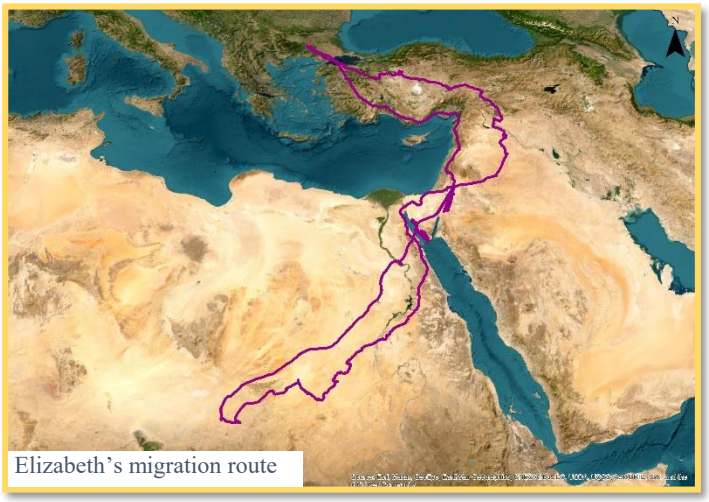
Elizabeth (4 years old; released in 2022)

Elizabeth spent the winter of 2024 again in Chad north of Abeche. She started her migration to the north on 8 April. As a non-mature bird she was slowly making her way back to Bulgaria and the Balkans. On 28 April she reached the city of Kayseri in Turkey where she stopped for two days. On 04 May she crossed the Marmara Sea through the Marmara island. On 04 May she reached the feeding site where she was once released. She spent the rest of the month in an area encompassing the northern shore of Studen kladenets dam. Afterwards she settled in a compact area on the southern shore of the dam. There she was spotted with a partner in the beginning of July. Her partner is a wild unmarked bird. As a very young pair they didn't attempt building a nest and breeding but were sticking to the newly established territory until the autumn migration. The area they have occupied is neighboring the breeding territory of Zara that is just two kilometers away.



Elizabeth roosting with her male partner

Elizabeth started he autumn migration on 18 September and on the same day crossed the Marmara Sea. She reached Sinai on 26 September. She spent the next four days flying along the western coast of the peninsula and on 01 October she crossed the Gulf of Suez between Abu Durba and Ras Shukeir. Then she continued through Sahara Desert to the northwest and reached her wintering grounds in Chad on 07 October.



Elizabeth's migration route

Luis (3 years old; released in 2023)

Luis has spent the first two years after the release venturing and wintering in Saudi Arabia and Yemen. In spring 2025 as a three years old bird it was just about time for Luis to get back and he started his almost 2 months long journey to the Eastern Rhodopes, Bulgaria on 28 March. He made a long detour crossing into Saudi and then Iraq. Then for almost 2 weeks (23 April – 05 May) he stopped at a dumpsite in eastern Turkey near the city of Karakocan. In May he continued slowly through Turkey to the west but stopped for another 11 days in an area between Ankara and Istanbul known for its dense Egyptian vulture population. On 13 May Luis almost reached the Bosphorus but suddenly swirled south again.

On 17 May reached the Black Sea coast again but returned for another few days to Beypazari. Then, on 21 May Luis spent the night in the outskirts of Istanbul and on the next day crossed the Bosphorus to enter the Balkans. On the next day he flew straight to the feeding station in Bulgaria where he was released exactly 2 years ago – in May 2023. Luis spent the entire summer in a small area

near the feeding station without making any long exploratory flight. returned for another few days to Beypazari. Then, on 21 May Luis spent the night in the outskirts of Istanbul and on the next day crossed the Bosphorus to enter the Balkans. On the next day he flew straight to the feeding station in Bulgaria where he was released exactly 2 years ago – in May 2023. Luis spent the entire summer in a small area near the feeding station without making any long exploratory flight.

Luis at the feeding station with Griffon and Cinereous Vulture



On 12 September he started his journey back to Yemen. This time, in contrast to the spring, it took him only 17 days to accomplish the autumn migration and on 28 September he arrived in the wintering grounds west of Taizz in Yemen.



The migration route of Luis to Yemen

Kaloyan (2 years old; released in 2024)

Last year, during his first autumn migration Kaloyan made an incredible journey travelling 10,000 km between Bulgaria and the wintering grounds in West Africa. It became the first Egyptian Vulture from the Balkans wintering in Benin and the first ever record of an Egyptian Vulture in this country. Kaloyan spent about 4 months in a very compact area of around 500 km2 in northern Benin before he started his exploratory movements in April 2025. Kaloyan entered Burkina Faso on 22 April and visited some large national parks and reserves (e.g. W National Park, Arli National Park, Singou Reserve and Pama Reserve) in the east of the country in almost a month stay. Nevertheless, Kaloyan was determined to continue and on 19 May entered into Niger where he settled in the Tahoua region. On 24 June he was captured by local people north of Kao village.

Kaloyan captured by local people in Niger



A local man claimed that he saw the vulture feeding on a carcass of a sheep and believed the vulture killed his animal, therefore decided to capture the bird. The man initially intended to kill the vulture, but upon discovering the GPS transmitter on the bird's back, he decided to contact the team of BSPB using the phone number written on the device. BSPB's team immediately sought assistance from our partners at the Sahara Conservation Fund and they quickly established contact with the man. The man demanded a ransom of 1 million Nigerian naira (approximately €600) for releasing the vulture.

Kaloyan confiscated by the authorities in Niger



Thanks to the swift intervention of our partners from the SCF, local authorities in Niger were immediately alerted. Following their prompt action, the bird was confiscated along with the transmitter, and rangers ensured its safety. Photos confirmed that the vulture was in good overall condition with no visible serious injuries. After being fed and given water, and allowed to regain its strength for a few days, the bird was successfully returned to the wild. Unfortunately, the straps of the GPS transmitter had been cut, and the device could not be reattached, which means we can no longer track his movements.

