



LIFE NORTHERN BALD IBIS

REINTRODUCTION OF THE NORTHERN BALD IBIS IN EUROPE

ANNUAL REPORT 2019



Flight over the Alps during the human-led migration in 2019 (H Wehner)

Mutters, May 2020

LIFE+ Northern Bald Ibis (LIFE+12-BIO_AT_000143)

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1. DEMOGRAPHY

In the end of 2019, the European migratory population of Northern Bald Ibises comprised 142 individuals, consisting of 4 breeding colonies with a common wintering area in Tuscany (Tab.1). This year the population was reinforced with a total of 82 juvenile birds (Tab.2). On the other side, this year we lost 41 birds and one juvenile ibis we had to depart from (chapter 9). Thus, the population increased by 39% this year.

63% of the Northern Bald Ibises of our total population belongs to the generation F0 (founder generation; hand-raised). The other 37% belong to generation F1+ (wild birds, born and raised in the wild). The sex ratio is well balanced.

	Kuchl	Burghausen	Überlingen	Rosegg	Sum
juveniles	14	12	29	13	68
2nd year	4	7	16	2	29
3rd year	0	8	7	0	15
adults	17	13	0	0	30
total	35	40	52	15	142
LIFE+	35 (0)	37 (+3)	38 (+14)		

Tab. 1: Demography at the end of 2019; breeding colonies Kuchl (Salisbury, Austria), Burghausen (Bavaria, Germany), Überlingen (Baden-Württemberg, Germany) and Rosegg (Carinthia, Austria). The last line indicates the targeted figures for the LIFE+ project (difference in brackets). Since the start of a fourth colony in Rosegg (Zoo Rosegg) was not planned for the LIFE+ project, there are no targeted figures.

2. BREEDING COLONIES KUCHL AND BURGHAUSEN



Fig. 1: Breeding in an artificial niche in Kuchl (J Fritz)

In 2019, a total of 30 Northern Bald Ibises returned to the breeding sites in Burghausen and Kuchl.

In the two colonies 37 Northern Bald Ibises fledged out of 13 nests, which corresponds to an average of 2.85 chicks per nest (Fig.1; Tab.2).

	Kuchl	Burghausen	Überlingen	Rosegg	sum
reproduction					
fledged juveniles	21 (7)*	16 (6)*			37
release					
integration of juveniles				18	16
human-led migration			29		29
juveniles in total					82

*numbers in brackets: number of nests

Tab. 2: Reproduction in the breeding colonies in Kuchl (Salisbury, Austria) and Burghausen (Bavaria, Germany); release in the colony of Rosegg (Carinthia, Austria) and Überlingen (Baden-Württemberg, Germany).

Hence the number of migrating birds, as well as the number of fledged birds this year was higher than ever. The positive trend of the last years continues (Fig.2).

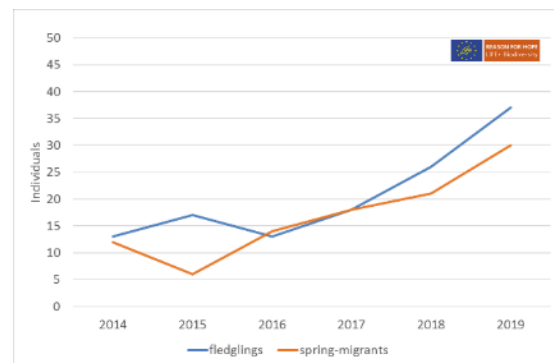


Fig. 2: Reproduction (blue line) and spring migrants (orange line) during the time of the LIFE+ project. In 2015 there was a noticeable drop, due to high losses of adults in autumn 2014.

To support and initialize the colonization of the numerous natural niches in Kuchl, we implemented a nest transfer in 2019 for the first time. In June we transferred two nests with a total of six chicks of 20 to 30 days of age, together with their parents into a niche positioned at a height of about 20 meters (Fig.3). The method worked very well; the parent birds picked up feeding the chicks immediately.

By transferring the two nests we draw the attention of other conspecifics, which started to examine further natural niches. The successful transfer is an important step for the project. We aim to continue with nest transfers in Kuchl as

long as necessary and plan on future implementation of this method in Überlingen.



