



## SAVING BIRDS FROM EXTINCTION BY DISCOVERING THEIR HABITATS

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### YOUNG REVIEWERS:



**HARRISON**

AGE: 15



**KARUBAKEE**

AGE: 12



**KATIE**

AGE: 15

With only 700 individuals left in the wild, the northern bald ibis is considered to have a moderate risk of going extinct. What does it take to prevent a species from going extinct? Aside from ensuring there is adequate habitat and making sure the species is safe, knowledge about an animal's behavior is key for conservation management. Which sites do these birds use for foraging and roosting? Do they move alone or in groups, and are there recurring patterns to their movements? These are just some of the questions we tried to answer in our study. We monitored the movements of 32 free-flying northern bald ibises over 4 years, by equipping the birds with GPS transmitters. We found that our birds are pretty predictable in their

habits and that they preferably fly along valleys. Being aware of such preferences is important when planning to reintroduce new colonies into the wild.

## WHY IS IT IMPORTANT TO UNDERSTAND IBIS PREFERENCES?

Sadly, nearly half of the bird populations worldwide are declining. In a nutshell, life has become harder for most bird species. But why? There are many factors contributing to the decline of bird species [1]. One is the destruction of their habitats by humans, which means that there are not enough suitable places for the animals to live. Another reason for habitat loss is the use of **pesticides**, which change the quality and quantity of available food, like insects and seeds. If a species is the victim of hunting, this is another reason for decline. Finally, risks from climate change can push species toward extinction. Translated into human problems, this means a housing crisis, poisonous food and water, being tracked down by our enemies, and trying to survive through droughts and floods.

In general, human activities are changing the environment. The roads and cities that we build make animal survival more difficult. This is especially true for species that cannot change their behavior quickly because the spread of civilization moves faster than these species can adapt. Imagine your route to school changing every week, or the fridge suddenly being located in the basement—these things would make life a lot harder, right?

All these reasons have played a role in the decline of the bird species we are working with: the northern bald ibis (Figure 1). There are only 700 northern bald ibises left in the wild in Morocco, and ~230 semi-captive animals in Turkey. Thanks to **reintroduction projects** across Europe, the northern bald ibis can be found again in Spain, Austria, and Germany, after going extinct in these areas several hundred years ago. However, these populations are not **self-sustaining** yet, so they need our help.

To protect these ibises and to successfully reintroduce new colonies into the wild, knowledge about their behaviors—their needs and habits—is key. Depending on where the birds choose to roost, fly, and forage, specific conservation strategies must be tried, because each species, population, flock, or even each bird has its own needs and own way of behaving, just as we humans are all unique.

## THE NORTHERN BALD IBIS

The animals we studied belong to a colony of free-ranging northern bald ibises, which has existed since 1997 in the northern part of the

### PESTICIDES

Substances used to control or kill pests like weeds, insects, rodents, or bacteria.

### REINTRODUCTION PROJECTS

Consists of putting an animal in a place where it has disappeared (went extinct) but where it used to be.

### SELF-SUSTAINING

Able to maintain oneself and survive without help, often in terms of resources or energy.

### Figure 1

Two northern bald ibises. You can see the colored bands on their legs—each bird has a unique combination, which allows them to be identified. The names of the two birds in this photo are Othello (**left**) and Aleppo (**right**). Both were equipped with GPS transmitters during the study, which are visible among the feathers on their backs (Photo credit: Verena Puehringer Sturmayer).



Figure 1

Austrian Alps [2]. The birds are used to the presence of humans, and each ibis is marked with a special combination of colored leg rings for identification (Figure 1). They use a year-round open aviary for roosting and breeding, which is a safe, warm haven because infrared lamps help the birds through the cold Austrian winter. From approximately July to September, the ibises usually fly off to other villages and grasslands (about 50 km away) but they always come back in late autumn. We provide the birds with additional food during winter and the breeding season, which prevents them from migrating. However, during summer and autumn, they forage totally on their own by probing the soil with their long beaks for worms and insect larvae.

In general, northern bald ibises are excellent long-distance flyers, which is necessary for migration [3]. But they also show daily movement patterns, foraging in small groups during the day and roosting together at night. Think about the way you move around in your daily life (bed-to-kitchen or home-to-school) and the larger-scale movements you might make on a holiday, for instance. Therefore, we can say that these birds stick to a rhythm in their everyday lives. We call this **space use**. Many factors influence space use, such as habitat quality and season, as well as individual influences, such as age or sex. These differences are understandable in human terms, too. A grandma might enjoy baking at home, while kids like to go running around in the sun, for example.

