LIFE20 NAT/AT/000049 | LIFE NBI

Foto Dennis Pfleghaar; Überlingen 2024

Annual Report 2024

REINTRODUCTION OF THE NORTHERN BALD IBIS IN EUROPE

Responsible for content:
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Content

1. Introduction

The year 2024 marked the third project year of our LIFE Project (LIFE20 NAT/AT/000049 – LIFE NBI; 2022–2028; www.waldrapp.eu) led by Zoo Vienna. We look back on an intensive and highly productive season.

The Northern Bald Ibis continues to gain recognition as a flagship species in international wildlife conservation and serves as a powerful symbol in the fight against two major threats to biodiversity: electrocution on unsecured medium-voltage powerlines and poaching. A significant milestone in this context was the symposium on "New Approaches and Technologies against illegal bird hunting", hosted at Parco Natura Viva, which created a platform for interdisciplinary collaboration and innovative solutions.

A particular highlight of the 2024 season was the human-led migration — the longest and arguably the most challenging journey ever undertaken by humans guiding migratory birds. This impressive endeavour demonstrated once more the unique potential of this conservation method. Beyond that, we successfully implemented other innovative approaches, including the use of dummies to colonize a new natural breeding site in Überlingen at Lake Constance.

The trustful and constructive partnership with *Proyecto Eremita* in Andalusia further developed. This collaboration forms the basis for a conservation initiative that spans six European countries and covers an area of approximately 600,000 km² connected by the two migration corridors. In terms of geographic scale, this joint effort ranks among the largest conservation projects worldwide focused on a single species. It inspires new and important initiatives, such as the planned establishment of additional breeding colonies along the newly established migration route to Andalusia.

2024 was also an exceptional year in terms of media outreach. Among numerous media productions, the largest production ever took place this year by a very professional US film team, following our project for several months.

None of all these achievements would have been possible without the dedication of our outstanding team and of many reliable partners, volunteers, and sponsors.

2. Demographic Overview

In 2024, the population increased from 256 to 280 individuals (Tab. 1), closely aligning with the LIFE Grant Agreement target of 282 by year-end. A total of 71 chicks fledged in the wild, including 12 in Italy's Friuli region, confirming the encouraging trend of breeding outside established colonies. Additionally, recruitment from sedentary colonies continues, with 14 juveniles joining from Grünau (Upper Austria) and two from Fagagna (Friuli, Italy).

Reproductive rates were high across all four breeding areas, averaging 2.6 fledglings per nest (Tab.1).

Last year, 36 juveniles were released in Andalusia in the frame of a human-led migration. Further 17 juveniles from the sedentary zoo colony in Rosegg were released on-site in autumn to integrate into the local migratory colony. This sums up to a total of 53 released juveniles.

A total of 109 birds were lost during 2024. This equals a rate of 43% of the initial population size (N=256). This rate is below the mean of 47% over the years 2014-2024. The majority of losses (47%) occurred in Italy,

The overall population growth rate (Lambda λ) was 1.1, reflecting a 10% increase. This indicates a relatively low growth, caused mainly by high losses in the Überlingen, where the colony size dropped with λ of 0.6 (Tab. 1).

Table 1: Demographic development 2024. Recruitment refers to birds that independently joined the population from sedentary free-flight colonies. Lambda (λ) represents the population growth rate, with λ > 1 indicating growth. Reproductive rate denotes the mean number of fledged chicks per nest. Note: Of the 16 chicks from the Rosegg group, 7 were taken to complete the human-led migration group.

	Kuchl	**BGH**	**ÜBLG**	**Rosegg**	**extra-territorial**[1]	Grünau	Fagagna	SUM
initial population	51	52	71	61	4	5	12	**256**
fledglings in the wild	19	12	12	16	12			71
of that transferred to HLM group[2]				7				
release	18	18		17				53
recruitment						14	2	16
losses	18	19	43	22	4	2	1	109
final population	70	63	40	65	12	17	13	**280**
Lambda	*1.4*	*1.2*	*0.6*	*1.1*				***1.1***
reproduction rate	*2.7*	*3.0*	*2.4*	*1.8*				***2.6***

[1] Extraterritorial refers to chicks hatched outside the established breeding areas;
[2] Number of chicks from the Rosegg colony taken to complete the human-led migration group;

Figure 1 In early April the season started with the first chick collection at Zoo Rosegg in Carinthia; all chicks undergo a veterinary screening; from left: Helena Wehner (foster mother), Jean Meyer (veterinarian).