Kaloyan's migration to Africa in 2024

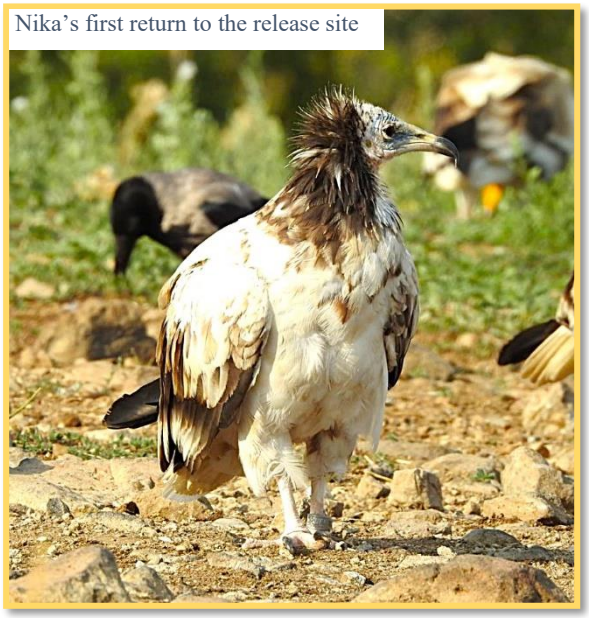


We hope that Kaloyan will recover fully and continue his journey. If he returns to Bulgaria, we will try to identify him by the ornithological ring he wears on his leg. Whether this story will have a happy ending remains to be seen.

Nika (2 years old; released in 2024)

Nika spent the winter in Saudi Arabia. On 08 May she started her spring migration. She was progressing slow but without any long stops along the way. On 02 June Nika crossed the Dardanelles and a day later arrived at the feeding station in the Eastern Rhodopes where she was released a year ago. In the next three days she made an exploratory flight first to Xanthi in Greece and then to Sredna gora in Bulgaria. By the end of the month she continued to actively explore the Eastern Rhodopes in Bulgaria and Greece. In July and August, she mainly stayed around the feeding site.

Nika's first return to the release site



On 16 September Nika made a trip to the Marmara Sea and returned. She did exactly the same on 18 and 20 September. Finally, on 22 September she started her actual migration. After crossing the Bosphorus, she reached northern Türkiye, where she was unfortunately caught by darkness in an open agricultural area crossed by a hazardous powerline. Seeking a place to roost for the night, Nika landed on a hazardous type of pylon, a fatal decision that led to her electrocution. Upon receiving the signal of her transmitter, BSPB immediately contacted Doğa Derneği (BirdLife Türkiye), as well as Eskişehir Zoo. A dedicated team from Eskişehir Zoo reached the site within hours, only to confirm the tragic end of this young vulture.

Nika got electrocuted in Turkey during migration



Adela (2 years old; released in 2024)

Adela also spent the winter in Saudi Arabia, in the same area near Al-Qunfudhah where Nika was wintering. On 15 May she began her spring migration, flying north through Jordan and reaching Syria on 23 May. However, she then turned south again, travelling back through Jordan and Egypt to reach the Negev Desert in Israel on 28 May. There she settled near Sde Boker, frequently visiting the vulture feeding station located there.

Adela stayed in Israel until 12 June, when she resumed her journey north. On 19 June she crossed the Dardanelles, and the next day she returned directly to the vulture feeding station where she had been released the previous year. Her fidelity to this site was remarkable—she did not leave it until the onset of the autumn migration on 16 September.

In just 16 days she completed her return to the wintering grounds on the southern edge of Saudi Arabia's Red Sea coast.

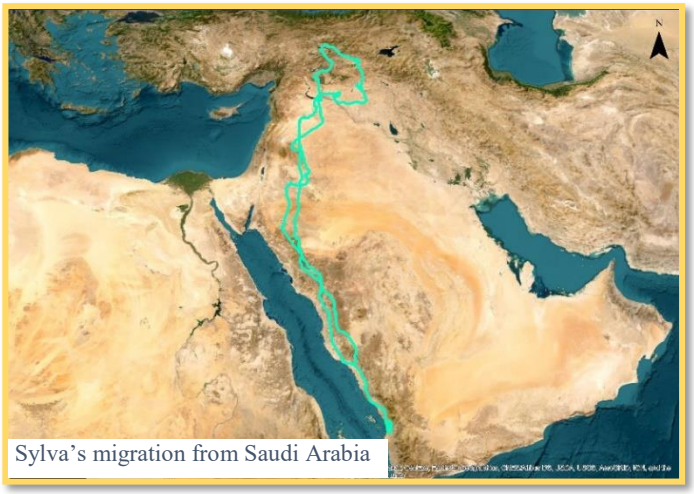


Nika's migration from and to Saudi Arabia

Sylva (2 years old; released in 2024)

Sylva spent the winter in the exact same area as her sibling Adela. She remained there until May 2025, when she made her first bold move. On 27 May, after a 10-day journey, she reached the Central Anatolian Plateau and settled near a rubbish dump northwest of the city of Elâzığ. This site offered a stable food source, and Sylva quickly established a routine, visiting the dump daily and roosting on a high-voltage powerline that passed close by—behaviour frequently observed among young Egyptian vultures. She remained in this area for the entire summer, demonstrating strong site fidelity and no further exploratory flights until the onset of autumn migration.

On 15 September she began her southward migration and, in just 10 days, reached the wintering grounds in Saudi Arabia. There she reunited with her sister Adela in a lowland area north of the city of Jazan, once again sharing the same habitat on the southern edge of the Red Sea coast.



Sylva's migration from Saudi Arabia

Electra (2 years old; released in 2024)

During her first migration Electra reached the Red Sea coast in Yemen. Between 20 November – 14 December she undertook a long exploratory movement eastwards towards Oman, reaching halfway across the country before returning to the Red Sea coast. In January 2025, her signal was lost after she moved north, close to the border with Saudi Arabia, most likely entering a remote region with no GSM coverage. Since then, no further data have been received, leaving her current status unknown. Despite this uncertainty, we remain hopeful that Electra is alive and will reappear during the upcoming spring migration.

Veli (2 years old; released in 2024)

Veli has been out of coverage since early October 2024. His last recorded position showed him about to cross the Saudi Arabia–Yemen border, after which the signal disappeared. He likely moved into a remote area with no GSM connectivity, which is common for Egyptian vultures in this region. Since then, no new data has been received, and his current status remains unknown. We remain hopeful that he is alive and will reappear during the spring migration when he returns to an area with coverage.

