Large Print Guide

Birds

Brilliant & Bizarre

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This large print guide has been produced for Birds: Brilliant and Bizarre.

Contents

When an asteroid collided with Earth 66 million years ago, only a small number of avian dinosaurs – the birds – made it through. Amazingly, they went on to become one of the most successful and diverse animal groups on Earth.

Birds have evolved both brilliant and bizarre behaviours that defy our expectations. Their ingenious approach to surviving a changing planet has seen them flourish and spread throughout the world. Unfortunately, it is human-created change that is proving their greatest challenge today.

However, we can offer hope. Discover the secrets of birds' success and how we can support the future of these living dinosaurs.

[Projection]

Birdsong

These lines represent bird calls from across the globe. The colours change from cooler blues to warmer oranges and reds when a species lives closer to the equator. Plumage may have evolved to be more colourful in the tropics because of the greater number of birds living there, and the need to stand out.

Birds are dinosaurs

Birds are dinosaurs

The birds outside your window, darting among the trees, are living dinosaurs. They evolved around 150 million years ago from two-legged, three-toed theropods. This group of dinosaurs originally emerged 230 million years ago and includes *Tyrannosaurus* (tie-RAN-oh-sore-us) and *Velociraptor* (vel-OSS-ee-rap-tor).

The characteristics that make birds recognisable today – feathers, flight, warm blood, walking on two legs – came together gradually over millions of years of evolution. Clues to this ancient dinosaur ancestry are revealed in the anatomy of modern birds and in the study of a diverse fossil record.

Shared origins

At first glance, the 123-million-year-old *Hypsilophodon* (hip-sih-LOH-foh-don) looks different to a modern emu, but subtle similarities reveal their shared origins.

Both walk on two legs. Their open hip sockets – where the top of the leg joins the hip – allow their legs to be beneath their body, rather than sprawled to the side like a crocodile's.

***Hypsilophodon*, skeleton**
123 million years old

Common emu, skeleton
Dromaius novaehollandiae

Shared origins: *Tyrannosaurus rex*

Modern birds are descended from a group of two-legged, meat-eating dinosaurs called theropods.

While birds seem very different from the mighty *Tyrannosaurus rex*, they are both theropods and shared features like warm-bloodedness, a wish bone, and maybe even feathers.

***Tyrannosaurus rex* jawbone**
68–66 million years old

Shared origins: *Velociraptor*

With teeth, claws and feathers, *Velociraptor* was a small theropod dinosaur more closely related to birds than to *Tyrannosaurus*.

Its arms were too small for its feathers to have been used for flight. Instead, *Velociraptor*'s ancestors likely evolved feathers to keep their bodies warm.

***Velociraptor mongoliensis* skull, cast**
75–71 million years old
Cast made from original at the American Museum of Natural History

Feather evolution

Feathers gradually evolved from simple tufts called ‘dino fuzz’ into complex interlocking structures, as seen in this ancient bird feather.

Feathers are made from keratin, which human fingernails are made of too. They’re strong and flexible, and while theropod dinosaurs used them for courtship displays, insulation or camouflage, birds evolved to also use them for flight.

Fossil bird feather, likely from the outer tail
33 million years old

Flying reptiles

Pterosaurs (TER-oh-sores) evolved 100 million years before birds. They were not related. These reptiles could be tiny or have wingspans reaching 11 metres (36 feet). They could fly as skilfully as birds do, but they didn't have flight feathers. Instead, their wings were formed from a membrane stretching between their limbs and body.

***Pterodactylus antiquus*, cast**
149–145 million years old
Cast made from original in the collection of Bayerische Staatssammlung für Paläontologie und Geologie

Breath and flight

Bird lungs don't expand and contract. Instead, a system of air sacs pushes fresh air through them as birds breathe in *and* as they breathe out. This efficient breathing makes high-energy flight possible.

Breathing like this first evolved in early dinosaurs. This dinosaur vertebra (right) is hollow where the air sac system extended into the bone.

Air sacs inside a modern duck (left) fill much of its body and even extend into its wing bones.

Hollow, strong bones were essential for helping large dinosaurs to move and birds to fly.

Mallard air sacs, resin cast
Anas platyrhynchos

Sauropod dinosaur vertebra
Xenoposeidon proneneukos
141–138 million years old

[Illustration text]
The blue dotted line circles the hollow where an air sac extended into the dinosaur's vertebra (spine bone).

[Touch object]

Please touch

Feel the hard outer layer of this dinosaur egg.

This egg was laid by a titanosaur (tie-TAN-oh-sore). Titanosaurs laid eggs with hard shells, just like birds do. Unlike birds, which mostly care for their young, titanosaurs likely left their eggs before they hatched.

Hard eggs

Hard-shelled eggs helped protect dinosaur embryos. While huge dinosaurs like titanosaurs (tie-TAN-oh-sores) laid relatively small eggs, bird eggs are large compared to their body size. Larger eggs hold more nutrition for the embryo, and they hatch faster, leaving less time for predators to snatch them.

Titanosaur egg
67 million years old

Dinosaur nests and colourful eggs

Like most birds do today, some dinosaurs made nests and sat on their eggs to warm them.

Oviraptor (OH-vi-rap-tor) dinosaurs incubated eggs and cared for their young. Traces of blue and green pigments were recently discovered in *Oviraptor* eggshells. This suggests birds may have inherited colourful eggs from their dinosaur ancestors.

***Oviraptor philoceratops* nest, cast**
75–71 million years old
Cast made from original at the American Museum of Natural History

An early tree-dwelling bird

The long toes of this little bird show it was adapted for perching on branches. It belonged to a bird group specialised for forest life. This group of tree-dwelling birds died out 66 million years ago, when an asteroid destroyed the world's forests.

***Iberomesornis romerali*, cast**
129–126 million years old
Cast made from original at Las Hoyas Collection, Museo de Cuenca, Spain

Lost ancient birdlife

This bird flew over dinosaurs and alongside pterosaurs. Its fossil was found in lake sediment, suggesting it may have fed along a shoreline, but it could fly up to treetops for safety.
Its descendants didn't make it through the extinction event caused by the asteroid that wiped out almost all the early bird groups.

***Concornis lacustris*, cast**
125 million years old
Cast made from original at Las Hoyas Collection, Museo de Cuenca, Spain

A bird-like dinosaur

This incredible fossil is one of the most significant ever found. It was the first bird-like dinosaur discovered, and by revealing its link to dinosaurs, it transformed our understanding of how birds evolved.

Archaeopteryx (ar-kee-OP-ter-ix) had reptilian claws, sharp teeth, a long bony tail and bird-like wings. It's not clear if it could fly propelled by wing beats or if it simply glided between branches, but its wing bones resemble those of a modern pheasant, which flies in short bursts.

Archaeopteryx lithographica
150 million years old

***Archaeopteryx*, model (above)**

Evolving bird brains

Archaeopteryx had a brain far larger than the brains of similar-sized reptiles, yet smaller than those of today's birds. Scans have revealed its brain function was midway between earlier dinosaurs and modern birds.

This is the only *Archaeopteryx* fossil from which the braincase could be scanned to reconstruct the size and shape of its brain.

***Archaeopteryx lithographica*, cranial endocast (a cast of the skull's inner shape)**

[Touch object]

Please touch

Feel the teeth of this early bird. Unlike modern birds, which have toothless jaws, it used sharp teeth to catch and grip fish. Only a little beak at the tip of its jaw is toothless.

