BirdLife
INTERNATIONAL

State of the World's Birds

A focus on migratory species and their flyways

Sanderlings *Calidris alba*. Photo © Veronica Winters, Shutterstock

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GLOBAL FLYWAYS

Executive summary

This sixth edition of *State of the World's Birds* focuses on migratory birds and their flyways, and what they reveal about the state of nature, the drivers of biodiversity loss, and the solutions needed to reverse declines.

Common Eider *Somateria mollissima*. Photo © dennisjacobsen, Adobe Stock

Migratory birds undertake extraordinary journeys as they travel across the world between breeding and non-breeding areas. Arctic Terns *Sterna paradisaea* fly from pole to pole, travelling the equivalent of four journeys to the moon and back in their lifetime. Great Snipe *Gallinago media* fly at almost the height of Mount Everest as they cross the Sahara Desert, while Ruby-throated Hummingbirds *Archilochus colubris* weigh just three grams yet cross the Gulf of Mexico nonstop. The broad routes used by migratory species are called 'flyways'. Every country in the world is connected to others through bird migration.

Migratory birds present a unique conservation challenge. Their journeys across continents and oceans are central to their survival and make them a shared natural heritage, but also expose them to multiple threats along their flyways.

Birds are powerful indicators of environmental health, and are better studied than any comparable group of organisms. This wealth of information enables a detailed assessment of the status of migratory birds across the world's terrestrial and marine flyways.

The findings are alarming. One in nine migratory bird species is threatened with extinction, and seven species are confirmed or suspected to have been lost in the last 150 years. The official announcement in 2025 of the extinction of the Slender-billed Curlew *Numenius tenuirostris* marks the first global bird extinction in mainland Eurasia and Africa in recent centuries. Many formerly common species now have depleted populations, with 45% of migratory species in decline. Seabirds and shorebirds are faring particularly poorly. Furthermore, the networks of habitats on which migratory birds depend are becoming increasingly degraded and fragmented, including the loss of intertidal wetlands along the East Asian–Australasian Flyway.

The drivers of these declines are well understood and are overwhelmingly caused by human actions. The most significant threats to globally threatened migratory birds include invasive alien species and diseases, agricultural expansion and intensification, climate change, hunting and trapping, and pollution. These threats are already having profound impacts across flyways, from declines of formerly common species in North America and Europe linked to agricultural intensification, to mass mortality events caused by Highly Pathogenic Avian Influenza, and climate-driven shifts in species' distributions and migration patterns. Additional pressures include expanding energy infrastructure and urbanisation, human disturbance, injury or death in fisheries (bycatch) and logging. Most migratory species face multiple threats across their flyways, leading to cumulative impacts and high mortality during migration.

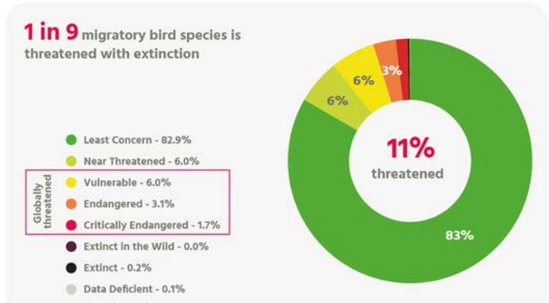
Fortunately, the solutions are also well known. Conservation programmes around the world show that evidence-based action can restore habitats, prevent extinctions, and support population recovery. Few conservation challenges illustrate the value of collaboration more clearly than migratory bird conservation, where coordinated action across flyways can achieve impacts far greater than isolated efforts within individual sites or countries. The BirdLife Partnership is uniquely placed to unite such conservation efforts across countries, continents and ocean currents, with 120 of our Partners (98%) working to conserve migratory birds.

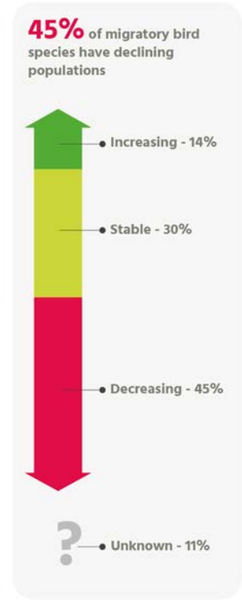
A priority is conserving and effectively managing the network of sites critical for migratory birds, particularly Key Biodiversity Areas. This can be achieved through protected areas or other effective area-based conservation measures. Beyond these sites, retaining intact habitats, restoring degraded ecosystems, and implementing conservation solutions in production landscapes is essential to maintain connectivity along flyways.

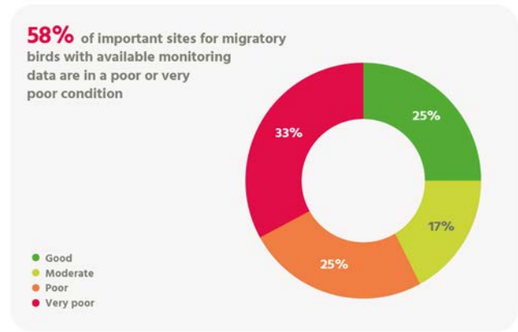
Key threats to migratory birds require targeted action. This necessitates controlling or eradicating invasive alien species, managing agriculture and forestry more sustainably, minimising harmful impacts of energy and other infrastructure, ending overexploitation and illegal killing and preventing fisheries bycatch. Nature must be integrated into land-use planning to support sustainable development, while nature-based solutions should play a central role in climate mitigation and adaptation. Some species will also require intensive, species-specific interventions such as captive breeding and reintroduction.

Delivering these interventions depends on a suite of enabling conditions. Lasting global change is built on local action, making the empowerment of Indigenous Peoples, local communities and national institutions essential for effective and equitable conservation. Policies and legislation must be science-based, comprehensively implemented and supported by monitoring systems that track progress towards biodiversity targets. Achieving effective conservation across flyways will require sustained and innovative financing.

Birds provide both a warning and a source of hope. They demonstrate the scale of the biodiversity crisis but also show that conservation works. Yet current efforts remain insufficient. Since the adoption of the Kunming-Montreal Global Biodiversity Framework in 2022, progress towards its goals and targets has remained far too slow. Urgent action is needed to scale up conservation for migratory birds, protect the natural world and secure a sustainable future for people and the planet.







FOREWORD

Foreword

Martin Harper, Chief Executive Officer, BirdLife International

Every year, billions of birds migrate across countries, continents and ocean currents.

Some of these journeys are extraordinary.

Just think about the bird that is BirdLife International's logo—the Arctic Tern, which travels pole to pole and has the longest migration on the planet: up to 100,000 km each year.

And like the Arctic Tern, most birds move predictably, along defined routes which we call flyways—a bit like natural super-highways.

Yet, migratory birds are in trouble.

This new *State of the World's Birds* report highlights that 11% of all migratory birds are globally threatened and 45% have declining populations.

And this should serve as a warning to us all. We are not doing enough to save our shared nature.

Migratory birds are in trouble principally because of habitat loss. But they are also declining because of threats during migration, especially from illegal killing and collision with human infrastructure, for example for energy—where electrocution from power lines kills hundreds of thousands of birds per year.

This matters not just because we risk losing the wonder of migration, but also because the sites that migratory birds rely on—such as mudflats, wetlands, grasslands and forests—hold enormous value for people.