Fig. 3: Corinna Esterer with transferred parent birds in the natural niche, 20 meters above ground; the chicks are in the back in the shadow (J Fritz)

3. MIGRATION OF THE WILD BIRDS



Fig. 4: Juvenile bird (AG Schmalstieg)

The number of wild birds which migrate independently is constantly increasing (Fig.2). 30 birds of the two breeding colonies in Kuchl and Burghausen participated in the spring migration this year. In autumn a total of 78 birds started their migration to the wintering area. 23 of them were adults, 37 were juveniles from the breeding sites of Burghausen and Kuchl and further 18 juveniles came from the breeding colony of Rosegg (Tab.2).

The autumn migration of 2019 started with an unusual delay. Although the birds showed first attempts to cross the Alps already on October 13th, proper migration started only by November 22nd. Harsh weather conditions caused a major part of the juveniles to lose contact to their experienced conspecifics. Our team put all their effort in reuniting such unguided juveniles with their leaders. Nevertheless until the end of 2019 13 juveniles

have not reached the wintering area yet and further 12 juveniles are being missed.

4. IMPACT OF CLIMATE CHANGE

Our data clearly indicate that the delayed start of the autumn migration is linked to the changing weather conditions caused by climate change. In 2014 and 2019 we could experience unusually mild autumn and early winter conditions. In both years the birds started their autumn migration with a substantial delay.

We must assume, that such extreme weather conditions will increase due to ongoing climate change. In fact the birds might face higher risks and higher numbers of losses during their future migrations.

But we try to mitigate the negative consequences of climate change, by transferring the juveniles to the wintering area which could not reach it on their own. As a matter of fact, only a small part of those transferred Northern Bald Ibises manages to migrate back to its breeding site as they reach maturity. Therefore we plan to establish a further breeding colony south of the Alps, in the region of our partner Parco Natura Viva near Verona. Birds which are not capable of returning to their original breeding site will have the possibility to breed there and thus, still contribute to the population growth.

5. BREEDING COLONY ROSEGG

The zoo Rosegg in Carinthia hosts a successful captive breeding colony of Northern Bald Ibises. Most of the year the birds are free-flying, only in winter they are kept in the aviary. A total of 167 chicks that we hand-raised during our LIFE+ project came from this very zoo.

We plan to gradually integrate the zoo population into the wild and in the migrating population. Hence, in 2019 16 juveniles were equipped with GPS-trackers and, unlike the rest of the colony, kept outside the aviary in autumn. Three additional, experienced

migratory birds of our colony were placed at their side to guide the juveniles.

On December 24th two juveniles from Rosegg reached the wintering area in a small group. A second group failed to reach the wintering area lacking only 150 km. This was due to electrocution of the leading bird, leaving the juveniles without any guidance and no option but to return. A third group of six juvenile Ibises mistakenly headed to Croatia, three of them died there. At least two of those were victims of illegal hunting. Juveniles which didn't reach the wintering area on their own, were transferred there. There is a good chance that also those transferred birds will migrate back to Rosegg as soon as they are sexually mature.

Despite the early successes of this method, there is potential for improvement and we will continue with the establishment of a wild migratory colony in Rosegg in 2020.

6. SONIC



Fig. 5: Sonic in Tuscany, shortly before her departure to Überlingen (D Trobe).

It was a pleasant surprise for us when the female Sonic, hatched in 2017, returned to her breeding site in 2019 already (Fig. 5). She is the first immature Ibis to return to its historic breeding site in Überlingen at Lake Constance choosing a new route over the Swiss Alps (Fig. 6). It is a remarkable return after 400 years of absence that caused tremendous media coverage in Switzerland.

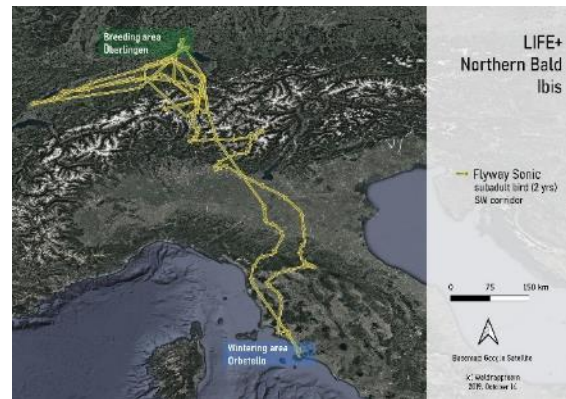


Fig. 6: Flight of the 2 years old female Sonic from the wintering site to its breeding site (figure B Eberhard).