***Ichthyornis dispar* jaw, cast**
Enlarged to two-and-a-half times its normal size

A beak is a toothless jaw

Today's birds do not have teeth. Some early birds lost them as beaks became more efficient for feeding, preening and nest-building.

Ichthyornis (IK-thee-ore-nis), a seabird the size of a small gull, shows this evolutionary change. Its jaws are filled with teeth, but the toothless tip shows teeth were lost from the front of the mouth first.

***Ichthyornis dispar*, cast**
86 million years old

Surviving catastrophe

Surviving catastrophe

A few million years after they first evolved, hundreds of different bird species flourished in the forests and skies throughout the Cretaceous (145 to 66 million years ago). But a catastrophic event at the end of this period changed all this. An asteroid at least 11 kilometres (seven miles) wide struck the Earth triggering murderously hot forest fires that obliterated wildlife.

Over 70% of all life on the planet was wiped out, including all pterosaurs and non-bird dinosaurs. Only a few bird groups survived. These were the ones that were small and primarily ground-dwelling, and able to adapt to new habitats as the trees disappeared. From these survivors, birds continued to evolve, diversifying into over 11,000 species alive today.

The oldest modern bird

Nicknamed ‘Wonderchicken’, this bird lived just before the non-bird dinosaurs were wiped out. It shared a common ancestor with all birds today, which means it’s among the oldest known modern birds.

Wonderchicken was small, ground dwelling, able to reproduce quickly, and could fly. It offers a glimpse into how some birds survived when the world’s forests were destroyed in the mass extinction 66 million years ago.

Wonderchicken skull, cast
Asteriornis maastrichtensis
66.7 million years old

Wonderchicken, model
Courtesy of Dr Daniel J. Field,
University of Cambridge

Surviving extinction

From the few bird groups that survived the mass extinction, thousands of new species evolved.

Ducks and chickens (left and middle) descended from a group of birds that emerged alongside dinosaurs over 70 million years ago, a group that included the Wonderchicken.

Emus (right) evolved from another group that first appeared around the same time. While these early relatives of emus could fly, their descendants achieved greater success being flightless.

Common eider
Somateria mollissima

Sri Lankan junglefowl
Gallus lafayettii

Common emu
Dromaius novaehollandiae

[Touch object]

Please touch

Fossilised plants discovered in ancient layers of soil tell us about past landscapes. Tree pollen in soils from before the extinction event caused by the asteroid impact indicate there were vast forests at the time. After the asteroid impact, soils contained less tree pollen and more fern spores. This shows that the forests had died, and low-lying ferns grew in their place.

Ancient tree pollen, cast (left)
This pollen came from a bombax tree that grew just before the asteroid impact.

Bombacidites sp.
Original pollen grain is 0.035 millimetres wide

Modern fern spore, cast (right)
This fern spore is from a fern similar to the ones that thrived just after the forests had been destroyed by the asteroid impact.

Anemia ferruginea
Original spore is 0.1 millimetres wide

Ancient extinct seabirds

Adaptations came and went as some bird groups evolved and then went extinct. One group of unusual ancient seabirds called pelagornithids (pel-a-GORN-i-thids) had wingspans reaching six metres (20 feet), and bony, tooth-like points on their beaks for gripping fish.

This skull (left) is from one of the smaller pelagornithids. It was about the same size as a wandering albatross (right), today's largest seabird.

***Odontopteryx toliapica*, skull**
56–49 million years old

Wandering albatross, skull
Diomedea exulans

Flourishing birdlife

Birds diversified and thrived in the millions of years following the mass extinction. Adapting to many different environments, they evolved to be tree-dwellers once again.

Exceptionally well-preserved fossils found in a German quarry reveal a rich bird community living by an ancient, subtropical lake. Some look bizarrely familiar, despite being 47 million years old.

Wading birds
This bird was a shoreline forager. It had long legs like its modern relatives, a family of birds called rails, which include moorhens.

Messelornis cristata

Perching birds
With feet adapted for perching, this bird probably nested in trees, like treeswifts do today.

***Scaniacypselus szarskii*, cast**

Forest birds
This was a long-beaked, hoopoe-like forest bird. The black silhouette is its fossilised feathers.

***Messelirrisor* sp.**

On loan from Senckenberg Research Institute and Natural History Museum, Frankfurt am Main, Germany

Birds and fruiting plants evolved together

Many birds and plants have a mutually beneficial relationship. Birds eat the nutritious fruits, then spread the seeds in their droppings.

As bird species diversified and expanded into new environments, flowering plants like the dogwood evolved to have smaller, fleshy fruits, which birds found easier to swallow.

Fossilised dogwood fruits
Cornus sanguinea
130,000–120,000 years old

New food, new beak

Today, birds continue to adapt. When humans introduced a larger snail species (left) to North America, the beaks of snail kites adapted in just 10 years, becoming longer and better suited to digging into the bigger shells.

Snail kite
Rostrhamus sociabilis

Island apple snail shell
(larger, non-native species)
Pomacea maculata

Florida apple snail shell
(smaller, native species)
Pomacea paludosa

Evolving bird beaks

Beaks dramatically differ across the 11,000 bird species living today.

At some point between 80 and 65 million years ago, many new bird species rapidly evolved specialised beaks. Beak shape and size adapted for foraging and eating in diverse environments such as forests, wetlands or oceans. As different bird groups established their roles in these environments, the pace of change gradually slowed.

Thousands of beaks from our bird collections have been scanned as part of a project based at the University of Sheffield, which is investigating evolutionary change.

[Touch object]

Please touch

Underwater filter feeder
A flamingo pushes its upside-down beak into shallow water, quickly moving it side to side to sieve algae, shrimps, worms or insects from the water.

American flamingo beak, cast
Phoenicopterus ruber

[Touch object]

Please touch

Generalist feeder
Crows are generalist feeders, which means they can eat many different things. Their beaks can stab, scoop, poke or tear to eat worms, small mammals, insects, eggs, seeds, frogs or carrion (the meat from already-dead animals).

Carrion crow beak, cast
Corvus corone

[Touch object]

Please touch

Fruit picker
Hornbills have evolved large beaks for eating fruit, insects, lizards and small birds. They also have a hollow horn on top of their beak, probably for amplifying their loud calls.

Rhinoceros hornbill beak, cast
Buceros rhinoceros

[Touch object]

Please touch

Nutcracker
Macaws have one of the strongest bites of all birds. Their beaks can crack open incredibly hard seeds and tough fruits – even coconuts. Macaws are important seed dispersers, dropping seeds as they tear into fruit.

Hyacinth macaw beak, cast
Anodorhynchus hyacinthinus

[Touch object]

Please touch

Insect finder
A kiwi uses its long, pointy beak to eat small insects, earthworms or larvae found in soil or logs. It finds them by smell. Kiwis are the only birds with nostrils at their beak's tip, and they can be heard snuffling to clear the dirt that gets caught in them.

Great spotted kiwi beak, cast
Apteryx haastii

[Touch object]

Please touch

Fish grabber
This beak has sharp edges and a hook, which its owner, a shoebill, uses for snatching large fish, snakes and even baby crocodiles from freshwater marshes and swamps.