To save migratory birds, to save the wonder of migration, and to protect the services that healthy environments provide to people, we must safeguard the integrity of the whole flyway, saving our birds wherever they go.

The whole BirdLife Partnership is prepared to play its part to the full. But we cannot do this alone. We need help from others. We know that we need to forge new partnerships and secure new resources.

Even though world leaders agreed in 2022 to mobilise new funding to help reverse declines in wildlife populations, the global biodiversity funding gap is growing—now estimated at US$900 billion per year.

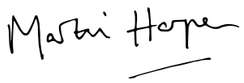
This is why BirdLife International has been exploring innovative ways to mobilise new resources for flyway conservation and it's why we have joined forces with the Multilateral Development Banks.

Five years ago, BirdLife launched a Regional Flyway Initiative with the East Asian–Australasian Flyway Partnership and the Asian Development Bank. We have since established similar ventures in the Americas with one of our USA Partners, National Audubon Society, and the Development Bank of Latin America and the Caribbean, and most recently with the World Bank for the African-Eurasian Flyway.

Through these partnerships, billions of dollars are being mobilised for site-based conservation benefiting migratory birds, people and the climate.

We are building something special, uniting conservation across continents.

Despite all the challenges that nature faces, I am confident that, together, we can help migratory birds and all life thrive.



Foreword

HIH Princess Takamado, Honorary President, BirdLife International

Birds are our constant outdoor companions. Wherever we go, they have already got there. Whenever we start the day, they are already singing about it. And whether we like it or not, they are always telling us how we are doing.

We like it most when they tell us how healthy the landscapes and environments are on which we all depend. This is almost always because we have not yet managed to leave our heavy footprints on such places. Then we happily celebrate the birds in art, music, literature and fashion across all cultures.

We like it rather less when they tell us what damage we are doing to our world. If birds are in trouble—which we only discover when they are not our constant outdoor companions—we know that the rest of nature is also at risk, and that we are too. Instead of celebrating, we have to think about our behaviour and what it is going to cost us to change it.

The two words that make up the name BirdLife point to this connection. By gauging the state of our wild birds, we take the pulse of our planet. The pulse is our sign of life.

By understanding the pressures on nature that affect wild bird populations, we identify which conservation responses are needed, and where to target them. By telling stories of conservation success, we bring the world the confidence that a different future is possible—indeed, not just possible but vital.

This report, published every four years by the BirdLife International Science Team, provides a moment to take stock of the world's progress in halting and reversing the declines in wild bird populations. And for the first time, the team has also put a spotlight on migratory species and the flyways they use as they travel across the world.

Perhaps we take migration too much for granted. Every year the swallows come back, and the swifts; we welcome them with a smile and then go about our business. But the migration of birds is one of the great wonders of nature, a collaboration that has lasted many millions of years between tiny, feathered dinosaurs, the earth's magnetic fields and the stars.

The incredible journeys of migratory birds remind us that everything and everyone is connected in this life. They also remind us that we need coordinated conservation action across countries, because birds know no borders.

That is why I believe BirdLife International is uniquely placed to help migratory birds. Through its ever-expanding network of Partners operating in 120 countries around the world, it combines collective expertise with a deep passion for nature to press for action wherever it's needed. But as this report tells us, so much action is needed, and urgently. Please read it and join hands with us to safeguard the birds and all the life of our planet.

Bluethroat *Luscinia svecica*. Photo © SGR Wildlife Photography, Shutterstock

Section 1

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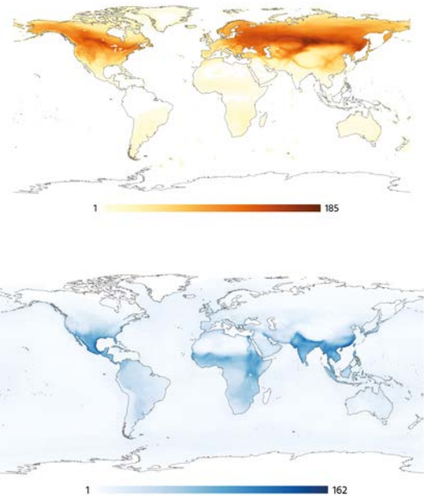
INTRODUCTION

Balearic Shearwater *Puffinus mauretanicus*.
Photo © Arnau Soler, Shutterstock

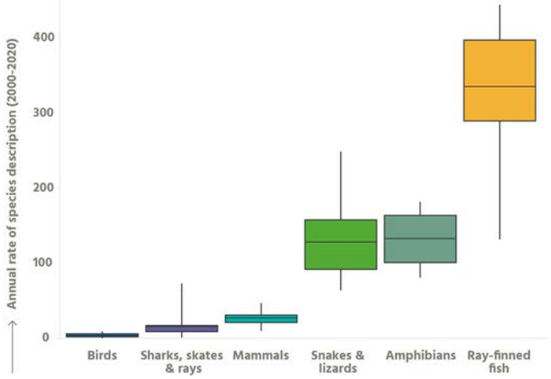
SENTINELS OF THE SKIES:

Birds as indicators of planetary health

Assessing the state of global biodiversity often relies on using well-studied species as proxies for wider environmental change. Although no single group serves as a perfect indicator, birds are particularly well suited to this role. They are widely distributed across all continents, occupy nearly every habitat, and are among the most extensively studied and consistently monitored taxa. Birds also respond rapidly to environmental change, and their population trends frequently mirror those of other groups, making them valuable indicators of overall ecosystem health.



Distribution of the world's migratory bird species during a) the breeding season and b) the non-breeding season, based on overlaying the ranges of all known fully migratory bird species. Data: BirdLife International (2026)



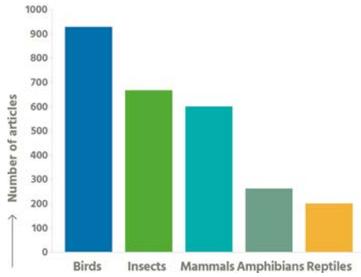
Bird taxonomy is well known and relatively stable

Most bird species were described in the eighteenth and nineteenth centuries, with fewer than ten species per year newly described over the last two decades[1]. In contrast, 180 new amphibian species were described in 2017 alone[2], meaning that analyses and priorities rapidly become out of date.

Number of new species described per year during 2000–2020 for six groups of vertebrates. Vertical lines show the minimum and maximum values, boxes show the interquartile range and horizontal lines show the mean. Data: Li *et al.* (2025)

Birds are widespread, occurring almost everywhere around the globe

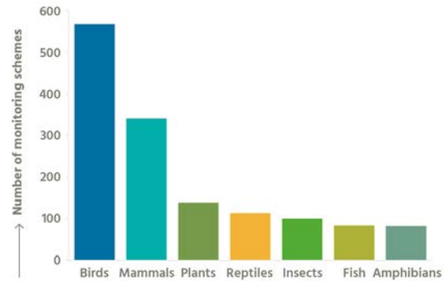
Birds occur in every country on Earth, and many migrate across entire continents. From Blackpoll Warbler *Setophaga striata* (NT↘) linking boreal and tropical forests in the Americas, to Common Swift *Apus apus* (LC↘) travelling between urban Eurasia and sub-Saharan Africa, Siberian Crane *Leucogeranus leucogeranus* (CR↘) flying from northern Russian wetlands to China, and Sooty Shearwater *Ardenna grisea* (NT↘) roaming the length of the Pacific Ocean—birds occupy and connect nearly every habitat on the planet.