Hacking

Deni (5 years old; released in 2020)

Deni spent the winter in Chad, north of Lake Fitri, in the same area where she had spent the previous winter. On 20 February she began her spring migration, flying almost 400 km into the Sahara Desert before, after seven days on the wing, suddenly turning south and returning to the vicinity of Lake Fitri. With renewed determination, she resumed her northward journey on 28 February and did not look back. On 13 March she crossed the Suez Canal and continued rapidly northwards. Although she was temporarily grounded by severe weather in the Taurus Mountains of southern Turkey, she soon resumed her flight. Deni reached her breeding territory on 26 March, where she reunited with her partner and began preparing the nest. A camera trap installed in the nest confirmed that she laid a single egg on 17 April, which successfully hatched on 27 May. The chick developed well under the care of both parents.

Deni in her nest captured by a photo trap



Tragically, on 31 July, Deni visited the vicinity of a farm within her breeding territory where she fed on a cow carcass laced with poison intended for wolves. She succumbed within minutes of ingesting the bait. BSPB's anti-poison team, accompanied by a specially trained detection dog, immediately inspected the site and discovered both Deni's body and the poisoned carcass. The police and authorities were notified and a formal investigation was opened.

The dog unit discovers Deni poisoned in her breeding territory



Although the male survived the poisoning event, the chick's chances of survival in the wild had become uncertain. Therefore, BSPB team removed the chick from the nest and transported it to the Wildlife Rehabilitation and Breeding Centre (WRBC) of Green Balkans for veterinary care and rearing. The young vulture will be released back into the wild in spring 2026.

Rescue of Deni's chick from the nest



Summary of the results from 2025

In 2025 six Egyptian Vultures were released using the delayed-release method in the Eastern Rhodopes, Bulgaria. Five birds were born in 2024 and released in their second calendar year, while one was released as a 3cy individual.

Two of the vultures, Marti and Elif, were captive-bred and raised at Prague Zoo (Czech Republic). The other four – Neslihan, Kliment, Madzhestra and Kushka were collected from wild nests in the Eastern Rhodopes and Northern Bulgaria in 2023 and 2024 and reared at the Wildlife Rehabilitation and Breeding Centre of Green Balkans. **These chicks hatched very late** in the breeding season and would have fledged shortly before autumn migration, **facing high mortality risk.** Releasing them the following spring increases their survival prospects, in accordance with the criteria of the Reinforcement Strategy (Arkumarev *et al.* 2022).

Four of the released birds adapted well soon after the release, while two required recapture and brief rehabilitation before successfully rejoining the wild. Five individuals – Marti, Elif, Kliment, Madzhestra and Neslihan remained in the release area for most of the summer, feeding mainly at the supplementary feeding station managed by BSPB and occasionally at natural carcasses or the Dadia feeding station in Greece. Kushka was the only individual that did not use the Eastern Rhodopes feeding station and instead spent most of the summer in the mountains north of Serres in Greece. Once adapted to the wild all birds were roosting safely on cliffs and trees. Five of them were roosting at the communal Egyptian Vulture roost near the release site together with over 10 other immature or non-breeding vultures.

Five vultures followed the traditional migration route through Turkey, while Neslihan migrated south through Greece to the Peloponnese, where she was **killed by a Bonelli's Eagle**. From the five birds migrating through Turkey four crossed the Adrasan Peninsula. Only Marti could not find the safe route out of Adrasan and attempted a hazardous sea crossing and likely perished. **The remaining four individuals reached their wintering grounds successfully:** two settled in Chad and two in Yemen.

The table below summarises the start and end dates of migration for the six vultures released in 2025 (dates marked with * denote the last received GPS signal while the bird was still migrating or the date of confimed death).

Name	Migration start date	Migration end date	Age	Sex
Kliment	22.09.2025	10.10.2025	1 year	M
Elif	12.09.2025	30.09.2025	1 year	F
Marti	06.09.2025	21.09.2025*	1 year	M
Neslihan	31.08.2025	10.10.2025*	1 year	F
Kushka	08.09.2025	25.10.2025	2 years	F
Madzhestra	12.09.2025	07.10.2025	1 year	F

*date of last GSM connection or death

Release method

In 2025 six Egyptian Vultures were released through the delayed release method. This method foresees releases in spring when they are in their 2nd or 3rd calendar year. When the birds are released in the spring they have more time before the autumn migration to gain experience, improve their physical fitness, socialize with other non-breeding Egyptian Vultures, gain knowledge for important feeding sites, communal roost sites, etc. They spend 2 months of adaptation in an aviary and are released in the second half of May/early June when other immature birds are already present in the area. Then they have 4 months to adapt in the wild before the onset of the autumn migration.

Origin of the released Egyptian Vultures

Marti and Elif are captive-bred birds provided by the Egyptian Vulture EEP under EAZA. They are siblings born in 2024 in Prague Zoo, Czech Republic. The two birds are siblings, hatched in 2024 at Prague Zoo in the Czech Republic. Neslihan, Kliment, Madzhestra, and Kushka originate from the wild. Madzhestra and Neslihan were extracted from their nests in the Eastern Rhodopes in 2024, while Kushka was collected from the same region in 2023; all three hatched very late in the breeding season and therefore faced reduced survival prospects during their first autumn migration. Kliment was found weak beneath its nest in northern Bulgaria in September 2024 and subsequently rehabilitated.



Descent to a vulture nest to rescue chicks

All six vultures were raised at the Wildlife Rehabilitation and Breeding Centre (WRBC) of Green Balkans in Stara Zagora, Bulgaria, where they remained throughout the winter.

Management in captivity

Marti and Elif were raised by their parents at Prague Zoo in aviaries not accessible to visitors, ensuring minimal exposure to humans. Kliment, Madzhestra, Neslihan, and Kushka were raised by their wild parents in natural nests until the age of approximately 50–65 days, at which point they were collected for conservation management. At the WRBC of Green Balkans, all vultures were reared in specially designed aviaries with strict measures to minimise human contact and prevent imprinting.

During the winter, they were kept together in a large communal aviary to promote socialisation and natural flock behaviour, including communal roosting.