### TRACKING IBIS MOVEMENTS

We wanted to know more about how the ibises move in the region, how often and far they fly, what **flyways** they use, and what sites

#### SPACE USE

This term describes the probability of sighting an animal in a specific location.

#### FLYWAYS

Flight paths used by birds while migrating.



## GPS TRANSMITTERS

Miniature devices that use satellite signals to determine the location of tagged animals.

they visit. In other words, how consistent are they in their movement patterns, and do they have favorite spots they visit often?

Between April 2013 and October 2016, we equipped 17 male and 15 female ibises with **GPS transmitters** (Figure 1). These are instruments that use satellites to determine the location of tagged objects, in our case allowing us to monitor the birds over long periods of time and great distances. The birds carry the transmitters as little “backpacks”, which are designed to minimize impact on the birds—kind of like wearing a bracelet you can barely notice. The transmitters are solar powered and weigh less than 3% of the body mass of the birds (for more information, see [this Frontiers for Young Minds article](#)). The GPS transmitters allow us to work with exact data about the locations of the animals, and they save us from driving around searching for the whereabouts of the birds.

The birds were equipped with GPS transmitters over several years. The devices tracked the birds’ movements between 4 a.m. and 7 p.m. during spring, summer, and autumn. In winter, the tags were removed. We compared two age groups: juveniles (1–3 years after hatching) and adults (4 years or more after hatching).

## IBISES HAVE MOVEMENT HABITS

In total, we recorded 113,643 GPS positions between April 2013 and October 2016. We analyzed these data points using computer software. Our results showed that the tagged birds avoided direct routes over the mountains and instead used flyways along valleys (Figure 2). Maybe the birds chose not to fly over mountain tops to avoid being eaten by the large birds of prey that often hang out in the air currents over mountains. The sites most frequently visited were

### Figure 2

Our study area, in the northern Austrian Alps, including the two villages where the birds use to forage and the location of the research center. The black dots represent the GPS positions of the 32 tagged birds. The green/yellow shading indicates the elevation of the area: the lighter the color, the higher the elevation. You can see that the birds prefer to fly along valleys and avoid flying over mountains.

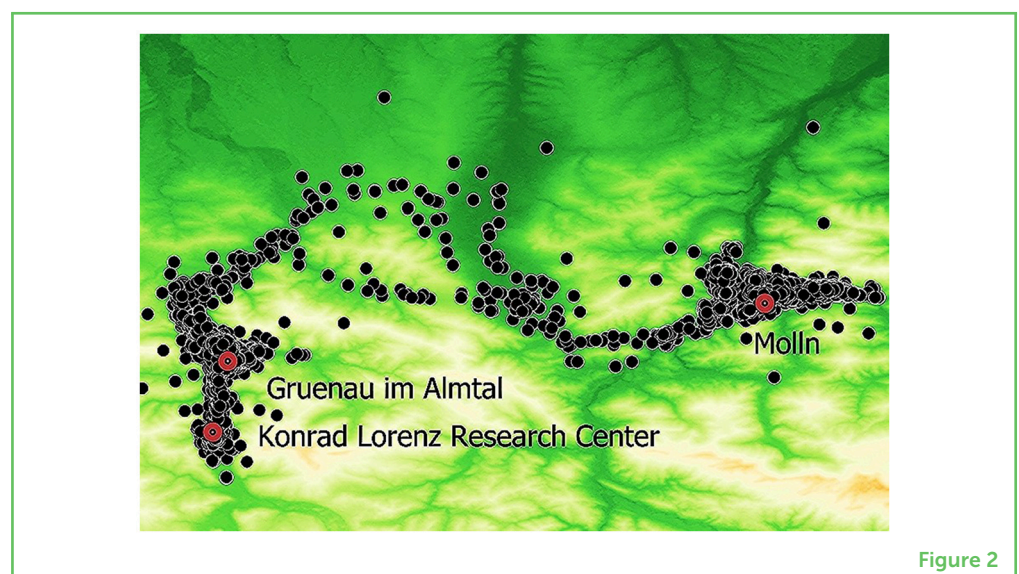


Figure 2



located in meadows along valleys in Grünau im Almtal, as well as in another village, Molln (Figure 2).