Shoebill beak, cast
Balaeniceps rex

[Touch object]

Please touch

Flesh ripper
This eagle's beak has a hook for tearing food such as fish, other birds or carrion (the meat from already-dead animals). Eagles wipe their beaks against branches and rocks to clean off blood and keep them filed to the right shape.

White-tailed eagle beak, cast
Haliaeetus albicilla

Birds today

Birds today

Modern birds are one of the most successful animal groups on Earth. With over 11,000 different species in 251 families, these crucial pollinators, seed dispersers and pest controllers are found everywhere from icy polar regions to steaming tropical rainforests.

To be this successful, birds have evolved brilliant and sometimes bizarre behaviours at all stages of their lifecycle, from drinking blood to taking acid baths.

Being young

Being young

Birds invest hugely in their young, even before the eggs are laid. Whether building nests from their own spit or flying thousands of kilometres to reach breeding sites, they are seeking the best start for their chicks.

A bewildering variety of egg colours, sizes and shapes keeps unhatched chicks from harm. Some adults even sing to embryos in the egg to influence their development.

Once hatched, chicks need to be fed, which demands a huge effort from adults. In some species, parents may need to find more than a thousand caterpillars a day for their brood. Feeding strategies are often tailored to the habitat and season, and human impacts such as climate change are creating additional challenges.

Nesting together

Rooks work together to attack birds that threaten their young. They build large nests only a few metres apart, in rookeries that can have over 200 nests.

This rook nest has plastic twine woven into it. Plastic may help with construction, but increases the risk of chicks becoming entangled and dying.

Rook nest
Corvus frugilegus

1, 2 Eggs: big or small?

Extinct giant elephant birds laid the world's largest eggs (1). Yet this is a very small egg compared to the parent's size, around 1% of the adult's body mass.

Azure-crowned hummingbirds (2) lay eggs little bigger than a jellybean. But these are relatively large, at about 15% of the adult's body mass.

Eggs need to be large enough to support a healthy chick, but not so large a female's body can't meet the demands of producing them.

1 Giant elephant bird egg
Aepyornis maximus

2 Azure-crowned hummingbirds with nest and chicks
Saucerottia cyanocephala

3 Protective shells

Most reptile eggs are soft and need to be laid where it's damp so they don't dry out. But bird eggs are hard and can therefore be laid in almost any environment on Earth. They are still porous enough to allow oxygen in, and weak enough for chicks to break out.

Striped whipsnake eggs, preserved in spirit
Masticophis taeniatus

4, 5 Egg shape and flight

Egg shape (4) depends on body shape. Birds with narrower, streamlined bodies that are adapted for strong flight produce pointier eggs. Common murres are fast-flying and deep-diving seabirds, and they lay the pointiest eggs (5).

4 Eggs of British birds by Henrik Grönvold (1858–1940)
Watercolour on card, around 1924

5 Common murre single egg
Uria aalge

6 Decorating eggs

A female murre lays one egg per year and each time the pattern is near identical. This helps them recognise their own egg in a busy clifftop colony.

Bird eggs are sprayed with pigment while in the reproductive tract. Other species use egg colour for camouflage or to block out light to help prevent overheating.

Common murre eggs
Uria aalge

[Interactive viewfinder]

Inside a snake

This snake probably swallowed a whole clutch of bird eggs. The CT scan shows how the eggs were crushed as they moved through its digestive tract.

Brown tree snakes are successful predators that eat forest birds. When humans have introduced them to new environments, such as to Guam in the Pacific, they've eaten bird species into extinction.

1, 2 An empty nest

This nest (2) was made by the now-extinct Guam flycatcher. Humans unintentionally introduced brown tree snakes (1) to the island of Guam in the late 1940s. Prior to this birds on the island had evolved without these predators, so had little or no defence against them. Eleven of 18 previously thriving native bird species were lost within a few decades.

2 Guam flycatcher nest
Myiagra freycineti

1 Brown tree snake from Seram, Indonesia, preserved in spirit
Boiga irregularis

3 Feathered linings

A pair of barn swallows has lined this nest with goose or swan feathers, which provide insulation, allowing them to leave their chicks for longer while they gather food.

Chicks kept warm in well-feathered nests grow faster, shortening the time they're vulnerable to predators and improving their chance of reaching adulthood.

Barn swallow nest
Hirundo rustica

4 Spit nests

White-nest swiftlets use saliva to weave their nests, so that the nests can stick to cave walls.

A traditional delicacy, the nests are extensively harvested by humans to make bird's nest soup. High demand has led to nests being taken before chicks fledge, causing population declines in many caves.

White-nest swiftlet nests
Aerodramus fuciphagus

5 Snacks for predators

The squirrel (above), mongoose (5) and snake are predators that all know eggs make an energy-rich snack. Chicks that hatch and fledge faster reduce the time they are vulnerable to predators, but the energy cost for parents to create a larger egg and feed fast-growing chicks is huge.

5 Banded mongoose
Mungo mungo

Grey squirrel (above)
Sciurus carolinensis

[Touch object]

Please touch

Feel the texture inside these swiftlet nests, which are made of saliva.

White-nest swiftlets nest on cave walls. They secrete saliva from a gland beneath their tongue, laying fibres to form the nest and glue it to the rock. A single nest can take weeks to make.

White-nest swiftlet nests, casts
Enlarged to two times their normal size

Hungry chicks

In their first days after hatching, golden plover chicks consume thousands of crane flies. Golden plovers even time their egg-laying so that their eggs hatch just as the crane flies emerge.

Warmer springs due to climate change could mean chicks start hatching weeks earlier. If the crane flies haven't yet emerged, many chicks will starve.

Eurasian golden plover nest and clutch
Pluvialis apricaria

Caterpillar feast (above)

Blue tits hunt for thousands of caterpillars to feed their sizeable brood, which can often be as many as ten chicks. As the fledglings mature, their voracious appetite peaks, with each consuming up to a hundred caterpillars a day.

In urban areas, declining numbers of moth caterpillars has led to declining numbers of blue tits, as fewer chicks survive.

Footage of a Eurasian blue tit
Cyanistes caeruleus

[Interactive smell pot]

Smell here

Hoopoe preen oil smells this strong because it's packed with bacteria. The oil is antimicrobial and females paint it on their eggs to protect them from harmful microorganisms.

The smell may also help deter predators and parasites.

Oiling eggs

Birds use preen oil to condition their plumage. Unlike other birds, hoopoes have bacteria in their preen gland, which produces a dark secretion with antimicrobial properties.

It's unusual for birds to poo in their nests, but hoopoes do. The preen oil they paint onto their eggs protects the embryos from infection.

Common hoopoe
Upupa epops

Singing to eggs

Australian zebra finches use fast, high-pitched ‘heat calls’ to warn their unhatched young when temperatures creep over 26°C (79°F). This song programmes cells in the developing young to produce less heat and grow smaller bodies which, after hatching, handle temperature extremes more efficiently.

Australian zebra finch
Taeniopygia castanotis

Sealed shelters

Female great hornbills squeeze into holes in large forest trees, then seal themselves in using their droppings. In this space, free from predators, they care for their eggs and chicks. Through a tiny gap in the seal they've created, their male partner delivers food. If anything happens to the feeding partner, the chicks and female starve.

Great hornbill
Buceros bicornis

Pair bonding

During incubation and chick raising, many birds reinforce their pair bond, strengthening their relationship. These brilliant behaviours occur in male–female and same-sex partnerships alike. In a Welsh zoo Frankie and Vinnie, two male macaroni penguins, preened each other to form an exclusive bond. Bonded male penguins in captivity have successfully raised chicks when given an egg.