Figure 2 Human-led migration track 2024; green: stages with all birds flying; orange: stages with a part of the birds flying and a part transferred by car; white: all birds transferred by car.

In 2024, 36 chicks were handraised by the experienced foster mother team Helena Wehner (Fig.1) and Barbara Steininger. 29 chicks for handraising were collected from the sedentary zoo colony in Rosegg, Carinthia, and further 7 chicks were collected from the migratory colony in Rosegg (Tab.1).

The first weeks of handraising took place at Zoo Rosegg. Then, the birds changed to a training camp located at a farm in Taching am See, Bavaria, located close to the two breeding areas Burghausen and Kuchl. The intention is to connect these two colonies to the migration route to Andalusia.

The human-led migration began on August 13th, with all 36 juveniles successfully guided over 2,608 km from Bavaria to Andalusia, with no losses. After 52 days and 19 flight stages, the team reached the wintering site in Andalusia on October 2nd (Fig.2).

It was the longest, furthest, and largest human-led migration to date, with the highest number of birds ever, demonstrating the effectiveness of this translocation method. However, this was also one of the most challenging migrations for the team, as the birds' behaviour became increasingly difficult to manage from France onwards. They began refusing to follow the aircraft, creating significant obstacles. In 7 out of the 19 flight stages (covering one-third of the total distance), all birds followed the aircraft. In 6 stages, only part of the group followed, requiring some birds to be transferred by car. In the remaining 6 stages, all birds had to be transported by car after repeated unsuccessful attempts to continue the flight.

Thorough evaluations and data analysis provided no conclusive explanation for the increasing difficulties with the birds´ behaviour. They were in good condition, showing no signs of extraordinary stress and only a slight average body weight loss of 7% throughout the migration. Furthermore, the social bond between the birds and their foster parents was very strong.

Figure 3 Human-led migration team at arrival in Andalusia; from left: Jonas Förster, Fabienne Tilg, Lisa-Maria Weber, Alexandra Welch, Helena Wehner, Rudolf Beck, Christine Schachenmair, Anna Schulz, Johannes Fritz, Barbara Steininger, Johanna Haas, Tabea Gaugler, Albert Vázquez Gutiérrez, Gunnar Hartmann.

Nonetheless, important flight stages, such as the crossing of the Pyrenees, were completed by all the birds, and based on our experience, we assume that all the birds are capable of finding their way back to the breeding area and can therefore be considered full migrants. Thus, despite all the challenges, it was the most successful migration in the history of the project to date.

4. Reproduction

The 2024 breeding season was successful, with 59 juveniles fledged from 25 nests across the four breeding areas: Burghausen, Kuchl, Überlingen, and Rosegg. This corresponds to an overall reproductive rate of 2.6 fledglings per nest, with a nestling survival rate of 83%.

Reproductive success varied by colony. Burghausen—the oldest and most established colony—achieved the highest rate at 3.0 fledglings per nest, while Rosegg, the youngest colony, recorded the lowest at 1.8. Overall, breeding success has increased significantly over the years, reflecting both the high quality of breeding habitats and the growing proportion of experienced breeders (Fig. 4).

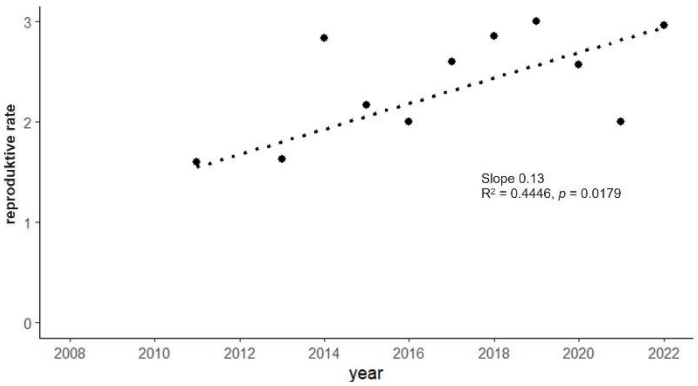

Figure 4 Reproductive rate of the migratory Northern Bald Ibis population as annual mean of fledglings per nest (black dots) with the regression line (dotted; slope 0.13).