Number of scientific papers published in 2025 on biodiversity conservation mentioning major animal groups in the title, abstract, or keywords. Data: Clarivate Web of Science (2026)

Bird distribution, behaviour and ecology are more widely studied than for other comparable taxa

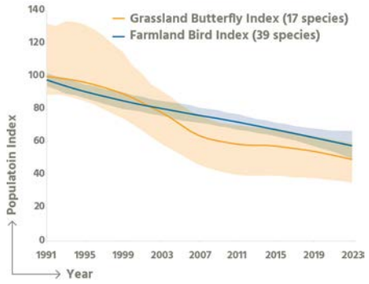
Birds are one of the best-studied taxonomic groups, with well-documented distributions, behaviour, and ecology. For example, more than 900 research articles published in 2025 on the topic of biodiversity conservation contained the word "bird" in the title, abstract or keywords, far more than contained "insect" (668), "mammal" (601), "amphibian" (263) or "reptile" (201)[3].



Number of species monitoring schemes in place for seven major taxonomic groups. Data: Moussy *et al.* (2022)

Birds are better monitored than any other taxa, being generally easy to detect, identify and count

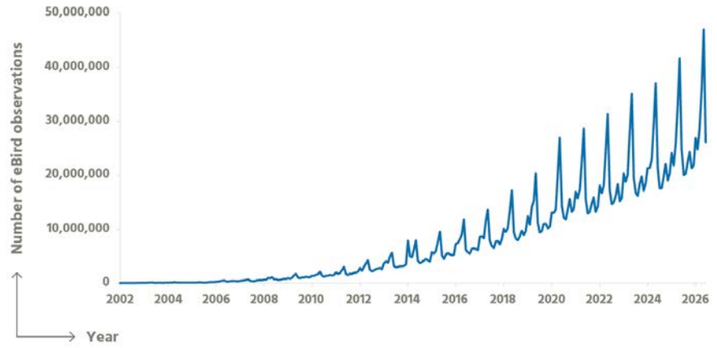
Birds are active, highly visible, and often occur in numbers that are relatively easy to count, making them easier to monitor than many other taxa. At least 566 schemes are in place to monitor the long-term population trends of birds, accounting for around half of all species monitoring schemes worldwide[4].



Bird population trends often mirror those of other species

Birds generally occupy top positions in food chains and are responsive to environmental change, so their population trends often closely mirror those of other taxa. For example, in the European Union, intensification of agriculture has driven congruent declines in the Grassland Butterfly Index[5] and the Farmland Bird Index[6].

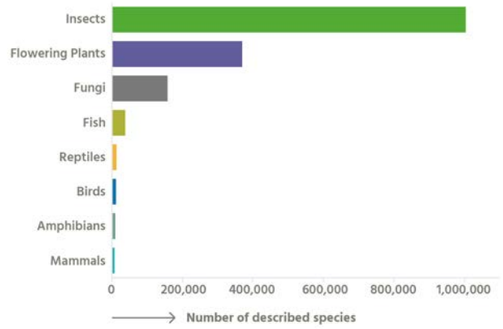
Indices showing changes in population abundance of 39 common farmland bird species (compared with a 1990 baseline) and 17 butterfly species (compared with a 1991 baseline) in the European Union. Shaded areas represent 95% confidence limits. Data: van Swaay *et al.* (2025), PECBMS (2024)



Birds are unparalleled in their popularity, with experts in every corner of the world

Birds are highly popular and widely observed by a large and diverse global community of birders and professional ornithologists. Participation has grown rapidly, with eBird—a global citizen science platform run by the Cornell Lab of Ornithology—surpassing 2 billion bird records worldwide in June 2025[9].

Number of observations submitted to eBird by month during 2002-2026. Data: eBird (2026)



Number of described species in eight major taxonomic groups. Data: IUCN (2025)

There are enough bird species to show meaningful patterns, but not so many as to hamper analyses

There are just over 11,000 recognised extant bird species, nearly all of which can be identified in the field through careful observation. Most other comparable groups have many more species, which are often much harder to distinguish, with hundreds of thousands to millions of plant, fungi, and insect species[8] requiring specialist knowledge or equipment for accurate identification.

Birds are mobile and responsive to environmental change

Many bird species are restricted to specific habitats and require predictable conditions for migration, making them highly sensitive to environmental change. Globally, population trends of birds during 1950–2018 are closely related to environmental factors such as land-use change and climate, while those of mammals correlate more closely with life history traits[7].

Bird distribution generally reflects that of many other wildlife groups

Areas that support high bird diversity are often also important for other taxa. For example, a recent global assessment showed that geographical prioritisations based on bird distribution broadly overlap with prioritisations for all but the most range-restricted threatened reptiles[10].

References 1. Li *et al.* (2025), 2. Button *et al.* (2026), 3. Clarivate (2026), 4. Moussy *et al.* (2022), 5. van Swaay *et al.* (2025), 6. PECBMS (2024), 7. Ma *et al.* (2024), 8. IUCN (2025), 9. eBird (2025), 10. Cox *et al.* (2022)

Assessing species' extinction risk for the IUCN Red List

The IUCN Red List of Threatened Species is the most comprehensive source of information on the global status of animal, fungi and plant species. For over 60 years, it has played a central role in conservation by providing an authoritative evidence base to inform conservation priorities, guide legislation and policy, direct funding, and support targeted action to halt biodiversity loss. The Red List has helped prevent species from moving closer to extinction and has supported recoveries, while also generating scientific knowledge and raising awareness of the biodiversity crisis. As the designated Red List Authority for birds, BirdLife is responsible for assessing the extinction risk of all c.11,000 bird species.

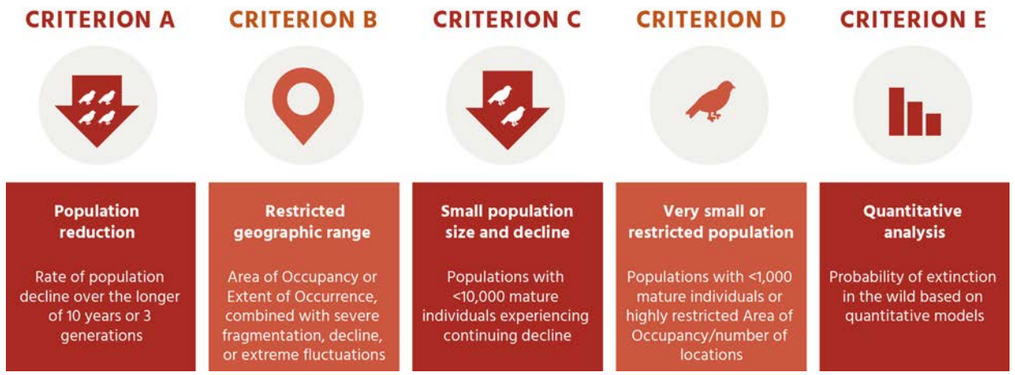
Red List categories and criteria

Species are assessed against five standardised Red List criteria, each with quantitative thresholds that determine extinction risk. Data on population size and structure, range, and trends are compiled from published and unpublished literature, museums, citizen science platforms, expert knowledge and other sources, and evaluated against these criteria.