Release site

The release site is located in the Eastern Rhodopes, Bulgaria at a vulture feeding station. It is considered suitable as it meets the following conditions:

Safety of the area. The release site is located in a vulture safe area where threats to vultures are minimised. It is located in the core area of the Egyptian Vulture breeding population on the Balkans. The area holds increasing and healthy population of Griffon Vultures and newly

established population of Cinereous Vultures. In the vicinity of the release site (5 km radius) there are no poisoning or poaching events for at least 5 years, there are no windfarms and the majority of the powerlines are safe or have been insulated and thus don't pose a risk for the vultures.

Food availability. The release site is located at a predictable food source - vulture feeding station where about 20-30 t of food for the vultures are provided annually. The adaptation aviary faces the feeding station which allows the adapting Egyptian Vultures to observe the behavior of the other scavengers and their wild conspecifics. Supplementary food is regularly provided at the vulture feeding station during the pre-release and post-release period.

Predator control. The feeding station is electric fenced in order to avoid the presence and access of terrestrial predators (stray dogs, foxes, jackals, wolves, martens etc.).

Conspecifics presence. The release site is in area with regular presence of non-breeding Egyptian Vultures and breeding pairs. The adaptation aviary is located about 1.5 km away from an active nest of a wild Egyptian Vulture pair in order to avoid unwanted aggressive interactions with the young birds after the release. The feeding station is regularly visited by adult wild Egyptian Vultures and non-breeding individuals. The permanent presence of other non-breeding Egyptian Vultures in the area is important for the socialization of the released vultures.



Other species' presence. The release site is located outside the breeding territories of other territorial raptors in order to avoid aggressive interactions with the released Egyptian Vultures. Such species are Golden eagle (*Aquila chrysaetos*), Eagle owl (*Bubo bubo*), Long-legged Buzzard (*Buteo rufinus*). In addition, the feeding station is regularly visited by only low numbers of Corvids, e.g. up to 5-10 Ravens (*Corvus corax*) and 12-20 Crows (*Corvus cornix*). Ravens often congregate in big numbers near vulture feeding stations and compete with the vultures for food and roosting sites showing prominent aggressive behavior. Because only a few Ravens are present at the feeding station they are outcompeted by the Egyptian Vultures and there was no serious risk for the released birds.



Griffon and Cinereous vultures are regularly present at the feeding station and in the vicinity of the release site. The area holds a population of 145 Griffon Vulture pairs and 4 Cinereous Vulture pairs but also Cinereous Vultures from Greece frequently visiting. During the post-release period the captive-bred Egyptian Vultures have the

opportunity to interact with the other scavengers at the feeding station and find their place in the intra-guild hierarchy.

Roosting substrate. The release site is located in area with high inaccessible cliffs which are used as safe roosting sites by the released birds. The availability of dead trees is an advantage as well because very often Egyptian Vultures roost on such trees. All pylons and powerlines in the vicinity of the release site are of safe types or were insulated.

Adaptation aviary

Location. The adaptation aviary was located inside the electric fenced feeding station. It was installed about 100 m away from the area where the

The Egyptian Vulture adaptation aviary



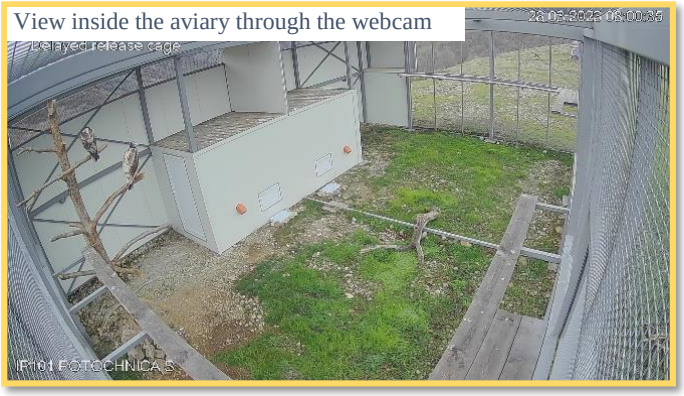
supplementary food for the wild vultures is placed. This allowed direct visual contact between the birds in the aviary and the feeding place without disturbing the wild vultures. In addition, the aviary was installed under the top of the hill in order to avoid the strongest winds and harsh weather conditions. The area around the aviary was open without bushes or dense forest which might make the vultures feel unsafe.

Exposition. The aviary is facing east, south and west. The northern exposition, from where harsher weather conditions usually occur, is covered.

Size and structure of the aviary. In 2022 new larger aviary was constructed. The dimensions of the aviary are 12m/8m/4m. This size allows the vultures to fly from one side to the other, strengthen their wings and prepare for the first flight after the release. The main construction is built of metal and sandwich panels. Wire mesh with 25x25 mm openings was used for covering the aviary. The floor of the aviary remained uncovered to prevent vulture's legs from injuries while walking and feeding. The wire mesh on the sides was extended with additional 50 cm and put in the ground in order to prevent predators from entering in the aviary.

The north side of the aviary is closed with sandwich panels. This is the side from where the strongest and more frequent winds were expected. This side of the aviary should protect the birds from the harsh weather conditions. Wooden perches are mounted along the sides of the aviary. The perches are at about 2 m height above the ground. They are about 20 cm wide and placed about 40 cm away from the net in order to provide enough space between the vultures and the net,

View inside the aviary through the webcam



thus avoiding any unwanted damages on their flight feathers. In 2023 a dead tree high about 4 m was inserted in the aviary to be used by the Egyptian Vultures for roosting. There are two doors for releases placed at the two sides of the long side of the aviary. The doors are 2 m long and 1.5 m high. This dimensions and position of the

entrances allow the vultures to leave the aviary by flying out straight from the perches.

Food and water delivery port. The food and water are delivered through 2 small windows at the covered side of the aviary in order to avoid direct visual contact between the keeper and the vultures.

Video surveillance. Video cameras with wide-angle lens are installed in the two corners of the aviary to closely monitor the behavior of the vultures during the adaptation period. The cameras have good visibility towards the place where the food is delivered in order to closely monitor the food intakes by the different individuals in the aviary.