Macaroni penguin
Eudyptes chrysolophus

Cuckoo conservation

Habitat loss and climate change mean cuckoos are nearly lost to the UK. Globally they are in trouble too, and scientists are satellite-tagging them to understand the pressures they face while migrating.

One tagged cuckoo was named ‘Flappy McFlapperson’ by schoolchildren in China who tracked its migration from Mongolia to Southeast Africa.

Common cuckoo
Cuculus canorus

Brood parasites

Common cuckoos lay an egg in another bird's nest so that the host bird raises their chick while they set off south on migration.

Cuckoo chicks also have an unusual and very successful survival adaptation. Once hatched they kill the competition, pushing the host's eggs and chicks out of the nest.

Common cuckoo eggs
Cuculus canorus
Collected between 1924 and 1925
Laid alongside eggs of yellowhammers, pipits, linnets and warblers

Feeding and leaving

Albatrosses raise one chick at a time. During their chick's first year, parents must leave them for days at a time in search of food. To sustain their waiting chick, adults feed them a rich oil, which they make in their stomachs from fish.

Albatross chick
Diomedea sp.

Albatross losses

Albatrosses fly thousands of kilometres to find food for their chick. But many adults don't return, drowning at sea when caught on the long lines of commercial fishing fleets. This, or hitting trawler cables, is what killed this female.

If both parents fail to return, their chick starves.

Antipodean albatross, adult
Diomedea antipodensis

Hookpods can help

This is one of several lifesaving solutions preventing seabird deaths from commercial fishing lines. Baited and cast as normal, the hook is only released after sinking below the normal diving depth of seabirds.

Fisheries using safeguards like this have reduced albatross deaths by up to 99%.

Donated by Hookpod Ltd

Courtship

Courtship

From life-long partnerships to brief encounters, the task of finding the perfect partner is not easy.

In many bird species, a male needs to work hard to impress a female by displaying flamboyant plumage, warbling breathtaking songs, building desirable nests, or exhibiting mesmerising dances.

These techniques help birds to prove their fitness as a mate and offer the chance to pass on their genes. Some birds even use deception, mimicking sounds or copying the appearance of other birds to trick potential mates and distract rivals.

Drumming

Male palm cockatoos are the only non-human animals to make drumming tools. They trim sticks and seedpods and use them to play regular beats, demonstrating to their potential life partners that they have claimed the best trunk to nest in.

Cockatoos have a strong sense of rhythm, with individuals playing in their own style.

Palm cockatoo
Probosciger aterrimus

Attractive singing

Eurasian blackcaps have a quiet song they use year-round, likely for communication across a short distance. Breeding males sing a far-carrying song with two parts: a warble likely attracts females, while a whistle warns off male intruders.

These incredibly complex songs are produced by a special vocal organ unique to birds, called a syrinx.

Eurasian blackcap
Sylvia atricapilla

False alarms

Female superb lyrebirds select mates based on their courtship display. To successfully pass on their genes, males evolved elaborate feathers, impressive dance moves and incredible vocal abilities.

If a female loses interest during courtship, a male can deceptively mimic the alarm calls of other birds. This causes the female to believe a predator is nearby and to freeze, giving the male more time to mate.

Superb lyrebird
Menura novaehollandiae

[On-screen game about mimicry]

[Listen to 10 sounds and guess if they're made by a superb lyrebird. Superb lyrebirds are amazing mimics. It's a challenge to tell whether you hear a car alarm, a crying baby, or if it's a lyrebird mimicking these sounds.]

Extravagant male plumage

Birds of paradise don't form partnerships to raise young, so females select mates based on the apparent quality of their genes. These are expressed in a male's ability to perform elaborate courtship displays, which involve singing, dancing and flashing extraordinary plumage.

Females – typically camouflaged with brown feathers – sometimes spend over five hours studying a displaying male.

1, 2 King of Saxony bird-of-paradise, female (1) and male (2)
Pteridophora alberti

3 Raggiana bird-of-paradise, male
Paradisaea raggiana

4 King bird-of-paradise, male
Cicinnurus regius

5 Brown sicklebill, male
Epimachus meyeri

6, 7 Blue bird-of-paradise, male (6) and female (7)
Paradisaea rudolphi

Film of:
King bird-of-paradise, male
Cicinnurus regius

Magnificent bird-of-paradise, male displaying to a female
Cicinnurus magnificus

Magnificent riflebird, male
Lophorina magnifica

Raggiana bird-of-paradise, males
Paradisaea raggiana

Red bird-of-paradise, male displaying to a female
Paradisaea rubra

Standardwing bird-of-paradise, male displaying to a female
Semioptera wallacii

Victoria's riflebird, male displaying to a female
Lophorina victoriae

Wilson's bird-of-paradise, male
Cicinnurus respublica

Sacred feathers

Golden eagles perform intricate undulating aerial courtship flights.

The feathers of these amazing birds are sacred and have been used sustainably by Indigenous communities in North America for centuries. However, hunting by farmers led to population declines by the early 1900s. Today, ethically sourced feathers for religious ceremonies are available via eagle aviaries and a US-government-run scheme.

Golden eagle feathers
Aquila chrysaetos
Donated by the Hawk Conservancy Trust, UK

Footage of a golden eagle courtship flight (left)

Killed for fashion

Bird-of-paradise feathers, heads, wings – sometimes even entire corpses – once adorned fashionable hats across Europe. By the early 1900s, up to 80,000 dead birds-of-paradise were exported to Europe each year.

The excessive killing of many bird species for this purpose eventually stopped when a UK law, passed in 1921, banned the importation of feathers.

Birds-of-paradise feather mourning hat
Made around 1914 to 1920
Lent by Amgueddfa Cymru – Museum Wales

Raggiana bird-of-paradise trade skin
Around 1900
Paradisaea raggiana

Toxic mating advantage

During the mating season, male great bustards increase their consumption of toxic beetles.

The toxins likely prevent infection by killing parasites in their cloaca (kloh-AY-kah), the opening through which sperm and excrement are released. During courtship, a female will rigorously inspect a male's white rear to assess health.

Great bustard, female (right)
Otis tarda

The return of the great bustards

Great bustards became extinct in the UK in the 1800s likely due to hunting, egg collection and human land use. In 2004 they were successfully reintroduced with the help of local farmers.

The birds now gather on Salisbury Plain, with males pumping up their chests in spectacular mating rituals.

Great bustard, male (left)
Otis tarda

Two mating extremes

Male ruffs gather together to compete for females. Most exhibit their elaborate plumage to attract a mate. Others have a different strategy. Fewer than 1% of the male ruff population have inherited a gene that gives them plainer feathers that mimic the plumage of female ruffs. These males discreetly move between rivals, rushing in unchallenged to fertilise females.

Male ruffs (in a ring) with elaborate plumage

Female ruff (front left) with plainer plumage

Male ruff (front right) with plainer plumage

Calidris pugnax

Sensing and intelligence

Sensing and intelligence

Birds can perceive and experience a world beyond what humans can. Heightened senses help them hunt, escape predators, navigate and find the fittest mates.

Their brains may seem small, but many birds are incredibly smart, so much so that the insult ‘bird-brained’ should be a compliment. Corvids, a family of birds including crows and jays, can be as intelligent – and playful – as great apes.