A notable development this year was the high number of breeding attempts outside the established breeding areas (extra-territorial breeding; Tab. 1). Twelve pairs bred in various regions of Friuli, Italy, as well as at the wintering site in Orbetello, Tuscany. These efforts produced 12 fledglings, resulting in a reproductive rate of 1.0 fledgling per nest. This is substantially lower than within the core breeding areas (2.6), likely due to poorer breeding and feeding conditions in these more southern regions.

5. Autumn Migration

The 2024 autumn migration of the wild Northern Bald Ibises revealed significant differences in migration success between the breeding colonies north and south of the Alps. From the three northern colonies—Burghausen, Kuchl, and Überlingen—only 42 birds, representing 43% of the population, managed to migrate independently to Italy. In contrast, 56 birds, or 57%, failed to complete the migration on their own. These birds had to be captured and transported to the southern foothills of the Alps, from where they continued their journey further south.

Meanwhile, the Rosegg colony, located south of the Alps in Carinthia, showed a much higher rate of autonomous migration. Of the birds from this colony, 35 individuals (92%), successfully completed the migration without any intervention. Only three birds from Rosegg required transfer to Friuli for various reasons.

These results clearly highlight the increasing challenges faced by the colonies north of the Alps during autumn migration. The growing number of birds unable to cross the Alpine barrier independently underlines the urgent need to establish an alternative migration tradition to ensure the long-term viability of these northern colonies.

Capturing the remaining birds north of the Alps was once again carried out by our two professional bird managers, Daniela Trobe and Corinna Esterer. They employed various techniques, including a remotely controlled food dispenser, a trap-door cage, and a spring-loaded clap net. Nevertheless, capturing these birds remains a task that demands extensive experience and patience.

6. Biologging

A total of 91 juveniles were newly equipped with GPS transmitters. This includes 100% of the released juveniles (53 out of 53) and 47% of the wild-hatched juveniles (38 out of 78). The relatively low tagging rate among wild-hatched birds reflects the growing difficulty of capturing them for ringing and tagging. This challenge is especially evident in the colonies at Kuchl and, more recently, Überlingen, where all nests are located on inaccessible rock faces.

In addition, 3 adult birds were equipped with new GPS transmitters for various reasons.

7. Mortality

In 2024, a total of 109 individuals were lost, equalling 43% of the population at the beginning of the year (N=256). This rate is consistent with the mean annual losses recorded between 2014 and 2023, which averaged 47% of the starting population.

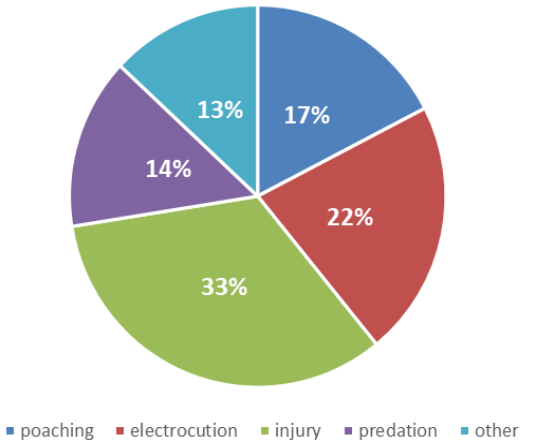

Figure 5 Mortality causes. In 63% of the cases (N=70), the cause of death could be determined.

Mortality varied by countries, with Italy alone accounting for 47% of the losses (N=51), followed by Spain with 20% (N=22). In 63% of the cases (N=70), the cause of death could be determined (Fig.5). Injuries of various types emerged as the leading cause, responsible for 33% of the confirmed cases. Electrocution on powerlines accounted for 22%, continuing to represent a significant anthropogenic threat. Poaching was verified in 17% of cases, with ten out of twelve incidents occurring in Italy and two in Spain. Additionally, predation accounted for 15% of the identified losses and 13% were due to other causes.

A particularly severe setback occurred in the Überlingen breeding colony, where 43 birds were lost. This reduced the colony size from 71 individuals at the end of 2023 to 40 by the end of 2024. These losses were primarily caused by electrocution and poaching during the autumn migration to Tuscany.

Of the 32 juveniles released in Andalusia at the end of 2023, 19 died due to various reasons and 13 survived, corresponding to a 41% survival rate at nearly two years of age. Although losses are considerable—especially for the founding generation of the second migration tradition—this survival rate is well within the expected range. Notably, the survival rate of our juveniles released in Andalusia is substantially higher than the average first-year survival of 31% reported for other Northern Bald Ibis release populations. It also compares favourably with our project's mean survival rate of 33% until sexual maturity at three years for birds wintering in Tuscany.