Across the years, the ibises used specific sites many times for nesting, foraging, and roosting. Overall, northern bald ibises show a stable use of space (Figure 3). We can say they develop habits, just like we do. The birds were more likely to be in a particular area during the breeding season. Additionally, adults were more reliably found at certain locations than juveniles were. This suggests that older ibises have lower **behavioral flexibility**, which might be part of the reason why the species is declining throughout its original habitat [4]. Once their home is no longer suited to their needs, they are in serious trouble because it seems they do not like changing their ways of doing things. Space use overlapped a lot between individuals and from year to year. We learned that the birds tend to move in stable social groups and forage in specific sub-groups during the day. Put simply: they hang out with those they know, making their lives more peaceful and safer.

## BEHAVIORAL FLEXIBILITY

Changes in animal behaviors in response to changes in the external or internal environment.

### Figure 3

The colored loops show how the birds use the space around the three main locations: the research center and villages Grünau im Almtal and Molln. Different colors are used for different individuals. (A) Data collected in 2013 from 10 birds. (B) Data collected in 2015 from 17 birds. You can see that the birds tend to use the same meadows over different years. Green represents low-lying areas and red represents high mountain peaks.

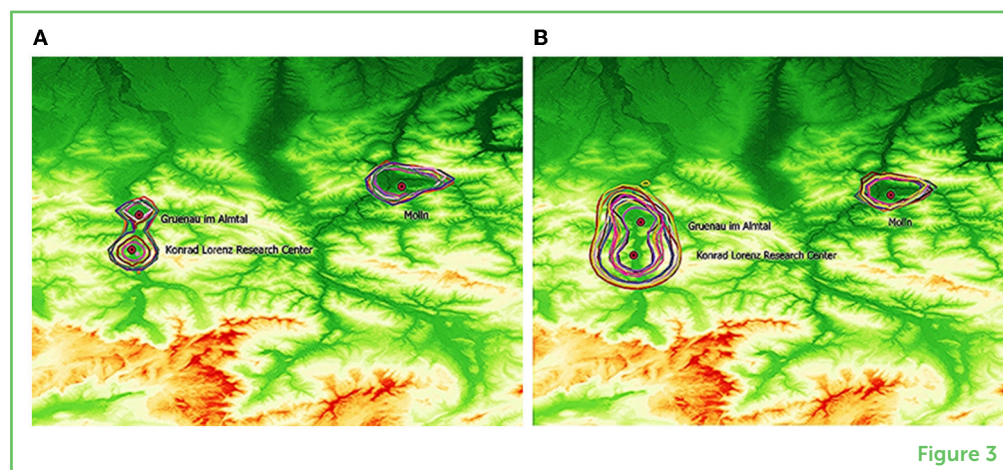


Figure 3

Our results showed that, on average, birds had larger space use during the breeding season than during the non-breeding season. During the breeding season, adult males and females traveled further to find food for their chicks. Both male and female ibises incubate the eggs and feed the chicks. Juveniles (teenagers) did not increase their space use very much during the breeding season. From a conservation perspective, it is useful to know that males and females in this population tend to use the same areas at the same times of year.

## SAVING THE IBISES

Our results provide useful information that can help us to improve the protection of existing ibis colonies and can also identify new habitats for potential reintroduction. Our results show that ibises are conservative in the use of space and resources, which means that they tend to keep the same patterns even though there are valuable

## ELECTROCUTION

when a bird comes into contact with power lines insufficiently insulated and dies due to the high electricity.

alternatives to their favorite places and routes. Protecting their favorite routes can prevent illegal hunting as well as **electrocution** which occurs mostly during long distance movements and is responsible for losses in many colonies [5]. We suggest that conservation projects targeting this species should take into account the fact that the birds do like to use different foraging sites in different seasons, but they do not like to fly over mountains to reach such locations. Conservation approaches based on our results could help keep the northern bald ibis from extinction.

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## ORIGINAL SOURCE ARTICLE

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## YOUNG REVIEWERS



### HARRISON, AGE: 15

I love playing sports such as hockey and going running and chasing my dog! I also love discovering new things, but not new foods! My favorite subject in school at the moment is math.



### KARUBAKEE, AGE: 12

I like to read about space related facts and am highly interested in knowing about the world history. I also like to read fantasy books and listen to music.



### KATIE, AGE: 15

At school I am currently studying Biology, Chemistry, and Geography. I love music and the outdoors and through *Frontiers for Young Minds* I hope to learn more about people and the world!



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Didone Frigerio is a behavioral biologist. Her main interest is the relationship between Her main interest is the relationship between sociality and body processes in group-living birds. She applies citizen science as a tool of research approach in her behavioral investigations. \*[didone.frigerio@univie.ac.at](mailto:didone.frigerio@univie.ac.at)



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