Adaptation period

Insertion in the adaptation aviary. The six Egyptian Vultures were inserted in the adaptation aviary on 9 April, soon after the arrival of the first breeding pairs which visit the feeding station. This allowed the young birds to observe their wild conspecifics since their first day in the adaptation aviary. All birds were ringed with different colored plastic rings to ease the identification during the adaptation period. The color rings were removed before the release.

Arrival of the Egyptian Vultures to the adaptation aviary



Feeding. The vultures were fed 2-3 times per week with about 150-200 g per day per individual. However, in cases when whole carcass was provided or the food in the aviary was not completely consumed and was still fresh the frequency of the feedings was decreased until most of the food was consumed. Food and water were provided through small windows from the covered side of the aviary in order to avoid the direct visual contact between the vultures and the keeper. Water was kept clean and permanently available. The food provided was as diverse as possible. As the birds have used to some specific type of food (rats, hares, chickens) as a main food source provided during the captivity period, the same food items were used in the first days of the adaptation. After that period the quantity of these food items was gradually decreased and at the same time the quantity of other food items was increased. The Egyptian Vulture is an opportunistic scavenger with very wide diet spectrum which includes carcasses of bigger animals, eggs, invertebrates, slow-moving small animals which are captured alive, faeces etc. (Negro *et al.* 2002, Hidalgo *et al.* 2005, Dobrev *et al.* 2016). Training the captive-bred Egyptian Vultures to recognize different food items might be crucial for their survival and successful adaptation into the wild. Thus, the food provided during the adaptation period was as diverse as possible including whole parts of carcasses (e.g. sheep legs), pieces of red meat or skin small animals (e.g. lizards, snakes, hares, tortoises, hedgehogs, birds), bones with some meat on them, offal.

Monitoring. The behavior and the interactions between the vultures in the aviary were permanently monitored and recorded. An experienced observer was any aggressive behavior between the birds or social exclusions.

Tagging. All Egyptian Vultures were tagged with 30g GSM/GPS Ornitela transmitters prior to release. They were tagged 2 weeks before the release. During the tagging the birds were thoroughly examined by vets and treated against ecto- and endoparasites as this was their last handling prior to release. The tags were set to provide high frequency of GPS points (GPS locations every 5-10 min) and high frequency of data deliveries (30 min). This allowed the field team to immediately react if the birds experience some problems after the release. The transmitters were mounted using leg-loop harness (Anderson *et al.* 2020). All vultures were ringed with metal rings on their left leg and had microchips for identification. The color rings used for identification in the aviary were removed as in the wintering grounds in central Africa some birds are killed because of the color rings.

Last veterinary check prior to release



Public event

On 15 May we celebrated the "graduation" of the young vultures from the Class of 2025 at the Vulture School in the village of Potochnitsa. Nearly 120 students from four schools in the Eastern Rhodopes took part in the event. The day was filled with exciting activities and new knowledge about one of the region's most iconic species. The children had the unique opportunity to witness the fitting of transmitters on young Egyptian vultures. The event aimed to build environmental awareness, a sense of stewardship, and active involvement of young people in the conservation of the species. Each participating school was given the honour of choosing a name for one of the vultures to be released.

GPS-tagging of the young vultures and a public event



School pupils from Eastern Rhodopes attending the tagging event



Release

Release period. The adaptation period lasted 55 days. All vultures were released on 03 June. The release took place after the arrival of the first non-breeding Egyptian Vultures in order to allow the inclusion of the captive-bred birds into the social structure of the wild conspecifics near the feeding station. In the Balkans the non-breeding birds start arriving in early May.

Feedings. At the day prior release supplementary food was provided at the feeding station. About 400 kg of offal was provided and was scattered on the feeding station. The aim was to ensure that the released vultures will have access to food even if Griffon Vultures monopolize the food and outcompete the other vultures.

Release. The vultures were released in the morning (around 10:00 am local time) on 03 June by opening the two side entrances of the adaptation aviary. All further observations were held from a distance of about 400 m in order to avoid disturbance. All birds left the aviary in the first 1 hour after the gates were open.

First flight into the wild



Post-release monitoring and actions

Monitoring. After the release the Egyptian Vultures were closely monitored by experienced field team. The most critical period was expected to be the first night when the birds might not roost on a high safe place.

Post-release monitoring



The monitoring of the released birds continued 6 days until most of the birds started feeding at the feeding station. After that period the released birds were closely monitored by the GPS transmitters and visual observation about 1-3 times per week.

Feeding. Supplementary food was permanently present at the feeding station after the release and until the start of the autumn migration. This approach aimed to attach the birds to a safe food source and in area visited by other non-breeding Egyptian Vultures. Whole carcasses and offal were regularly provided. Food items were scattered in order to ensure easy access to food for the released vultures. Food was also places in a walk-in trap frequently used by the Egyptian Vultures but not used by the Griffon Vultures and thus the competition with the latter was minimized.