8. Mitigation Measures and Campaigns Against Major Mortality Causes

Mitigation measures and awareness campaigns were continued and expanded in 2024, focusing primarily on poaching and electrocution, the most significant anthropogenic threats.

Efforts to combat poaching were maintained in Italy, where poaching remains a persistent threat to the population. Specific campaigns were also initiated in France and Spain to address growing poaching risks along the migratory route. These efforts were complemented by public sensitization, scientific contributions and conference presentations emphasizing the need for improved legal frameworks and enforcement measures.

A significant milestone in the campaign against poaching was the symposium on "New Approaches and Technologies against Illegal Bird hunting", hosted at Parco Natura Viva (see the next chapter).

Figure 6 Northern Bald Ibises roosting on a retrofitted power pole; picture C Esterer.

Electrocution continued to pose a severe threat, particularly during migration. In 2024, 43 high risk power poles were retrofitted by Netz Oberösterreich in Upper Austria in the feeding area of the Burghausen colony (Fig.6). In Salzburg, 42 high risk power poles were retrofitted by Salzburg Netz in the region of the Kuchl breeding colony, a further 26 power poles were scheduled for insulation in 2025. Finally, in Carinthia 10 high risk power poles were retrofitted by Kärnten Netz in the feeding area of the Rosegg colony, and further 40 power poles were scheduled for insulation in 2025.

An essential tool in monitoring mortality, implementation campaigns and mitigation measures is the extensive project's GPS tracking program.

9. Research and Dissemination

In 2024, three scientific papers were published, further manuscripts are in preparation.

Fritz J, Unsoeld M, Goenner B, Kramer R, Siebert-Lang L & Wehner H. (2024) Mitigating acute climate change threats to reintroduced migratory Northern Bald Ibises. Conservation 4(4), 748-761; https://doi.org/10.3390/conservation4040044.

Perinot E, Mizrahy-Rewald O, Fritz J, Nobile MS, Vyssotski AL, Ruf T, Fusani L & Voelkl B (2024) Small energy benefits of in-wake flying in long-duration migratory flights. Proceedings of the Royal Society B. https://doi.org/10.1098/rspb.2024.1173

Fritz J (2024) The story of the Northern Bald Ibis: from extinction to conservation. Vital Data., Berlin; proceedings.

In 2024, 14 contributions were presented at conferences in the form of talks and posters.

Campanaro, C (2024) Why does the environmental and economic value of wildlife legally matter? Symposium 'New approaches and technologies against illegal bird hunting', Parco Natura Viva, Bussolengo, Italy, 18.-19. Apr. 2024, talk.

Fritz J (2024) The story of the Northern Bald Ibis. Vital Data, Berlin, 19. Jun. 2024, talk.

Fritz J, Peroni R (2024) Challenges and Priorities in Combatting Illegal Bird Hunting: Insights from the Northern Bald Ibis Reintroduction Project. Symposium 'New approaches and technologies against illegal bird hunting', Parco Natura Viva, Bussolengo, Italy, 18.-19. Apr. 2024, talk.

Fritz J (2024) What is the value of a Northern Bald Ibis? Symposium 'New approaches and technologies against illegal bird hunting', Parco Natura Viva, Bussolengo, Italy, 18.-19. Apr. 2024, talk.

Fritz J (2024) Progresses in the LIFE NBI project. 25. LIFE Plattform, Linz, 22. - 23. Mai 2024, talk.

Gönner B, Fritz J (2024) Höheres Risiko für Täter – neue Aspekte im Kampf gegen die illegale Vogeljagd. 157. Jahresversammlung der Deutschen Ornithologen-Gesellschaft, Wien 18.- 22. Sept. 2024, talk.

Gönner B (2024) Status-quo of GPS monitoring possibilities in NBI project with practical examples. Symposium 'New approaches and technologies against illegal bird hunting', Parco Natura Viva, Bussolengo, Italy, 18.-19. Apr. 2024, talk.

Gönner B, Fritz J, Kramer R (2024) Successful reintroduction of the Northern Bald Ibis (Geronticus eremita) to Central Europe challenged by climate change and human made mortality. European Congress of Conservation Biology (ECCB), Bologna, Italy, 17.-21. Jun.2024; talk.