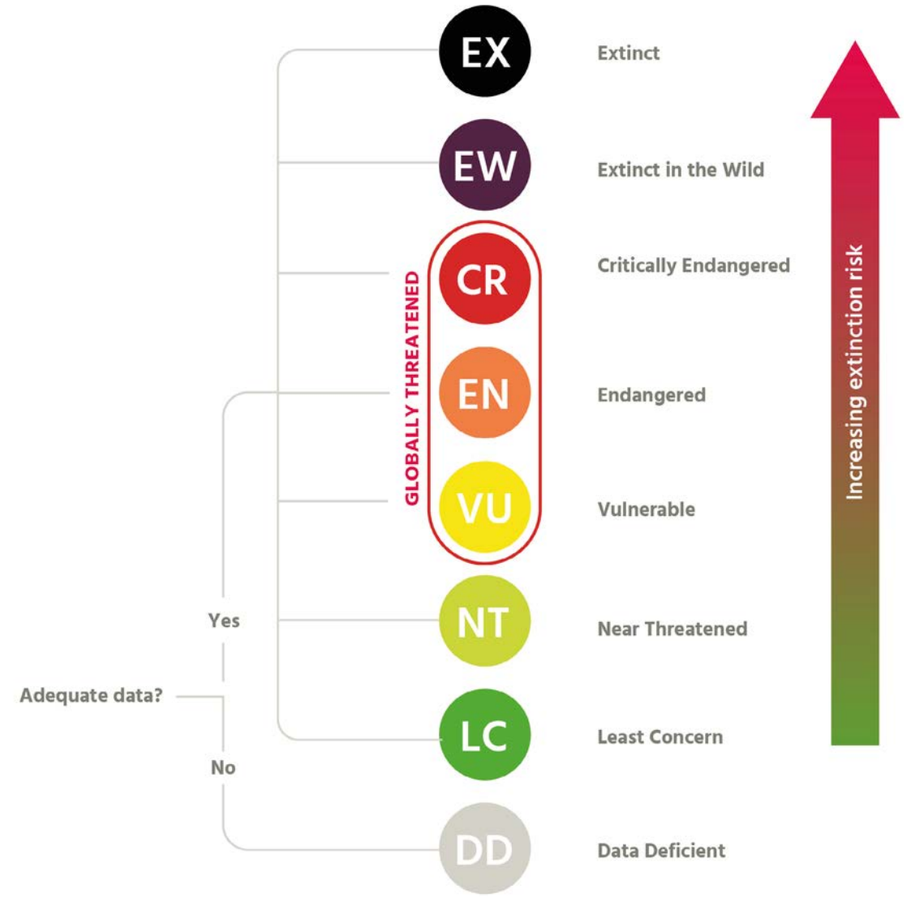
Once a species has been assessed against the Red List criteria, it is assigned to the highest category for which it meets the quantitative threshold. Categories range from Least Concern (LC) and Near Threatened (NT) to Vulnerable (VU), Endangered (EN) and Critically Endangered (CR); the latter three are collectively termed 'threatened'. A species is listed as Extinct (EX) when there is no reasonable doubt that the last individual has died. Extinct in the Wild (EW) applies to species that survive only in captivity or outside their natural range. Species are listed as Data Deficient (DD) when there is insufficient information to assess their risk of extinction.

In this report, the Red List category and current global population trend of each species mentioned is shown in brackets after the species name. The category is indicated using the standard two-letter codes listed above. Population trend is indicated using the following symbols:

↘ = declining → = stable ↗ = increasing ? = unknown



Overview of the criteria used to assign each species to a Red List category. Each criterion has quantitative thresholds to determine the level of extinction risk.



The eight IUCN Red List categories. Those collectively termed as "threatened" are indicated by the red box.

Measuring trends in extinction risk: the Red List Index (RLI)

Repeated species assessments enable analysis of trends in extinction risk. In 2025, we completed the eighth comprehensive Red List assessment of all bird species. Changes in a species' Red List category over time may reflect genuine changes in population or habitat, or non-genuine changes resulting from improved knowledge or revised taxonomy. The Red List Index (RLI) measures trends in the average extinction risk of groups of species over time, based on the number of species in each Red List category and movements between categories resulting from genuine improvements or declines. It can be calculated globally, by taxonomic group, for subsets of species (e.g. migratory birds), or in relation to specific threats (e.g. trade). National RLIs can be derived from country-level assessments or by weighting global data according to the proportion of a species' range within a country. The RLI is widely used in policy and conservation reporting, including by the Convention on Biological Diversity and the UN Sustainable Development Goals, and helps identify trends, guide action, and highlight the effectiveness of conservation efforts[1].

References 1. Butchart *et al.* (2025)

Identifying important sites for birds

Biodiversity is not evenly distributed around the planet, being concentrated in areas with suitable conditions for survival. Identifying the places that are disproportionately significant for biodiversity allows effective targeting of conservation resources. Important Bird and Biodiversity Areas (IBAs) are sites identified as being internationally significant for the conservation of birds, and form part of the wider global network of Key Biodiversity Areas (KBAs), which are sites of significance for the global persistence of biodiversity more broadly. Hereafter, these internationally important sites are referred to collectively as KBAs. Such sites have been identified for birds on land and at sea in more than 240 countries and territories worldwide.

The criteria used to identify important sites for birds

Local experts and stakeholders drive the identification of KBAs, often led by BirdLife Partners. Locally collected data are compiled and evaluated against a set of standardised criteria to determine whether sites qualify as being of international significance. A site may be of global significance if it supports threatened or geographically restricted species, large congregations, or has high ecological integrity or irreplaceability. The site network also includes a set of sites and qualifying species that meet regional or sub-regional criteria developed for IBAs. BirdLife has developed methods to identify sites using tracking data (i.e. information on the location of individual animals over time, based on satellite technology or related sources), which can then be assessed against KBA criteria. This approach has proved particularly valuable in the marine realm, where alternative data sources for site identification are often limited, especially in areas beyond national jurisdiction.

Overview of the criteria used to assess whether a site qualifies as being globally important for the conservation of birds and wider biodiversity.

GLOBAL IBA CRITERIA

A1: Globally threatened species
The site is known or thought to regularly hold significant numbers of a globally threatened species.

A2: Restricted-range species
The site is known or thought to hold a significant population of at least two range-restricted species (those with a global range size ≤50,000 km^2).

A3: Bioregion-restricted assemblages
The site is known or thought to hold a significant component of a group of species whose distributions are largely or wholly confined to one biome-realm.

A4: Congregations
The site is known or thought to hold congregations of ≥1% of the global population of one or more species on a regular or predictable basis.