Many birds learn from each other through social networks, passing on knowledge and skills. Their intelligence can help them find and exploit opportunities that other animals might miss, which can be especially useful in a world modified by humans.

[Interactive viewfinder]

Bird vision

Birds can recognise millions of colour shades that humans cannot perceive, and they even see ultraviolet (UV) light. This is important because their colourful plumage helps them communicate with each other.

Look through and press the button (right) to see a Eurasian jay and a turquoise-browed motmot reflect UV light.

Ultraviolet vision

Birds can see colours beyond human vision. In addition to cone cells that recognise red, green and blue, bird eyes have cones cells that pick up ultraviolet (UV) light.

Many birds use this enhanced perception to select mates. Some blue tit feathers reflect UV light and their bright head plumage is a sign of fitness to potential partners.

Eurasian blue tits, adult and juvenile
Cyanistes caeruleus

Heightened hearing

The feathers of a barn owl's heart-shaped face form a disc, trapping sounds and directing them to their hidden ears.

Positioned at different angles, one ear captures sounds from below, the other from above. This adaptation allows the bird's brain to pinpoint exactly where their prey is rustling.

Common barn owl with wood mouse
Tyto alba and *Apodemus sylvaticus*

Owl prey

Like humans, owls see in 3D, helping them estimate distance and precisely time their attacks on prey. Unlike humans, their eyesight is sharpest in low light levels, helping them hunt at dusk and dawn.

These pellets contain regurgitated bones and fur – the parts of small mammals that owls can't digest.

Common barn owl pellets and rodent bones found inside pellets
Tyto alba
Donated by the Hawk Conservancy Trust, UK

Food-sensing beaks

A spoonbill hunts by plunging its beak underwater and swinging it side to side. Its beak is covered in sensitive receptors that connect to its nervous system through tiny pits in the bone. At the slightest touch their beak will sense and snap up a shrimp or small fish.

Spoonbill skeleton
Platalea sp.

Exceptional eyesight

Kestrel eyes have evolved twice the number of photoreceptors that human eyes have, which helps them pick out detail and hunt by sight.

In open farmland, birds such as bullfinches rely on hedgerows to escape these efficient predators. But over half the UK's hedgerows were removed between 1947 and 2007 and many that remain are in poor condition.

Common kestrel feeding on a Eurasian bullfinch
Falco tinnunculus and *Pyrrhula pyrrhula*

Precision smell

Shearwaters have evolved particularly sensitive and long nostrils that funnel scent. Their brains also have an enlarged area for processing smell. This helps them detect smells more than a kilometre away on the open sea, carried over the water's ever-moving surface.

Manx shearwater
Puffinus puffinus

[Interactive smell pot]

Smell here

The strong-smelling chemicals released from fish oil and plankton allow shearwaters to locate their next meal from far across the sea.

[Interactive viewfinder]

Finches drinking blood

Vampire ground finches in the Galápagos feast on parasites living on the feathers and skin of blue-footed boobies. Both species benefit from this.

Food is scarce though, so the finches will also stab open the boobies' skin to drink their blood. Their beaks have adapted to be particularly long and pointy, perfect for this activity.

[Interactive viewfinder]

Eating bat brains

In winter when food is scarce, some great tits have learnt to eat the brains of hibernating pipistrelle bats. When other food is around, they leave the bats alone. This shows a sophisticated approach to their diet.

Teaching survival

Great tits are intelligent and opportunistic. One group of tits in Hungary have increased their chances of surviving winter food shortages by eating the brains and organs of hibernating bats. This survival strategy has been passed both among the group and down to the next generation.

Great tit
Parus major

A smart and rare bird

Spix's macaws understand complex social communication. They have over 35 different behaviours for responding to conflict. For example, young ones deter predators by playing dead – lying on their back and breathing slowly.

Unfortunately this couldn't protect them from habitat loss and the pet trade. They are now extinct in the wild.

Spix's macaw
Cyanopsitta spixii

Collective defence

Flightless kagus rely on their family bond to defend territory. Young kagus spend years working with their parents, running at rivals or threats with their stripy wings open.

While this defence works against cats introduced to the remote island of New Caledonia, humans also introduced dogs. Unfortunately it doesn't work against these larger predators, and kagus are now endangered.

Kagu
Rhynochetos jubatus

Bird brains

Birds don’t have a neocortex, which is the outer layer of the brain that primates use for complex decision-making, language and creativity.

But recent research on microscopic nerve fibres has shown bird brains do have an equivalent structure. These densely packed layers of neurons help explain their advanced cognitive behaviours.

Striated caracara, cranial endocast (a cast of the skull’s inner shape)
Phalcoboenus australis

An exceptional collaboration

In a unique relationship possibly millions of years old, wild greater honeyguide birds work with hunter-gatherers to forage for honey.

Honeyguides learn to recognise calls from different honey-hunting groups, such as the whistles from the Hadza people in Tanzania. The birds call back, guiding people to the bees' nests.

Using smoke and axes, the Hadza harvest honeycomb while the birds await their reward of wax and larvae.

Honeycomb and bees
Apis mellifera

Axe, used by Hadza hunter-gatherers to access bees' nests
On loan from the British Museum.
Axe (ato) made of iron and wood. Af1970,12.41.
Purchased from Dr James C Woodburn in 1970

Film of Hadza men hunting for honey with a greater honeyguide
Indicator indicator

[Interactive viewfinder]

Eating toxic toads

Carrion crows are smart. Some have learnt to avoid a toad's toxic skin secretions and eat just the nutritious liver by pecking a small hole and pulling the liver out. Others wash the toad in water to clear away the toxins, then eat everything but the still-inedible skin and head.

1 Avoiding poison

Crows have learnt how to prey on toads while avoiding their toxic skin secretions – wounds found on toads suggest crows are carefully removing and eating only the toads' nutritious livers. This knowledge had been passed through their social groups, and mass toad deaths in Denmark and Germany have been linked to crows.

Common toad
Bufo bufo

2 Planning ahead

Jays can remember up to 11,000 places where they've hidden acorns for winter.

They also know how to keep certain food fresh. When storing or 'caching' worms to eat later, they will paralyse them with a beak squeeze. They then return to eat them before they die and rot.

Eurasian jay
Garrulus glandarius

3 Oaks and jays

While jays are excellent at remembering where they hide their acorns, oak trees depend on them forgetting a few. Hidden among protective thorny shrubs, these forgotten acorns grow into new saplings which, in turn, become trees that provide food and shelter for jays and over 2,000 other plants and animals.

4 Acid baths

Some birds such as jackdaws intentionally disturb ant colonies to trigger the ants' defence strategy – they'll crawl over the bird and spray them with formic acid. This acid kills off microorganisms in the bird's feathers, keeping them healthy.

Eurasian jackdaw
Corvus monedula

5 Raven brains

Ravens are one of the smartest birds. Through learning rather than instinct, they can complete tasks using abilities rivalling that of adult great apes.

While their brains are small compared to these primates, their many brain cells are more densely packed, enabling complex cognitive acts like play and forward-planning.

Common raven
Corvus corax

[On-screen game about intelligence]

[In this game, players help a jay hide acorns and remember where they are, so they can survive winter.

Jays are from the corvid family, the most intelligent group of birds. Other corvids include magpies, jackdaws and ravens.