Siebert-Lang L, Wehner H, Fritz J (2024) Artenschutz im Wandel: Der Klimawandel wird zur Herausforderung für die europäischen Waldrappe. 157. Jahresversammlung der Deutschen Ornithologen-Gesellschaft, Wien 18.- 22. Sept. 2024; talk.

Unsöld M (2024) Neue Hinweise zur historischen Verbreitung des Waldrapps: Evidenz für eine bislang unbekannte Brutkolonie in Bayern. 157. Jahresversammlung der Deutschen Ornithologen-Gesellschaft, Wien 18.- 22. Sept. 2024; talk.

Winkler V, Gönner B, Kramer R, Fritz J (2024) Bruterfolg durch 3D-Druck: Waldrappe am Bodenseeufer. 157. Jahresversammlung der Deutschen Ornithologen-Gesellschaft; Wien, 18.- 22. Sept. 2024; poster.

Figure 7 Participants of the Expert Workshop on "New Approaches and Technologies against Poaching", hosted at Parco Natura Viva.

A milestone of the season was the symposium on 'New Approaches and Technologies against Illegal Bird Hunting, organized in the frame of our LIFE project and hosted at Parco Natura Viva (Fig.7). International experts presented 24 contributions focusing on three key areas: assigning a well-founded environmental and monetary value to endangered wild animals, improving and accelerating crime scene investigations through volunteer involvement and forensic science, and supporting investigations with new remote monitoring technologies. To share the outcomes with a wider audience, the workshop proceedings were compiled and published, providing valuable insights and recommendations for advancing the fight against wildlife crime.

10. Public Relation and Dissemination

Media	
TV and Cinema Productions	14
Radio and Social Media Productions	13
Printmedia Productions	185
Digital Media Productions	13
Audio Productions	11

Country	Printmedia
Germany	105
Austria	18
Switzerland	27
Italy	22
France	4
Spain	3
International	6
TOTAL	**185**

Table 2. left: media productions in 2024; right: print articles 2024; since we make no systematic media clipping the documented articles are only a selection.

In 2024 media attention was high (Tab.2). Since we do not conduct systematic media clipping, we certainly capture only a portion of the media coverage, especially regarding print media and

Figure 8 (a) 20-year anniversary in Burghausen; (b) from left: Hans Steindl (former Major BHG), Johannes Fritz (Waldrappteam), Emanuel Liechtenstein (President Association FV-WT), Dagmar Schratter (former Director Zoo Vienna), Florian Schneider (Major BGH), Oliver Habel (Waldrappteam).

online articles. In particular, the low number of print media reports from Spain and France is likely far below the actual figure, especially considering the human-led migration to Andalusia.

The successful presentation of the then young Northern Bald Ibis project at the 2004 Landesgartenschau in Burghausen marked the beginning of a 20-year close partnership between Waldrappteam and the City of Burghausen, supported by Bund Naturschutz, numerous institutions, and dedicated volunteers. On the evening of 22 June 2024, this remarkable two-decade collaboration was celebrated in Burghausen's magnificent town hall. The event was a great success, with around 400 participants (Fig.8).

On June 12, 2024, a Parliamentary Evening took place in Berlin (Fig.9). It was organized by the Association of Zoological Gardens (VdZ) regarding the implementation of the National Biodiversity Strategy for Germany. Johannes Fritz was invited to present the reintroduction of the Northern Bald Ibis as an outstanding example of the relevance and engagement of zoos in animal conservation. This event underscores the overarching significance of the project as a flagship example of innovative and successful species conservation.

Figure 9 (a) from left: Hanna Gerstmann (moderation), Bettina Hoffmann (Parliamentary State Secretary in the BMUV), Johannes Fritz (Waldrappteam), Matthias Meißner (WWF Germany), Theo Pagel (Zoo Cologne); (b) from left: Thomas Kölpin (Wilhelma Stuttgart), Heiko Werning (Citizen Conservation), Theo Pagel (Zoo Cologne), Stefan Hering-Hagenbeck (Zoo Vienna), Johannes Fritz (Waldrappteam).

Figure 10 from left: Tyler Schiffman (director), Kathryn Bays Francis (audio), Campbell Brewer (camera).