GLOBAL KBA CRITERIA

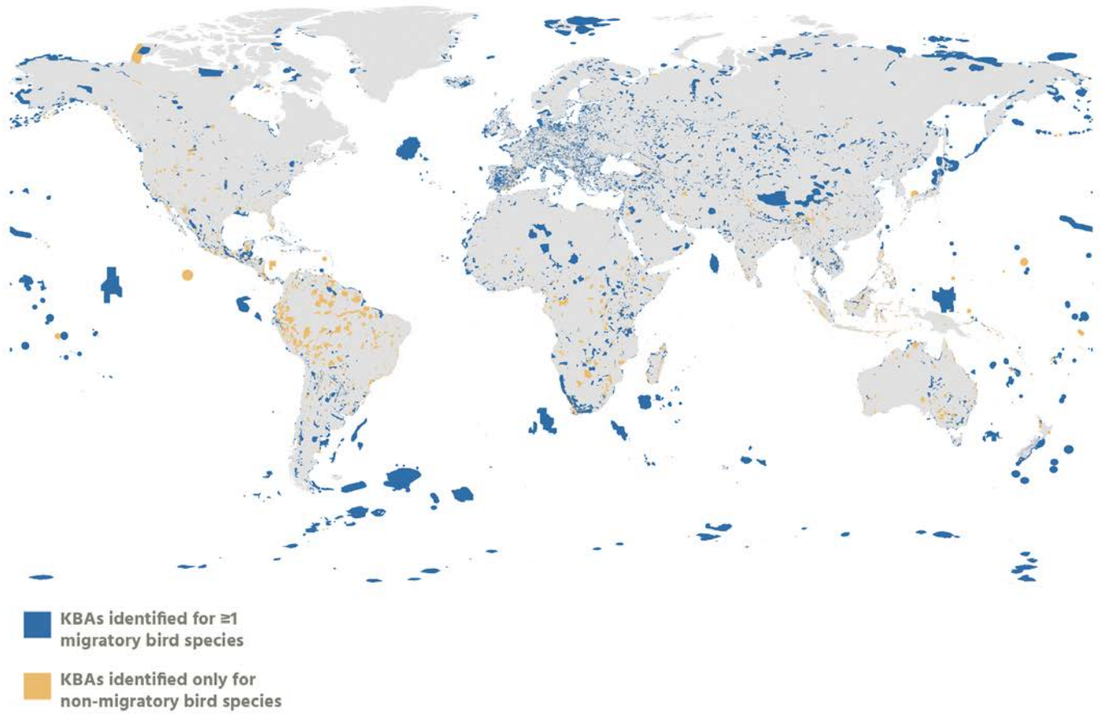
A: Threatened biodiversity
The site holds a significant proportion of (1) the global population of a species facing a high risk of extinction; or (2) the global extent of an ecosystem type facing a high risk of collapse.

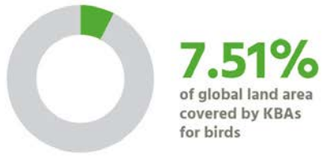
B: Geographically restricted biodiversity
The site holds a significant proportion of the global population of (1) a geographically restricted species; (2) multiple geographically restricted species; (3) a geographically restricted assemblage of species; or else it holds a significant proportion of the global extent of a geographically restricted ecosystem type.

C: Ecological integrity
The site holds wholly intact ecological communities supporting large-scale ecological processes.

D: Biological processes
The site holds a significant proportion of the global population of a species (1) during one or more life history stages; (2) during periods of environmental stress; or else it is where a significant proportion of the global population of a species is produced.

E: Irreplaceability
The site has a very high irreplaceability for the global persistence of biodiversity, as identified through quantitative analysis.



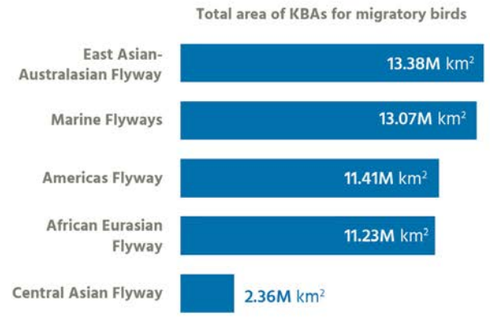


7.51%
of global land area covered by KBAs for birds

2.71%
of global sea area covered by KBAs for birds

10,656
KBAs identified for migratory birds

76.3%
of all KBAs identified for birds are of global importance for migratory species



Important sites for migratory birds

While resident birds may spend their entire lives within a single KBA, migratory species depend on a network of sites throughout their annual cycle. They require suitable breeding grounds to raise their young, safe stopover sites to rest and refuel during migration, and productive non-breeding areas that provide sufficient food. Therefore, effective conservation of migratory birds requires identification and safeguarding of an interconnected network of sites, often spanning multiple countries and even continents. Because migratory species depend on many sites across their annual cycle, they frequently trigger KBA criteria at breeding, stopover and non-breeding locations. As a result, 76% of the KBAs identified for birds are of global importance for migratory species, even though only 17% of birds are migratory.

Important sites for birds, including those identified for one or more migratory species (blue) and those identified only for non-migratory species (orange). Sites of importance for both are included in the former. Data relate to IBAs (193 countries) or KBAs identified for birds in 26 countries in which the BirdLife Partner has chosen to focus their sites work on KBAs, and 29 countries without a BirdLife Partner. Data: BirdLife International (2026)

What birds tell us about the state of nature

For over 20 years, BirdLife International has brought together the best available evidence on the conservation status of birds, the pressures they face, and the actions needed to secure their future. We have synthesised these in six editions of our flagship publication, *State of the World's Birds*. These reports have highlighted inspiring examples of species saved from extinction, populations recovering, threats reduced and ecosystems restored.

However, the latest information paints a stark picture. Drawing on data for all 11,185 bird species from the IUCN Red List, alongside global datasets on Key Biodiversity Areas for birds, our science reveals a continuing deterioration in the status of the world's birds—and of biodiversity more broadly. Here we summarise this global picture for all bird species, providing the context for the report's focus on migratory birds and their flyways.

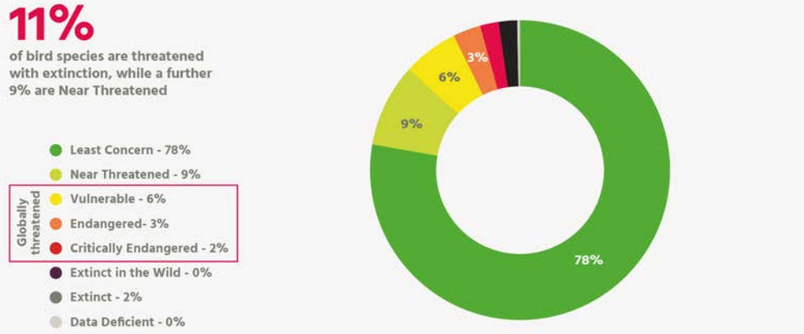
Data: BirdLife International (2026)