Movements, migration and wintering

Kliment

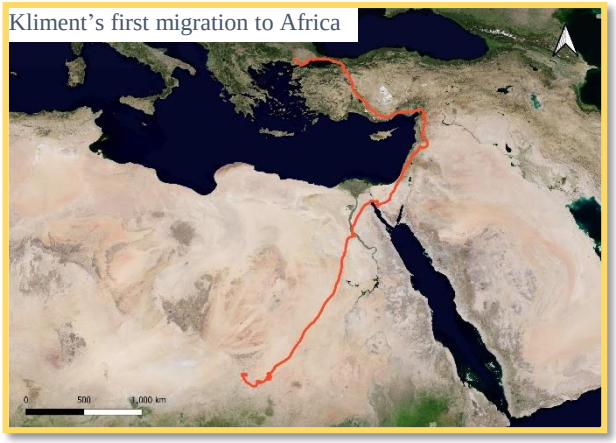
Post-release movements

Kliment left the release aviary only twenty minutes after the gates were opened. He made an excellent first flight and landed safely on a group of rocks at the top of the nearby ridge. Later that afternoon, he moved to the high cliff above the feeding station, where he remained for the rest of the day and spent his first night in the wild. During the first two days after release, he flew only short distances and spent most of his time perched and roosting on the high cliff. On 5 June he began flying more actively over the scree slope and surrounding area. That evening, Kliment attempted to roost on the ground under a tree in a location that was extremely difficult for the field team to access. To avoid potential risks, he was encouraged to relocate using a drone. He then moved to a rock in the centre of the large scree, where he spent the night. By 8 June, Kliment was noticeably stronger and more confident. That evening he joined a group of immature and non-breeding Egyptian vultures roosting on a dead tree. Early the next morning, he followed the group to the feeding station, where he fed for the first time since release and remained throughout the day. From that moment onward, Kliment roosted mostly with other vultures and visited the feeding station on a daily basis. Until September, he did not undertake any long-distance exploratory movements, instead staying within roughly a 15 km radius around the release site. On 2 September he left the area and spent three days exploring both the Bulgarian and Greek parts of the Eastern Rhodopes. He then settled near the feeding station at the Dadia–Soufli–Lefkimi Forest National Park in Greece. As the migration instinct intensified, Kliment reached the Bosphorus on 8 September but hesitated to cross, instead turning west and flying nearly 300 km to the Nestos River Delta. On 9 September he reversed direction again and returned to the Dadia feeding station.



Migration

Kliment began his first autumn migration on 22 September, heading directly east, and the following day successfully crossed the Bosphorus. He migrated rapidly through Turkey and, after four days, passed over Sarimazi before entering Syria. From there he continued south, flying through Lebanon and Israel, and on 1 October crossed the Suez Canal. In just five days he crossed the Sahara Desert and on 6 October paused for three days in Darfur State in Sudan, close to the border with Chad. On 10 October he continued west, crossed into Chad, and settled for wintering in the rocky Massif du Kapka in western Chad.



Kliment's first migration to Africa

Elif

Post-release movements

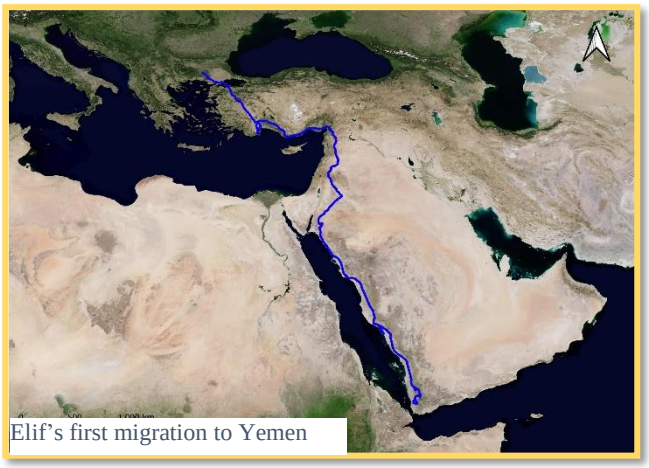
Elif was the first vulture to leave the release aviary, taking off only 20 minutes after the gates were opened. She immediately began soaring but was soon attacked by an adult vulture and forced to land on the slope behind the feeding station. A few hours after release, she completed a 4 km flight to the top of the main ridge of the Boynik Mountain, where she spent her first night in the wild roosting on a tree. During the night she was disturbed by something and moved approximately 600 m, landing again to roost safely in the forest. In the following days she remained in the same area near the ridge, consistently choosing trees as safe roosting sites.


Elif accompanied by wild vultures

On 5 June she landed in front of a hunter's hide within the nearby hunting reserve, where livestock offal had been deposited, and she likely fed there. On 10 June she flew south, making a circular movement of about 50 km before returning to the release area. A week later she undertook another long exploratory flight of around 200 km, visiting the Greek part of the mountain and subsequently returning to Boynik. Two days later she completed a similar large circular flight to the southwest, and the following day another to the west, reaching the town of Asenovgrad. On 24 June she made a one-day trip to western Strandzha and then to Sredna Gora near Stara Zagora. Elif returned for the first time to the feeding station where she was released on 28 June. Throughout July and August she continued exploring the Eastern Rhodopes in both Bulgaria and Greece, yet consistently returning to roost at the communal roost site near the feeding station.

Migration

Elif began her autumn migration early in the morning on 12 September. By noon the same day she crossed the Marmara Sea via Marmara Island without hesitation and continued south. On 14 September she reached the Adrasan Peninsula in southern Turkey—an area that often acts as a trap for young and inexperienced Egyptian Vultures, which may spend days circling around before finding a route over the 2,000 m mountains and along the eastern coastline. However, Elif made a quick decision and on the next day she turned north, found the correct route, and continued east along the coast. She flew over Sarimazi on 17 September and then south through Syria and Jordan. Unlike Kliment, she chose the eastern Red Sea migration route through Saudi Arabia. Elif followed the coastline and on 30 September reached southern Yemen near the coastal city of Mocha, where she settled for wintering.


Elif's first migration to Yemen

Marti

Post-release movements

Marti is the sibling of Elif. After leaving the release aviary, he flew approximately 300 m to a nearby rocky hill, where he spent several hours before making a longer flight of about 2 km toward the "Valchi Dol" Reserve. In the late afternoon he attempted to roost on the ground on a rock, and BSPB's field team intervened three times to encourage him to move to a safer roosting location. Only after nightfall he moved to the forest, where he likely spent the night perched on a tree. The following day, like his sister, Marti moved to the main ridge of the Boynik Mountain and was observed feeding together with Elif in front of the hunter's hide. Since then he has been regularly roosting on trees.

Marti in the nature in the Eastern Rhodopes



On 16 June he left the ridge for the first time and spent a day at Iran Tepe, 15 km to the east. Between 18 and 26 June he performed several exploratory flights to the east, south, and west but consistently returned to the Boynik area. On 26 June Marti finally returned to the feeding station where he was released, landing together with the other vultures. From that moment, he began visiting the feeding station daily and roosting at the communal roost site on the dead tree. Over the following three months, Marti remained mostly stationary around the feeding area, making only occasional exploratory flights to the Byala Reka, Varbitsa and Borovitsa river valleys, and to the area around Madzharovo.