A major media highlight was the collaboration with a professional, US film crew that documented the project from chick collection in Rosegg to the arrival in Andalusia (Fig.10). Spanning over 90 filming days, this was the largest media production ever undertaken within our project, capturing an extensive amount of incredible footage. The material will be edited in 2025 and released globally in various formats starting in 2026. Working with the team under the direction of Tyler Schiffman was highly professional and exciting—at times challenging, but always trustful and pleasant.

The reduction of climate-relevant emissions is an important objective in our LIFE-project. A project-internal Climate and Environmental Monitoring Group monitors CO_2 emissions and defines measures for successive reduction of climate relevant emissions, where the major focus is on mobility.

	km	CO2 equ. (kg)	difference to 2023
e-car	44.326	3.812	+44%
car	44.100	9.570	-36%
microlight plane	4.000	2.440	-30%
airplane	17.764	10.783	-80%
TOTAL	**65.864**	**22.792**	**-60%**

Table 3: Annual sum of kilometres and regarding CO2 equivalent for four mobility categories; difference to 2023 (%) in the right column.

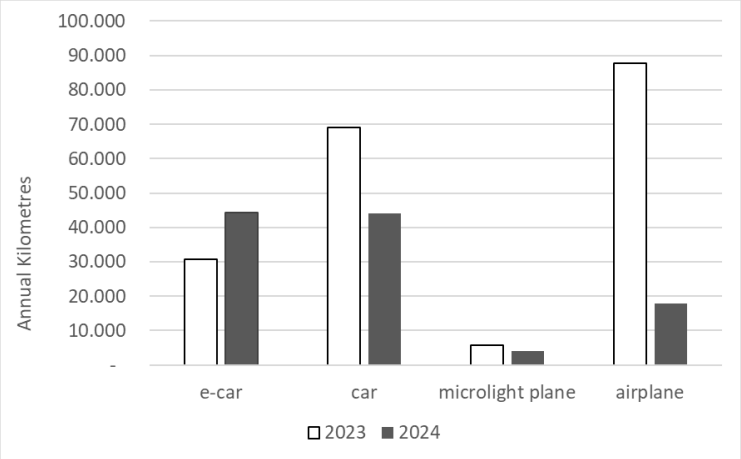

Figure 11: Comparison of the annual sum of kilometres in 2024 and the former year 2023.

In 2024, mobility across four categories resulted in a total of 23 tons of CO_2 equivalent emissions—a 60% reduction compared to 2023. This positive outcome was primarily driven by a 80% decrease in kilometres travelled by conventional airplanes.

Flight kilometres with the microlight plane used during the human-led migration also dropped by 30%. This was achieved by optimizing the method and guiding the birds with only one microlight instead of two, as in previous years.

Conventional car travel decreased by 36%, largely because the bird management team switched from conventional vehicles to electric cars. And during the human-led migration, two electric cars were used, up from one in 2023. As a result, travel by electric vehicles increased by 44%.

12. Partners & Supporters 2024*

AJS Förderstiftung | Artenschutzstiftung Zoo Karlsruhe | Bioparc Valencia | BUND Naturschutz in Bayern e.V. - Kreisgruppe Altötting | Bundesministerium für Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie (BMK) | Burghausen Touristik GmbH | Deutsche Postcode Lotterie | Deutsche Wildtier Stiftung | Fondazione A.R.C.A. | Grovni Stiftung | Hans und Helga Maus-Stiftung | HIT Umweltstiftung | Junta de Andalucía | Kärnten Netz GmbH | Land Salzburg | Leibniz-Institut für Zoo- und Wildtierforschung | Münchner Tierpark Hellabrunn AG | Natur- und Tierpark Goldau | Netz Oberösterreich GmbH | Parco Natura Viva | Proyecto Eremita | Réserve Africaine de Sigean | Schweizerische Vogelwarte Sempach | Stadt Burghausen | Stadt Überlingen | Tiergarten Heidelberg gGmbH | Tiergarten Schönbrunn | Tierpark Rosegg | Verein für Tier- und Naturschutz in Österreich | Verein zur Erhalt der Kulturlandschaft Hödingen e.V. | Veterinärmedizinische Universität Wien | WWF Deutschland | WWF Oasi Italy | Zoo Basel | ZooSchweiz | Zoo Zürich

* For data protection reasons, only an excerpt of persons and institutions is mentioned.

We want to thank
all our sponsors, staff, volunteers, helpers and patrons
for their active and valuable support in 2024!