The state of all 11,185 bird species

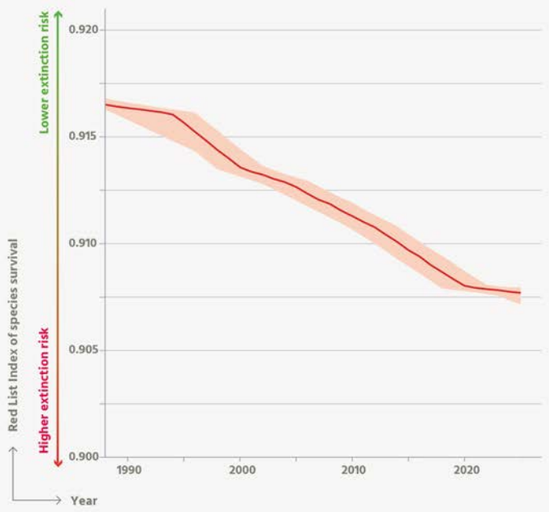
including non-migratory species

11%

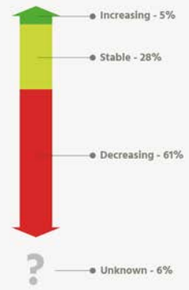
of bird species are threatened with extinction, while a further 9% are Near Threatened



The Red List Index for birds is declining, indicating an increasing risk of extinction



61% of bird species have declining populations



164

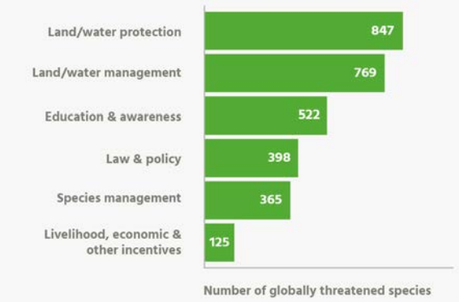
bird species are known or suspected to have gone extinct since 1500

Numerous threats continue to drive declines

with most birds impacted by more than one threat

Protection of land and water

is the conservation action needed for most globally threatened bird species



48%

of each key site for birds (IBA/KBA) is covered by protected and conserved areas, on average

Coverage by protected and conserved areas
- Complete - 21%
- Partial - 47%
- None - 32%

Mapping migration through global flyways

The ability to fly has made birds the most widespread and ecologically diverse group of vertebrates on Earth. Their remarkable mobility also underpins migration—a key adaptation that allows birds to track seasonal resources across changing environments. Every year, billions of birds migrate vast distances across the globe in response to environmental cues. These regular movements between breeding and non-breeding areas allow them to take advantage of seasonally changing resources, especially food. Understanding the routes used by migratory species is key to identifying pressures driving population declines and coordinating conservation actions at national and international scales.

What is migration?

Migration is the regular, repeated seasonal movement of birds between their breeding and non-breeding grounds. This report focuses exclusively on the 1,843 species recognised by BirdLife as full migrants—species for which a substantial proportion of the population undertakes regular movements beyond their breeding range, with predictable timing and destinations. It does not address partial migrants such as Masked Finfoot *Heliopais personatus* (CR↘), which have substantial sedentary populations, altitudinal migrants such as Rock Partridge *Alectoris graeca* (NT↘), which migrate seasonally between higher and lower elevations, or nomadic species such as Magpie Goose *Anseranas semipalmata* (LC→), which move in response to resources that are sporadic in time and distribution.

The evolution of migration research

Bird migration was a mystery for much of human history. Explanations for birds disappearing seasonally ranged from hibernation at the bottom of lakes, to migration to the moon and even transformation into other species. Evidence for transcontinental migration emerged in 1822, when German villagers shot a White Stork with an African spear through its neck. In 1899, the Danish ornithologist Hans Christian Cornelius Mortensen pioneered the use of metal leg bands to track birds across borders. More recently, rapid technological advances have transformed migration research. Increasingly small and sophisticated tracking devices now allow scientists to map migratory routes remotely and reveal not only where birds go, but also what they do along the way. There is much still to be discovered about migratory routes, with technological innovations increasingly helping to uncover new, and sometimes surprising movements.

What are flyways?

There is a wide array of different migratory strategies and considerable variability in migratory routes taken between and within bird species. Most species migrate along a broadly north-south axis, although movements across longitudinal gradients also occur. Some species undertake cross-continental journeys spanning thousands of kilometres, while others travel only relatively short distances. Species also differ in migration strategy, with some making frequent stops to rest and refuel, while others undertake long non-stop flights spanning entire oceans or deserts.

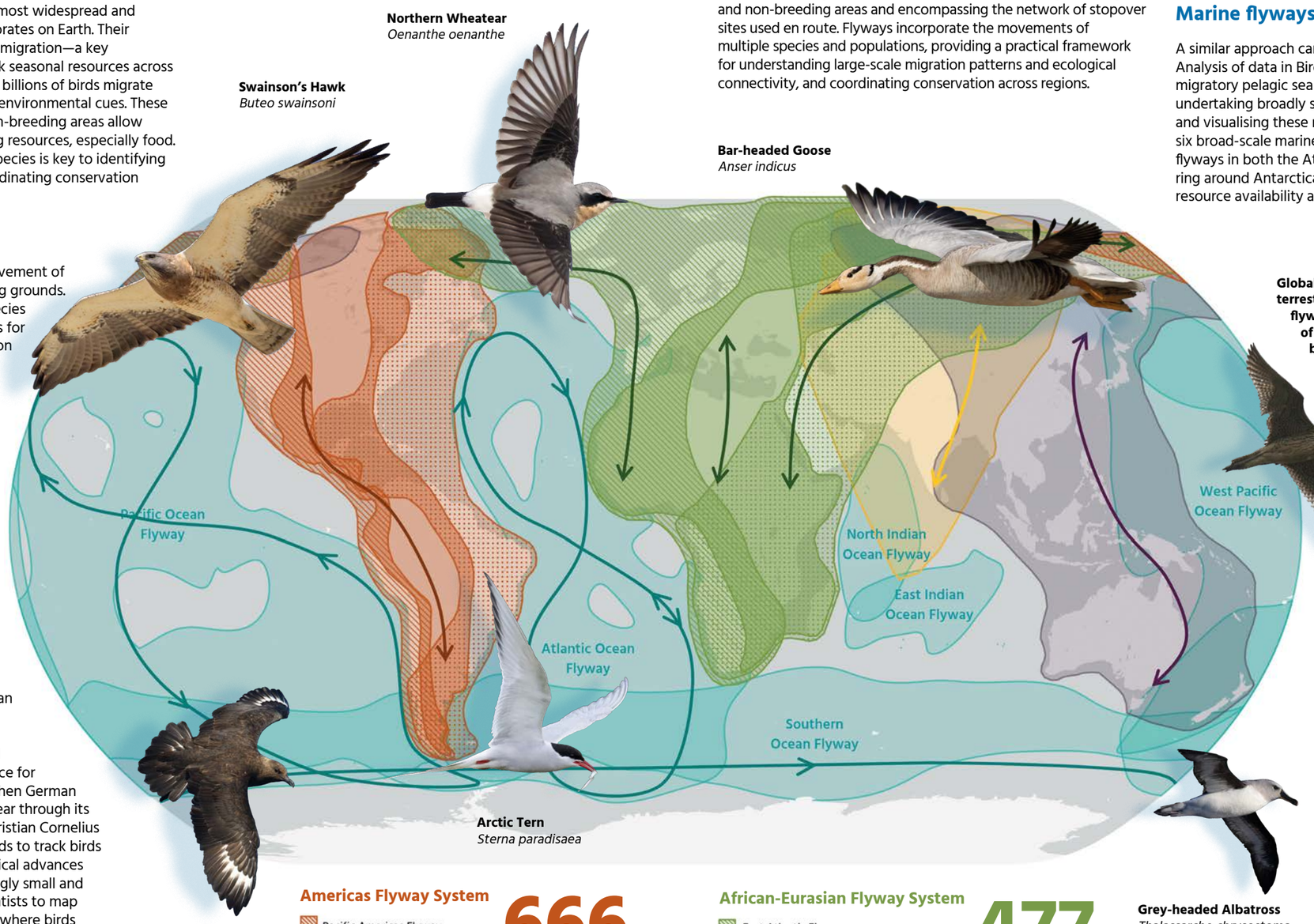
Amid this complexity emerge broad patterns that have enabled the identification of global flyways—major corridors linking breeding and non-breeding areas and encompassing the network of stopover sites used en route. Flyways incorporate the movements of multiple species and populations, providing a practical framework for understanding large-scale migration patterns and ecological connectivity, and coordinating conservation across regions.