Migration

Marti left the release area on 6 September and flew south into Greece. He spent four days circling in northern Greece, seemingly searching for a suitable route to continue his migration further south. On 10 September he crossed the Dardanelles and, without further hesitation, followed the Turkish coastline straight south. He reached the Adrasan Peninsula on 12 September, where his difficulties began. Marti became disoriented and spent several days flying back and forth along the coastline from one end of the peninsula to the other, without attempting to fly north over the mountains to reach the correct migration corridor. On the morning of 21 September he attempted to fly directly over the sea towards Africa, covering more than 500 km over open water. The signal from his transmitter was lost while he was still over the sea, and no further data have been received. It is therefore most likely that Marti perished during the crossing. However, there remains a small chance that he reached Africa and continued through an area without GSM coverage.



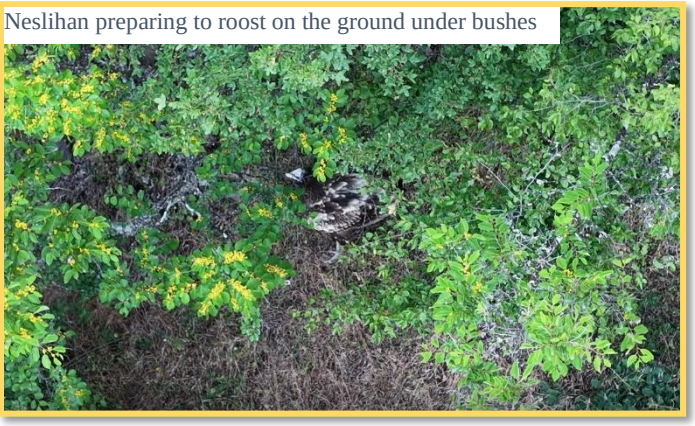
Marti's migration to Adrasan Peninsula and sea crossing attempt

Neslihan

Post-release movements

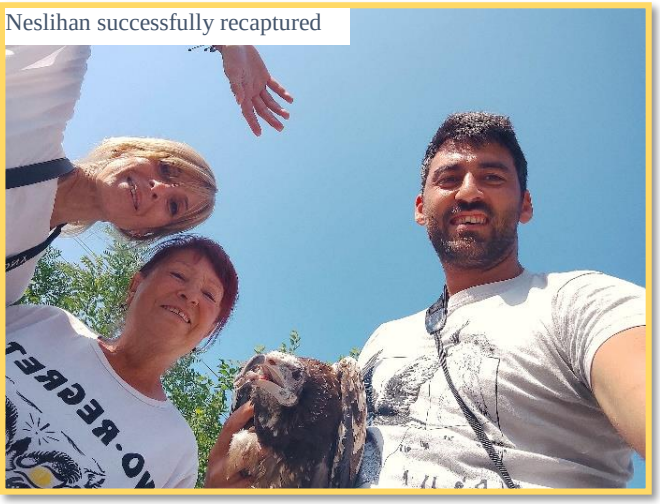
Neslihan was the last bird to leave the release aviary, exiting around one hour after the gates were opened. She flew down from the hill and landed in the middle of the large scree slope, where she made only short flights for the rest of the day and spent her first night in the wild. The following day she returned to the high cliff above the feeding station and roosted in a tree growing at the base of the cliff. Over the next several days, however, she continued to make only short low-altitude flights and repeatedly chose unsafe ground roosting locations among bushes. Despite multiple attempts by the field team to encourage her to move to safer roosting sites, she persisted in sleeping on the ground.

Neslihan preparing to roost on the ground under bushes



On 12 June, nine days after release and still without feeding, she unexpectedly undertook a long flight to Greece, covering more than 70 km. For the next three days she continued to move through northern Greece but showed clear signs of exhaustion. On 15 June she returned to the Bulgarian side of the mountain, where the BSPB field team, assisted by volunteers, successfully located and captured her. Having lost 300 g in weight, she was returned to the adaptation aviary for recovery.

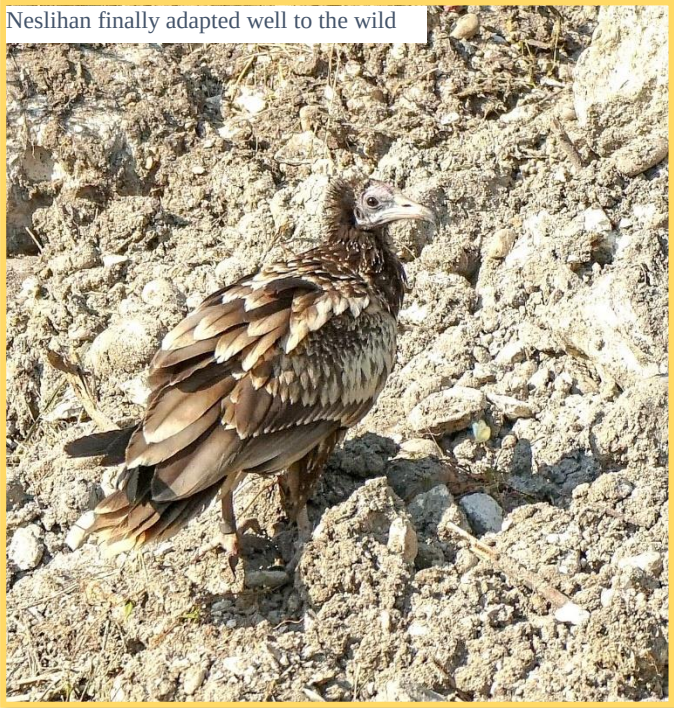
Neslihan successfully recaptured



On 24 June the aviary gate was opened to give her a second chance, but Neslihan remained inside for two additional days. She finally left on 26 June, yet again roosted mostly on the ground or on small rocks and did not feed at the feeding station. On 30 June she made another long exploratory trip, this time westward toward the town of Mineralni Bani. Over the next two days she continued across the Upper Thracian Plain and Sakar Mountain and ultimately returned directly to the release site on 2 July, where she finally fed at the feeding station. Two days later she began roosting on cliffs and subsequently joined the communal roost with the other vultures. Despite her very challenging start, the team was optimistic that she was now adapting successfully. Over the following month, Neslihan remained close to the feeding station and fed there regularly.

On 9 August, Neslihan embarked on another major journey. She travelled through northern Greece to the west, then turned south towards the island of Evia. After circling north again, she reached northern Albania on 19 August and settled near Drishti Castle, just east of the city of Shkodër. She stayed there until 31 August, when she moved

south again, marking what is considered the beginning of her autumn migration.