We hope that Sonic and further conspecifics will return to Überlingen in 2020 to establish a new breeding colony.

7. HUMAN-LED MIGRATION

In 2019 31 Northern Bald Ibis chicks were taken from the zoo Rosegg and hand-raised by AG Schmalstieg and H Wehner (Fig. 7).



Fig. 7: Anne-Gabriela Schmalstieg (l.) and Helena Wehner (r.) after a successful flight training (J Fritz)

The first stage of the hand-raising took place in the Schönbrunn Zoo in Vienna, where visitors could watch the foster parents raise the chicks. On May 13th the birds were transferred to the training camp in Heiligenberg near Überlingen at Lake Constance.



Fig. 8: Final flight of the HLM 2019; W Holzmüller and AG Schmalstieg (H Wehner)

In the last years we experienced a wide range of support from the city of Überlingen, the association for the conservation of cultural landscape in Hödingen, this year the municipality of Heiligenberg joined our network of supporters. Like in the last years we raised substantial public interest, resulting in 2.000 visitors attending our information area at the glider airfield of Heiligenberg from June to August.

However, during the last training flight an unfortunate accident occurred, when two juvenile birds collided with the ultra-light airplane, causing the birds to crash. One of them subsequently succumbed to the injuries, the other survived the accident with mere scrapes. Nevertheless, the silver lining is that the birds were equipped with accelerometric sensors, thus providing us with valuable data, required for our campaign against illegal hunting. Data thus obtained are crucial for the development of innovative GPS-trackers including sensor technology that can detect illegal shooting and a following crash of the bird, causing an ensuing alert.

On August 14th, the human-led migration started with 29 juvenile birds. Within twelve days and seven flight stages the team reached the wintering area WWF Oasi Laguna di Orbetello (Fig.8).

The team flew over the main Alpine ridge in two stages and reached a flight altitude of up to 2,950m. As in previous years, the team again was attacked by a golden eagle as it was

crossing the Alps. One juvenile bird lost its connection to the group but was found unharmed the next day.

Over the past few years we have been able to increase the efficiency of the human-led migration. Longer flight stages of up to 301 km led to a reduction in the number of stages. Moreover, the number of juvenile birds released into the wild during the LIFE-project was doubled (Fig. 9).

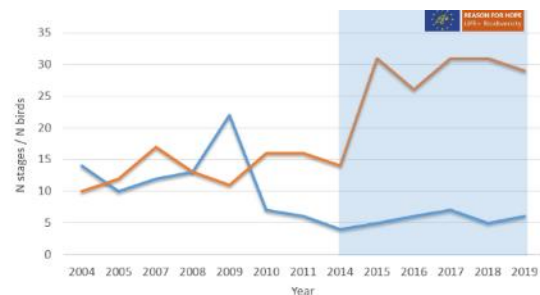


Fig. 9: Optimization of human-led migration; the number of flight stages (blue line) has been significantly reduced since the beginning of the LIFE project and the number of participating young birds (orange line) has been increased.

8. BASIC RESEARCH

In May 2018 we started a three-year research project financed by the Austrian Science Fund (FWF P30620-BBL).



Fig. 10: Installation of a GPS logger for the recording of data (B Gönner)

Under the scientific direction of Bernhard Völkl, University of Bern, the two PhD students Ortal Rewald and Elisa Perinot are concentrating their research on the function and energetic benefits of formation flight. The work is supervised by the University of Veterinary Medicine Vienna.

During the human-led migration in 2019, extensive data collection took place. Therefore, all birds were equipped with high-frequency GPS data loggers. Individual birds were also equipped with heart rate loggers during the flights (Fig. 10). The data obtained are currently being evaluated. The results will significantly increase our knowledge about formation flight.