Terrestrial flyways

Terrestrial flyways describe the broad routes used across land, coasts and sea by migratory landbirds and waterbirds, and are grouped into four major flyway systems—the Americas, Africa–Eurasia, Central Asia, and East Asia–Australasia. The first two can each be further subdivided into three individual flyways (see map). These flyways were defined by visualising the distributions of migratory species that undertake regular, long-distance, latitudinal movements between distinct breeding and non-breeding areas. Broad corridors were delineated which, between them, contain the majority of migratory species' movements, with each flyway encompassing all stages of the annual cycle[1].

Marine flyways

A similar approach can be taken in the marine realm for seabirds. Analysis of data in BirdLife's Seabird Tracking Database for migratory pelagic seabird species reveals groups of individuals undertaking broadly similar and repeatable movements. Combining and visualising these migratory routes has enabled identification of six broad-scale marine flyways[2]. These include large figure-of-eight flyways in both the Atlantic and Pacific Oceans and a circumpolar ring around Antarctica, reflecting movements influenced by resource availability and prevailing winds.



Global map showing terrestrial and marine flyways, with examples of the routes followed by some populations of migratory bird species along these flyways.

Central Asian Flyway

Central Asian Flyway

412
flyway species

East Asian-Australasian Flyway

East Asian-Australasian Flyway

551
flyway species

Marine Flyways

Marine Flyways

151
flyway species

Americas Flyway System

- Pacific Americas Flyway
- Central Americas Flyway
- Atlantic Americas Flyway

666
flyway species

African-Eurasian Flyway System

- East Atlantic Flyway
- Black Sea-Mediterranean Flyway
- East Asia-East Africa Flyway

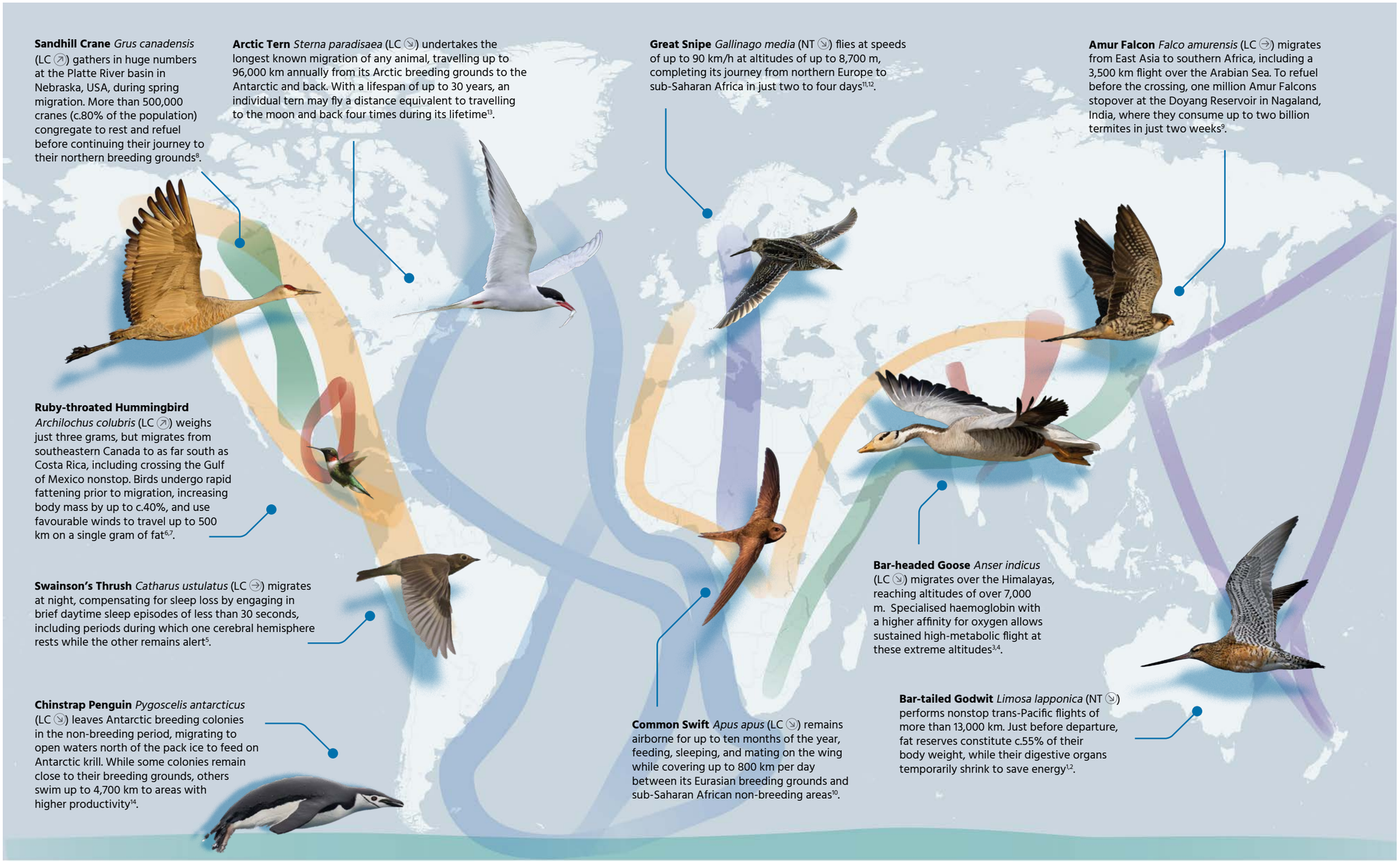
477
flyway species

Photos © Lars Petersson, Agami Photo Agency, Risto/Adobe Stock, John J. Harrison, Petr Simon/Shutterstock

References 1. Kirby (2010), 2. Morten *et al.* (2025)

The remarkable journeys of migratory birds

Twice a year, billions of individual birds—some weighing just a few grams—undertake extraordinary migrations across continents, oceans, deserts and mountains, demonstrating exceptional endurance and navigational skill. These journeys depend on specialised physiological adaptations, including efficient respiratory systems and substantial fat reserves that sustain prolonged flight. Migratory birds also possess sophisticated orientation capabilities and behavioural strategies that allow them to navigate vast distances and exploit peak food availability at stopover sites. Some groups of birds need to migrate by day, making use of thermals and updraughts to aid flight, while others migrate by night to maximise feeding opportunities by day, make use of celestial cues, avoid predators or keep cool. Many migrating birds use routes that minimise crossings over large waterbodies. Together, these adaptations enable migratory birds to accomplish some of the most remarkable journeys in the animal kingdom.