Neslihan finally adapted well to the wild

Migration

Four days later, Neslihan stopped near a farm close to the town of Astakos. On 9 September she continued south and, after two days, reached the westernmost of the Peloponnese peninsulas. She remained in the area for a week but appeared reluctant to attempt the risky sea crossing, eventually flying 200 km back north to the same farm near Astakos. During the following two weeks, she moved repeatedly between this location and the city of Patras. Finally, on 5 October she left the Patras area, headed south once more, and on 10 October reached the central Peloponnese peninsula. Just as she was turning north again, she was attacked and killed, most likely by a Bonelli's Eagle.


The remains of the vulture killed by a Bonelli's Eagle in Greece

BSPB contacted our partners from HOS, who immediately informed NECCA. A site inspection carried out by NECCA confirmed the vulture's death, and the remains, rings, and GPS transmitter were retrieved. Based on local knowledge shared by HOS, including the presence of a breeding pair of Bonelli's Eagles less than 2 km from the site, and the absence of other large eagle species in the area, we consider predation by a Bonelli's Eagle as the most probable cause of death.



Neslihan's migration route from Bulgaria to southern Greece

Kushka

Post-release movements

Kushka left the aviary shortly before Neslihan. She spent her first night in the wild inside a forest. Over the next few days, she flew very little and remained mostly within forest canopies around the area, consistently roosting on trees. On 7 June reached the "Studen Kladenets" Hunting Reserve. On 9 June she returned to the village of Studen Kladenets and landed near the last houses, repeatedly touching down in yards while clearly searching for food after a week without feeding. The BSPB team assessed this behaviour as dangerous, and early on 10 June visited the site and located Kushka sitting on the ground among bushes. Following a chase, she was successfully captured. She had lost an incredible 600 g of body weight, dropping to just 1.25 kg, and was therefore returned to the adaptation aviary. She regained strength quickly.

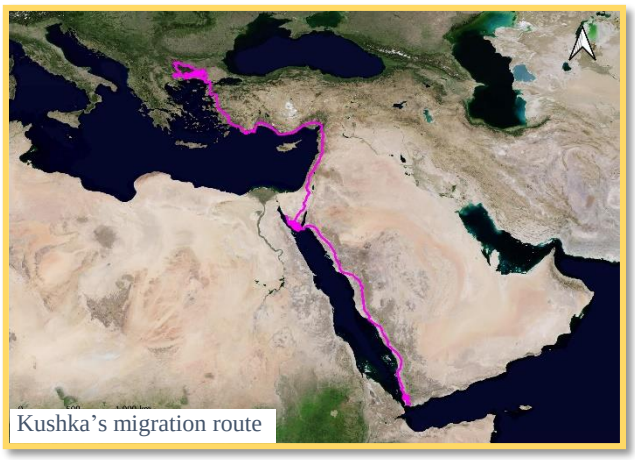
Kushka was given a second chance together with Neslihan and released again on 24 June. Immediately after release she left the area and once more visited the hunting reserve. She moved slowly south and on 8 July settled near the village of Shumnatitsa close to the Greek border. She continued roosting safely on trees, giving the team confidence that she could survive. A field visit to the site confirmed that she was feeding on livestock offal placed by hunters to attract predators. The team informed hunters and local residents about the presence of the vulture to prevent disturbance and casualties.


Kushka found offal to feed

On 8 July Kushka began another exploratory journey, travelling through the Western Rhodopes and Eastern Rhodopes. From there she continued moving restlessly and on 24 July visited Rila Mountain. The next day she followed the Mesta River valley and reached the mountainous area north of Serres in Greece, where she stayed for the following month, feeding near livestock farms. On 2 September she left the region and followed the coast to Dadia National Park, where she remained near the feeding station for about a week.

Migration

Kushka began her autumn migration on 8 September and crossed the Dardanelles. She then followed the Turkish coastline south and reached the Adrasan Peninsula on 11 September. She spent only two days there before finding the correct route east along the coast. On 22 September Kushka arrived at the tip of the Sinai Peninsula in Egypt, where she remained circling for several weeks. On 11 October she finally found a way out of the peninsula via Tiran Island and then continued south along the eastern coast of the Red Sea through Saudi Arabia. Kushka successfully completed her first autumn migration on 25 October, settling in Yemen.


Kushka's migration route

Madzhestra

Post-release movements

Madzhestra shows very good flying skills immediately after the release. The first few nights in the wild she is roosting mostly or rocky outrcrops. On the second night only she decided to roost on the ground under the communal roosting tree but the field team chased her away and she moved to a high cliff nearby. Only five days after the release on 07 June she landed to feed at the feeding station. She adapted very well and integrate in the group with the wild immature Egyptian Vultures in the area. She quickly joined the communal roosting site as well. Madzhestra spent the entire summer close to the feeding station where she was regularly feeding but was also able to detect food in the wild. She made exploratory flights in all directions for the release site but reaching not further than 30 km from the feeding station.



Madzhestra at the vulture feeding station

Migration

Madzhestra started her first autumn migration on 12 September. She made a circle over Dadia National park before flying towards Turkey. On 15 September she crossed the Dardanelles and with no hesitation continued further south along the coast. On 17 September she reached the Adrasan Peninsula in southern Turkey. As many other young and inexperienced Egyptian Vultures she struggled to find the way out of the Peninsula. For a week she was flying back and forth across the peninsula and once even flew over the sea for 12 km but decided to return back to safe land and did not undertake the hazardous sea crossing to Africa. Finally, on 24 September she flew north over the mountain and from there on continued to the east following the traditional migratory route for the species. On 26 September Madzhestra flew over Sarimazi and then 30 September over Suez. In just a week she crossed the Sahara Desert and reached Chad. She arrived in the wintering grounds on 07 October. Until December she was exploring different areas in western Chad but also in South Darfur in Sudan.



Madzhestra's first migration to Africa

Acknowledgments

The implementation of all activities described in this report was done by BSPB in accordance with Permit №ПВ-6/20.01.2023 and №831/25.03.2020 of the Ministry of Environment and Waters of the Republic of Bulgaria.

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