Within the framework of the research project, a wind tunnel was also constructed in cooperation with the FH Joanneum Graz and built in Seekirchen am Wallersee (Salzburg). Four ibises were specially raised for training in the wind tunnel (Fig. 11; <https://youtu.be/fdSDFpK4oIU>). The flights in the wind tunnel will be continued in 2020 to obtain additional data for the research project.



Fig. 11: Foster parents and trainers Katharina Neugebauer and Frederik Amann during flight training in the wind tunnel with two young birds.

9. MORTALITY

In 2019, 41 individuals were lost. This number is slightly lower than in the previous year (N=45). Mortality relative to population size has fallen from 41% (2018) to 29% (2019). In 20 cases the cause of death is known (Fig.12).

Electrocution by short circuit or grounding on unsecured medium voltage pylons is the primary cause of death with a share of 40%. The actual extent of this threat only became clear thanks to the GPS monitoring during the LIFE+ project. By reallocation of budget funds, safety measures could be implemented on risky power pylons in Upper Austria (municipality of Hochburg-Ach) and Salzburg (municipality of Kuchl) until the beginning of the breeding

season 2019. The measures were implemented in cooperation with the province of Salzburg, the company Salzburg Netz GmbH and the company Netz Oberösterreich GmbH. Further measures are planned in the breeding areas and along the migration route.

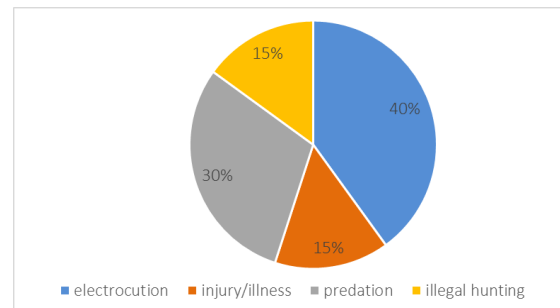


Fig. 12: Causes of mortality in 2019 (N=20).

15% of deaths were caused by illegal hunting. The extensive campaign during the LIFE+ period is showing results. The rates of illegal shooting decreased steadily. Over the entire period of the LIFE+ project we were able to halve the proportion of illegal hunting in the losses compared to the previous feasibility study. This is one of the great successes of our project.

10. GPS-TRACKING

All newly released birds were equipped with GPS transmitters. Thus, the monitoring of the entire population is still possible. The data are transferred to the App Animal Tracker. Numerous people use this possibility to follow the birds on their flights.

The GPS transmitters are now only attached to the lower back (leg-loop harness) (Fig. 13). This prevents the unilateral corneal opacity caused by transmitters attached to the upper back (wing-loop harness). The most plausible cause of this opacity (Unilateral Corneal Opacity; UCO) is the proximity effect of electromagnetic radiation from the GSM module that transmits GPS data via the mobile phone network. A manuscript on this topic was submitted for publication, a preliminary version is already available: Fritz et al. 2020. Biologging is suspect to cause corneal opacity in two populations of wild living Northern Bald ibises. <https://www.researchsquare.com/article/rs-19406/v1>



Fig. 13: GPS transmitter with solar panel, attached to the lower back using a leg-loop harness (Foto: D Trobe)

11. REASON FOR HOPE FESTIVAL KUCHL

On June 29th a Reason for Hope festival was held in the breeding area in Kuchl. Visitors could get information about the project and observe the breeding birds in the artificial rock niches as well as in the niches of the natural rock face at Georgenberg. Younger visitors were allowed to poke for (fruit jelly) worms like a Northern Bald Ibis or use the App Animal Tracker to search for the birds. Highlights from the past 18 years were presented at an evening event with former project staff and other invited guests.

12. PUBLIC RELATION

In 2019, 17 television productions took place and more than 150 articles were published in various countries. We published 6 press releases and 16 newsletters. A selection of TV productions is shown below.

Disney Channel	Disney "Die Beni Challenge"
KIKA ARD ZDF	Schau in meine Welt: Marian und die Waldrappe
ARTE	Theos Tierwelt: Aus dem Zoo in die Freiheit
Media Art Finnland	How to teach a bird to fly
SWR	Talkshow: Gaby Hauptmann "Talk am See"
ZDF	pur+ mit Eric Kinderfernsehen
ZDF	planet e
ZDF	terra Xpress "Die Kükenretter"
ZDF	Talkshow: Markus Lanz Show



Fig. 14: Johannes Fritz reports on the project at the Markus Lanz Show; about 1.6 MIO television viewers.