Corvids can imagine what other birds are thinking, a rare sign of intelligence in animals. During the game the jay watches where a magpie is hiding acorns, so it can steal them. If the magpie knows the jay is watching, it may use tricks such as pretending to hide food. But the jay knows the magpie might try to trick it, so hides itself while watching.]

Flight and migration

Flight and migration

Watching birds soar over the mountains or deftly dive into oceans, it's easy to see how flight could be birds' most fascinating ability. Their incredible diversity of body shapes and flight techniques help them reach food, breed and escape danger.

Some birds, though, are permanently grounded, having evolved away from flying. Without the need to remain light enough for flight, species such as ostriches and cassowaries have become giants.

Of those that do fly, millions of birds from thousands of species migrate with the yearly seasons. Some travel short distances while others travel thousands of kilometres across continents and oceans.

[Interactive projection]

Starling murmuration

Digital recreation

Starlings flock in swirling masses, known as murmurations, to confuse predators.

Murmuration used to appear over many UK cities, but human actions have caused starling populations to plummet, falling by nearly 89% since the 1960s. That's like losing over 700 starlings every day for 50 years.

Press the button when it lights up

See a peregrine falcon attack the murmuration.

Falcons will try to pick off single starlings but they're seldom successful.

Fast and flightless

Cassowaries are high-jumping and fast-running flightless birds that can reach up to 50 kilometres (31 miles) an hour.

There are only 60 flightless bird species left on Earth. They are particularly vulnerable to human impact: hunting and the introduction of new predators are linked to the extinction of 166 species of flightless birds.

Southern cassowary
Casuarius casuarius

Saving energy for flight

Powering flight muscles is so energy intensive that to survive cold nights, Anna's hummingbirds go into torpor. Their heart rate slows and their body temperature drops. They seem frozen in a mini-hibernation, until rising temperatures gradually awaken them.

Topor is a survival technique used by many species to save energy during cold periods or food shortages.

Anna's hummingbird
Calypte anna

[Touch interactive]

Hummingbird heartbeats

Hummingbirds move their wings exceptionally fast as they hover to feed. This energy-demanding flight requires huge effort from their hearts.

To save energy at night, some hummingbirds will enter torpor, a state that drastically slows their heart rate. They appear frozen until morning.

Feel the Anna's hummingbird heartbeat change.

Flying heart rate: 1,260 beats per minute

Torpor heart rate: 50 beats per minute

Touch here

Soaring flight (above)

Red kites can soar gracefully then flex their forked tails to quickly steer in and out of busy scavenging sites.

For 200 years red kites were hunted in the UK as they were seen as a threat to poultry and game birds. By 1989 only a few remained. After one of the UK's most successful reintroduction programmes, populations are now in the thousands.

Red kite
Milvus milvus

From flying to diving

Plunge diving is a specialised fish-hunting method. Gannets can dive from a height of 45 metres (148 feet), reaching speeds of more than 20 metres (66 feet) per second when they strike the sea's surface.

This should be fatal, but their arrow-shaped beak, as well as special muscles behind their skull, stop their neck breaking.

Northern gannet
Morus bassanus

First proof of migration

Europeans once thought that when birds disappeared during winter they were hibernating. This stork was shot in Germany in 1822. It had arrived with an arrow made in central Africa piercing its neck, and was the first evidence that birds were capable of long-distance flight.

Every autumn millions of birds make an epic journey to find food over winter, then return in spring to breed.

White stork with an arrow in its neck, model
Ciconia ciconia
On loan from the Zoological Collection of the University of Rostock, second replica of the Pfeilstorch from Bothmer Manor near Klütz, †21.05.1822

Reintroducing white storks to the UK

The once-familiar white stork disappeared from the UK in the 1400s due to hunting and habitat loss. A small colony has now been ringed and reintroduced in West Sussex where they are breeding again, for the first time in over 600 years.

Individual identification ring from the UK's White Stork Project

On loan from the White Stork Project, Knepp Estate

[Illustration text]

2023 migration route of the UK's white storks

1 In late summer the storks leave their breeding site in West Sussex, and migrate to a warmer climate with more food.

2 Gliding on currents of warm air, they fly south across Europe, sometimes stopping for a few days to rest and refuel.

3 Today, some storks end their migration in southern Spain, living on rubbish tips where there is food, though it's of questionable nutritional value.

4 Others fly onwards just as storks used to, and travel as far as North Africa.

They return to the UK by late spring.

1 New migration routes

Strong winds or becoming lost can force birds outside their normal range. A Nicobar pigeon recently arrived in northwest Australia, but why it flew so far off its usual routes around Indonesia is unclear.

Settling into new environments is one step towards populations adapting. With global climate change, it could be an act of survival.

Nicobar pigeon
Caloenas nicobarica

2 Night navigation

While male European robins prefer to remain in their territory, females usually migrate. They travel at night, crossing Europe to find food as the seasons change.

How birds navigate at night is still a mystery. One theory is that a protein in their eyes detects the Earth's magnetic fields, providing a sense of direction.

European robin
Erithacus rubecula

3 The longest migration

To avoid the unbearably cold, dark, polar winters, Arctic terns travel with the summer sunlight between the Arctic, where they breed, and the Antarctic Circle. They see more daylight than any other animal on Earth.

For months they glide on ocean breezes, travelling over 80,000 kilometres (50,000 miles) every year.

Arctic tern
Sterna paradisaea

4, 5 The cover of night

European nightjars (4) fly at night, avoiding predators as they migrate between central African grasslands and northern Europe.

Tracking (5) has shown how they do this. To make it over the Sahara Desert and Mediterranean Sea, they fly faster and higher than normal, without stopping. At these higher altitudes the air is less dense and turbulent, easing their flight.

4 European nightjar
Caprimulgus europaeus

5 Nightjar Global Positioning Satellite tracker
Loaned by the British Trust for Ornithology

6 Migrating up

Spending the winter in mountainous forests, Himalayan monals follow cooler temperatures up-slope during summer, climbing to 4,200 metres (13,780 feet) above sea level.

With global warming, their range is being pushed into higher altitudes. Conservationists are calling for the creation of new reserves for monals to migrate to as temperatures continue to rise.

Himalayan monal
Lophophorus impejanus

7 Bird ringing

Each year in the UK over 900,000 birds are ringed by licensed volunteers. Rings have a unique number and often our Museum's address.

For over 100 years the scheme has recorded birds' locations and lifespans, revealing how populations move and change. The first discoveries revealed epic migrations, such as swallows flying to South Africa. Today rings also help to monitor threats such as bird flu.

Donated by the British Trust for Ornithology, who manage the UK Bird Ringing Scheme

Rose-ringed parakeets don’t migrate (above)

Humans introduced parakeets to Europe. It’s most likely that their populations grew over decades from released or escaped pets.

These sociable parrots, which are originally from Pakistan or northern India, are particularly adaptable, able to find food and withstand cold in European cities.

Rose-ringed parakeet
Alexandrinus krameri

Under threat

Under threat

Habitats once wild and connected are now highly modified and fragmented. This includes the UK, one of the most nature-depleted countries on Earth.

Despite their amazing adaptations, birds are now facing their biggest challenge to date. Almost 50% of the world's bird species are in decline.

A minority of species are thriving, especially generalists, which can better adapt to change and live successfully in human environments. Birds with more specialised habitats, features or behaviours are struggling to adapt and are at greater risk of extinction.