13. SCIENTIFIC PUBLICATIONS

- Fritz J, Unsoeld M & Voelkl B (2019) Back into European Wildlife: The Reintroduction of the Northern Bald Ibis (*Geronticus eremita*). Bookchapter in: Scientific Foundations of Zoos and Aquariums: Their Role in Conservation and Research (Kaufman AB, Bashaw M, Maple T Edtrs.), Cambridge University Press; ISBN 978-1-316-64865-0.
- Böhm C, Bowden CG, Seddon PJ, Hatipoglu T, Oubrou W, el Bekkay M, Quevedo MA, Fritz J, Yenyurt C, Lopez JW, Orueta JF, Frigerio D, Unsöld M, (subm.) Northern Bald Ibis: History, current status, and future perspectives. Oryx.
- Fritz J, Eberhard B, Esterer C, Goenner B, Trobe D, Unsöld M, Voelkl B, Wehner H & Scope A (in prep.) Bio-logging causes unilateral corneal opacity in two populations of wild living Northern Bald Ibises *Geronticus eremita*. Methods in Ecology and Evolution.
- Fritz J (subm.) Praxishandbuch Vogelhaltung: Ableitung aus Freilandbeobachtungen für die Vogelhaltung – Fallbeispiel Waldrapp (W Lantermann & J Asmus Ed.).
- Wirtz S, Böhm C, Murray-Dickson G, Fritz J, Senn H, Veith M, Hochkirch A (in prep.) SNP discovery and genetic mapping for the critically endangered Northern Bald Ibis (*Geronticus eremita*).

14. ACKNOWLEDGEMENT



Fig. 15: Dagmar Schratte (Foto: M Unsöld)

Dagmar Schratte, then curator of the Schönbrunn zoological garden, was the first person to advocate financial support for the project in 2001, thus making a significant contribution to its launch. Since then, she has played a decisive role in shaping the project as a member of the association's board and director of Schönbrunn zoological garden.

At the turn of the year Dagmar handed over her office as director of the Schönbrunn zoological garden to Dr. Stefan Hering-Hagenbeck and also resigned from the association's board. We would like to thank her very, very much for her commitment and friendship and wish her a long, fulfilling and hopefully somewhat calmer new phase in her life.

15. TRIBUTE



Fig. 16: Mrs. Maria Schram (Foto: J Fritz)

It was also Dagmar Schratte who put us in touch with a "lady from Switzerland", Mrs. Maria Schram, in the early stages of the project. Mrs. Schram remained very attached to the project over all these years. She has promoted the project in a substantial way but has also helped in shaping and supporting it in many other ways.

Maria Schram passed away in September 2019. With her we not only lost a sponsor, but also a dear friend who shared our joy about the successes and who was always there for us in the difficult times. In deep gratitude we will always remember Maria.

PARTNER & SPONSOR 2019*

Alpine Zoo Innsbruck | BUND Nature Conservation Bavaria | Friend's Association Waldrappteam | Foundation Grovni | Foundation Hans und Helga Maus | Foundation Heinz-Sielmann | HIT Foundation for environment and nature conservation | Research centre Konrad Lorenz | Region Salzburg | Maria Schram | Natura Viva parc | City of Burghausen | City of Überlingen | Zoological garden Schönbrunn | Zoological garden Hellabrunn Munich | Zoological garden Rosegg | Association for animal and nature conservation Austria | WWF Germany | zooschweiz

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



HLM Team 2019: standing from the left Ulrich Hasche, Alexander Schmied, Seelich Hanna, Larissa Schwaiger, Johanna Gradnig, Edith Holz Müller, Bernhard Gönner, Valentin Fritz, Emmanuel Fritz, Max Holz Müller, Ortal Rewald, Johannes Fritz; sitting from left Anne-Gabriela Schmalstieg, Walter Holz Müller, Helena Wehner, Angelika Fritz, Elisa Perinot.

We would like to thank all **employees, volunteers, helpers and sponsors** for their active and valuable support in 2019!