But there is hope. From community activists to wildlife-friendly farmers, many humans are developing ways to protect birds and support their future.

An extinct seabird's egg

Because they were flightless and laid only one egg per season, great auks were vulnerable to human hunters. Hundreds of thousands were hunted for meat and oil from the 1500s across the North Atlantic. The last pair was killed in 1844.

Great auk egg, probably laid in the 1760s
Pinguinus impennis

An extinct forest bird

Kaua‘i ‘akialoa (cow-AH-ee AH-kee-ah-LOE-ah) beaks were unusually long, to reach insects deep within the crevices of decaying wood.

Last seen in 1969, this brilliant and bizarre bird is now extinct. Its extreme adaptation made it dependent on a specific habitat and therefore more vulnerable to changes – in this case, human-introduced disease and forest destruction.

Kaua‘i ‘akialoa
Akialoa stejnegeri

Sounding the alarm

In the past, caged canaries were taken into coal mines to detect dangerous gases. This cage revived the canary by releasing oxygen.

Today, birds continue to warn us of danger. With nearly half the planet's bird species in decline, they are a wake-up call to the impact humans have on the environment.

Island canary
Serinus canaria

Canary resuscitator,
made between 1920 and 1930
Courtesy of Science Museum Group.
Gift of Salford Museum and Art Gallery

Ecosystem loss

Philippine eagles are one of the largest and most critically endangered birds. Due to extensive deforestation, there are fewer than 500 individuals left.

They need vast territories to raise chicks and juveniles cannot safely move between the remaining fragments of forest.

Philippine eagle
Pithecophaga jefferyi

Deadly feathers

Egrets, kingfishers and many other birds were once hunted in huge numbers to decorate hats.

This letter highlights the extent of the plumage trade. The section underlined in red notes one auction catalogue advertising over 84,000 kingfishers, and another over 78,000.

It was sent in 1914 by the RSPB (Royal Society for the Protection of Birds) to the Museum, where curators were gathering evidence on the scale of harm and the disinformation spread by traders.

Auction catalogue, 1913

Letter from L. Gardiner, RSPB, 4 February 1914

The ‘murderous millinery’ campaign

Dead birds were shipped to 1800s Britain as part of its global colonial economy. A group of women led by Emily Williamson, Etta Lemon and Eliza Phillips set up the RSPB in 1889 to end the plumage trade, and the Museum’s scientists supported their campaign.

After years of the RSPB lobbying hat-wearers, sellers and politicians, in 1921 an act was finally passed outlawing the import of plumage.

1 **Great white egret (left)**
Ardea alba

2 **Common kingfisher (right)**
Alcedo atthis

[Photograph captions]
Flesh-footed shearwaters migrate across the Pacific to the isolated Lord Howe Island, Australia, to breed.

They forage among plastic found floating far out at sea. Mistaking it for fish or squid, they carry it back to feed to their young.

With stomachs filled with plastic instead of food, the chicks become malnourished, often dying after leaving the burrow. Too weak to take flight over the sea, they drown.

Our scientists are researching the effects of plastic on shearwater health, including the impact of a new disease called plasticosis.

Plastic collected on Lord Howe Island, Australia, 2023

Flying Without Wings
By Mandy Barker
(Above)

Marine plastic debris recovered from the stomachs of flesh-footed shearwater chicks, Lord Howe Island, Australia, 2019. One of a series of images for the project 'STILL (FFS)'.

Take action for seabirds
To help stop more plastic entering the oceans, try to buy products that use less plastic. While plastic can be recycled a few times, it ultimately ends up as waste.

Poisoned food

Once common across South Asia, white-rumped vultures heavily declined in number in the 1990s. They were dying of kidney failure after scavenging on cattle treated with an anti-inflammatory drug. While vultures are still critically endangered, this drug has now been banned.

White-rumped vulture bones
Gyps bengalensis

Take action for the food chain
Pesticides devastate insect populations, starving some birds. You can help by buying food grown with fewer pesticides, not using pesticides in gardens, and checking pet flea treatment doesn't contain the chemicals imidacloprid or fipronil, insecticides that are washing off into water systems.

Puffins at risk

Rising sea temperatures in the North Atlantic as well as industrial fishing have greatly reduced sand eel populations, a vital source of food for Atlantic puffin chicks.

To prevent their only chick from starving, parents must forage in riskier areas with more extreme weather.

Atlantic puffin
Fratercula arctica

Take action for puffins
Environmental campaigning helps: the UK government has recently banned sand eel fishing in the English North Sea.

But carbon emissions are causing sea temperatures to rise. You can help reduce emissions by insulating your home and switching from fossil fuels to green energy.

Farmed birds

With over 30 billion globally, chickens are arguably the most successful bird, but that comes at a cost.

Intensively farmed for meat, they are genetically selected to grow faster and bigger. Most reach slaughter weight after just 36 days. If they lived longer, they wouldn't be able to walk.

Left: Leg bones of an eight-week-old fast-growth chicken bred for meat

Right: Leg bones of a six-week-old red junglefowl, a wild ancestor of chickens

Gallus gallus

Bird flu at Bass Rock

In 2022, bird flu caused the worst ever mass death of seabirds in Europe. On Bass Rock, an island off Scotland with the world's largest northern gannet colony, many thousands perished.

Intensive poultry farming with confined high-density housing likely led to this variant of flu evolving.

Northern gannet from Bass Rock
Morus bassanus

Take action on farmed birds
While chicken meat is an important protein source for many, farmed poultry can increase the likelihood of disease spreading to other animals, including humans.

Consider eating less chicken and more plant-based proteins.

Take action to prevent disease

Infected birds can easily spread disease to each other. Regularly cleaning bird feeders, bird tables and bird baths with soapy water helps lower rates of transmission.

Killer cats

It is estimated that cats kill 27 million birds each year in the UK. Domestic cats are also linked to the extinction of at least 40 bird species worldwide. Introduced all around the world by humans, they are a significant threat to birds.

Domestic cat
Felis catus

House sparrow
Passer domesticus

Take action cat owners
Cat owners can have fun playing with their cat – even 10 minutes a day can reduce their kill count. Give them a colourful collar and keep them indoors around sunrise and sunset, when birds are most active. Getting them neutered can also help, by keeping cat populations under control.

[Birds decline graphic]

In the last 50 years, the UK has lost 73 million birds.

That's like losing almost 4,000 birds a day.

The RSPB's Big Garden Birdwatch

Since 1979, people across the country have been counting the birds in their gardens and parks as part of the Big Garden Birdwatch. This citizen science survey has highlighted their decline.

Starlings

The average count has declined by 82%.

Take action
If you have a garden, avoid artificial plastic turf and instead grow fruit and berry bushes.

Chaffinches

The average count has declined by 68%.

Take action
Chaffinches are severely affected by the disease trichomonosis. It causes throat wounds, so they struggle to swallow or breathe. You can regularly clean bird feeders, tables and baths to help stop this disease spreading.

Song thrushes

The average count has declined by 80%.

Take action
Song thrushes feed on what gardeners might call pests. To help keep thrushes well-fed, avoid using pesticides and herbicides in your garden.

House sparrows

The average count has declined by 57%.

Take action
House sparrows need places to nest, feed and shelter from predators. Let grass grow longer – don't mind the weeds – and avoid cutting back plants for winter.

Disappearing swifts (above)

Swifts stay safe from ground predators and parasites by eating, sleeping and mating while in flight. They travel over 4,800 kilometres (3,000 miles) from Africa to Europe, where they raise chicks.

A decline in their insect food and loss of nesting sites has caused the UK swift population to shrink by 60% in the last 25 years.

Common swifts
Apus apus

Swift bricks
Donated by Action for Swifts

Take action for swifts
House renovations and new building techniques remove little crevices where swifts can nest. Providing alternative nesting spaces such as swift bricks in buildings can help the population recover.

A conservation army

Greater adjutant storks, once common across south and southeast Asia, are now endangered. Through the 1900s their wetlands and nesting trees were destroyed.

Wildlife biologist Purnima Devi Barman, known as the Hargila Baideu (Stork Sister), leads a conservation campaign in India with her Hargila Army of over 10,000 women to protect the birds and their trees. Through their work, Assam's stork population continues to rise.

Assamese mekhela chador and paper headdress, the awareness-raising uniform of the Hargila Army
Donated by Purnima Devi Barman and the Hargila Army

Greater adjutant stork
Leptoptilos dubius

Bird-friendly buildings

The reflective glass and lights of large buildings are a danger for migratory birds, which become confused and crash into them.

The 82-story Aqua Tower in Chicago was designed with irregular, non-reflective surfaces, wave-like balconies and fritted glass with tiny ceramic dots on the surface, to help birds avoid fatal collisions.

Aqua Tower model (scale at 1:240)
Built in 2010, Chicago, US
Courtesy of Art Institute of Chicago. Funds provided by the Architecture & Design Society

Deadly windows

An estimated 30 million birds die each year in the UK from shock or injuries after flying into windows.

The birds here are all UK window casualties.

1 **Eurasian sparrowhawk**
Accipiter nisus

2 **European robin**
Erithacus rubecula

3 **European goldfinch**
Carduelis carduelis

4 **Dunnock**
Prunella modularis

Take action on window deaths
UV-reflecting stickers, films, or permanent ceramic dots bonded to glass can make windows more visible to birds, so they know to avoid them.

The dawn chorus

The dawn chorus

It's 2050. The UK has reached net zero targets for carbon emissions, and 80% of electricity now comes from renewable energy.

Across the country, bird populations are bouncing back and thriving in connected habitats, with top predators such as white-tailed eagles maintaining healthy ecosystems.

Cities and towns give space to nature, allowing birds to breed successfully. Farming uses fewer pesticides and is nature-friendly. Restored woodlands and wetlands overflow with birdlife.

The dawn chorus has been reinvigorated.

Installation experience: 3 minutes

An eagle returns

White-tailed eagles were once common across the UK but were relentlessly hunted until 1918, when there were none left.

They are now being reintroduced. The population is successfully expanding across Scotland and in 2023 a wild chick hatched in England for the first time in 240 years.

White-tailed eagles
Haliaeetus albicilla
Donated by the Naturhistoriska Riksmuseet (Swedish Museum of Natural History), Stockholm

The history of the Museum’s collections

The history of the Museum's collections

As well as looking to the future, the Natural History Museum is committed to examining its past. We were founded within the context of empire, colonialism and exploration and we recognise that the hallmarks of this legacy exist in our collections and galleries.

We are continuing to review the history of our institution to help tell the full story of its origins and of the people represented within it.

Every name carries a story
Bird species across the world have numerous local names, reflecting diverse cultures and regions. However, the global birding community typically uses standardised English common names. These often originate from a centuries-old European perspective, once the only viewpoint considered in science. While scientific names are strictly regulated by international rules to ensure consistency, common names are more flexible. They are also hugely important in how people identify and communicate about birds.

There is a growing movement within the international birding community to revise offensive, inappropriate or inaccurate English common names. Efforts to review these names are ongoing, though a comprehensive updated global checklist doesn't yet exist. In this exhibition we have used BirdLife International's Data Zone as our primary source for scientific and common names. We continue to monitor groups striving to create international lists of more inclusive common names and look forward to embracing their recommendations.

Acknowledgements

Acknowledgements

Developed and produced by the Natural History Museum

Exhibition supported by associate donor
The Huo Family Foundation

In affiliation with
The Royal Society for the Protection of Birds

Sustainability
The Natural History Museum works hard to make its installations as sustainable as possible. We strive to use sustainable materials in constructing installations and ensure the components have as long a life as possible. All this contributes to our commitment to care for the natural world.

Government indemnity scheme
This exhibition has been made possible as a result of the Government Indemnity Scheme. The Natural History Museum would like to thank HM Government for providing government indemnity and the Department for Digital, Culture, Media and Sport and Arts Council England for arranging the indemnity.

Curation and interpretation
Natural History Museum

Exhibition design
Real Studios / Natural History Museum

Graphic design
Surface 3 / Natural History Museum

Illustration
Ève Barlier

Interactives
Palma Studios / Clay Interactive Ltd / Natural History Museum

Lighting design
ZNA / Lux Lucis

Installation build
Sam Forster Associates

Graphics production
Omni Colour

Model-makers
ThinkSee3D

External scientific advisors
Professor Nicky Clayton
Dr Nigel Collar
Mary Colwell
Steve Dudley
Dr Daniel Field
Kabir Kaul
David Lindo
Dr Gavin Thomas

Lenders
Amgueddfa Cymru – Museum Wales
British Museum
British Trust for Ornithology
Dr Daniel J. Field, University of Cambridge
Science Museum Group
Senckenberg Research Institute and
Natural History Museum
The Art Institute of Chicago
The University of Rostock
White Stork Project, Knepp Estate

With additional thanks to
Carlos Jaramillo, STRI, for the ancient
pollen sample
The team at the Knepp rewilding project
LeAndra Nephin, enrolled member of the
Omaha Tribe of Nebraska and Iowa
Gustafson Porter and Bowman for the use of
their pylon design
RSPB Youth Panel
Oliver Wilson, 3D Pollen Project

Film, image and sound credits

Bird calls audio © The Listening Planet, ‘Blood Thirsty’ vampire ground finch image © Thomas Peschak, Blue tit footage © RSPB, Carrion crow images © Nick Upton / naturepl.com, Eagle footage © Jerry Liguori, Great hornbill footage © BBC Motion Gallery / Getty Images, Great hornbill nest camera footage © Hornbill Research Foundation Thailand, Great tit footage © Peter Estok, Honeyguide footage © Lee McEachern and Brian Wood, Lord Howe Island shearwater images © Justin Gilligan, Lyrebird crying audio © Taronga Zoo Sydney, Palm cockatoo footage © Dr Christina Zdenek, Vampire ground finches © BBC Motion Gallery / Getty Images

Where to go next

Where to go next

The Birds gallery
Discover everything from an extinct dodo to our historical hummingbird cabinet, and a Victorian anatomy display.

Hintze Hall balconies
Go to the first-floor balcony to find seabirds, pheasants and a giant moa skeleton.

The Museum's garden – open from summer 2024
Visit our beautiful new Nature Discovery Garden. Explore the birds, plants and other animals that are living right on the Museum's doorstep and find out how everyone can enjoy and support urban nature.

Take action to help birds

There are lots of things you can do to help support birds in your local area and at home. To find out more, visit **nhm.ac.uk/help-birds-thrive** or scan the QR code below.

Natural
History
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