Sandhill Crane *Grus canadensis* (LC ↗) gathers in huge numbers at the Platte River basin in Nebraska, USA, during spring migration. More than 500,000 cranes (c.80% of the population) congregate to rest and refuel before continuing their journey to their northern breeding grounds[8].

Arctic Tern *Sterna paradisaea* (LC ↘) undertakes the longest known migration of any animal, travelling up to 96,000 km annually from its Arctic breeding grounds to the Antarctic and back. With a lifespan of up to 30 years, an individual tern may fly a distance equivalent to travelling to the moon and back four times during its lifetime[13].

Great Snipe *Gallinago media* (NT ↘) flies at speeds of up to 90 km/h at altitudes of up to 8,700 m, completing its journey from northern Europe to sub-Saharan Africa in just two to four days[11,12].

Amur Falcon *Falco amurensis* (LC →) migrates from East Asia to southern Africa, including a 3,500 km flight over the Arabian Sea. To refuel before the crossing, one million Amur Falcons stopover at the Doyang Reservoir in Nagaland, India, where they consume up to two billion termites in just two weeks[9].

Ruby-throated Hummingbird *Archilochus colubris* (LC ↗) weighs just three grams, but migrates from southeastern Canada to as far south as Costa Rica, including crossing the Gulf of Mexico nonstop. Birds undergo rapid fattening prior to migration, increasing body mass by up to c.40%, and use favourable winds to travel up to 500 km on a single gram of fat[6,7].

Swainson's Thrush *Catharus ustulatus* (LC →) migrates at night, compensating for sleep loss by engaging in brief daytime sleep episodes of less than 30 seconds, including periods during which one cerebral hemisphere rests while the other remains alert[5].

Chinstrap Penguin *Pygoscelis antarcticus* (LC ↘) leaves Antarctic breeding colonies in the non-breeding period, migrating to open waters north of the pack ice to feed on Antarctic krill. While some colonies remain close to their breeding grounds, others swim up to 4,700 km to areas with higher productivity[14].

Common Swift *Apus apus* (LC ↘) remains airborne for up to ten months of the year, feeding, sleeping, and mating on the wing while covering up to 800 km per day between its Eurasian breeding grounds and sub-Saharan African non-breeding areas[10].

Bar-headed Goose *Anser indicus* (LC ↘) migrates over the Himalayas, reaching altitudes of over 7,000 m. Specialised haemoglobin with a higher affinity for oxygen allows sustained high-metabolic flight at these extreme altitudes[3,4].

Bar-tailed Godwit *Limosa lapponica* (NT ↘) performs nonstop trans-Pacific flights of more than 13,000 km. Just before departure, fat reserves constitute c.55% of their body weight, while their digestive organs temporarily shrink to save energy[1,2].

Photos © Dubi Shapiro, Petr Simon/ Shutterstock, Steve Byland/Shutterstock, Stephen Davies, Alan Van Norman, Lars Petersson, Alex Cooper Photography/Shutterstock, Dennis Jacobsen/Shutterstock

References 1. USGS (2022), 2. Piersma & Gill (1998), 3. Hawkes *et al.* (2013), 4. Jessen *et al.* (1991), 5. Fuchs *et al.* (2006), 6. Lasiewski (1962), 7. Hou & Welch (2016), 8. Ostrom & Caven (2026), 9. Kaur *et al.* (2024), 10. Åkesson & Bianco (2021), 11. Klaassen *et al.* (2011), 12. Lindström *et al.* (2021), 13. Newcastle University (2016), 14. Wilson *et al.* (2025)

The importance of migratory birds

Migratory birds play a critical role in the functioning of ecosystems, providing a wide range of benefits to both wildlife and people. Across their interconnected networks of breeding, non-breeding and stopover sites, they regulate insect populations, pollinate plants and act as ecosystem engineers. Their long-distance movements also facilitate seed dispersal and nutrient cycling, creating ecological connectivity between disparate ecosystems. Beyond their ecological importance, migratory birds hold deep cultural significance. Their journeys mark the changing seasons and have inspired art, music, folklore and religion for millennia. They are also widely appreciated and economically important, supporting ecotourism and livelihoods in many regions and attracting birders worldwide.

Nutrient cycling

Through their droppings, seabirds deposit marine-derived nutrients on land and in coastal waters, enriching soils and boosting primary productivity across coastal ecosystems such as coral reefs, tundra and mangroves[1,2,3].

Seed dispersal

During migration, Pink-footed Goose *Anser brachyrhynchus* (LC↗) disperses seeds across distances exceeding 2,000 km, facilitating climate-driven range shifts of terrestrial and aquatic plants[4].

Pest control

Birds consume an estimated 400–500 million tonnes of insect prey every year[5]. In Europe, migratory species comprise 88% of the bird species that provide control of agricultural insect pests, and 80% of those providing control of rodent pests[6].

Tourism

Migratory bird-based tourism was valued at US$14.7 billion globally in 2025 and is projected to reach US$28.9 billion by 2035[8].

Pollination

Rufous Hummingbird *Selasphorus rufus* (NT↘) travels from Mexico to as far north as Alaska, transferring pollen along nectar corridors that provide critical stopover resources during their migration[7].

Human health and wellbeing

The ecosystem services provided by birds support human wellbeing globally. There is also growing evidence that birding can improve mental health, reduce stress and may help protect against cognitive decline, particularly among urban populations in high-income countries with predominantly indoor lifestyles[9,10,11].

The key sites identified as crucial to the conservation of migratory birds—Key Biodiversity Areas (KBAs)—also deliver essential ecosystem services to people. They supply food and timber, purify water, store carbon, reduce flood risk, and create opportunities for ecotourism. One recent estimate suggests that wetlands—a key habitat for many migratory birds—provide benefits to people globally worth US$7.98–US$39.01 trillion every year, and sustain livelihoods for more than one billion people[12]. Therefore, conservation of migratory bird habitats simultaneously supports biodiversity, climate regulation and human wellbeing.

Resource provision

India's Western Ghats mountain range provides non-breeding habitat for migratory birds in the Central Asian Flyway, with multiple KBAs identified in this region. The forests of the Western Ghats also supply essential resources to Indigenous communities, including food, fodder, firewood, and timber[13].

Water purification and flood control

The Pantanal in South America is the world's largest tropical wetland, providing key stopover and non-breeding areas for migratory birds in the Americas Flyway. The Pantanal ecosystem reduces downstream flooding and delivers clean water by absorbing runoff in the rainy season, filtering out pollutants and slowly releasing water in the dry season[16].

Carbon storage and climate regulation

The seagrass beds of Banc d'Arguin National Park in Mauritania—a KBA that hosts more than two million migratory waterbirds every year—are estimated to store 109 million tonnes of carbon. This is equivalent to the average annual emissions of more than 100 coal-fired power plants[14,15].

Recreational and cultural value

Cranes hold deep cultural significance across many societies, symbolising longevity, good fortune and peace. This reverence is reflected in annual festivals celebrating their seasonal migrations, held at key sites around the globe. In Phobjikha Valley, Bhutan, communities gather each November to welcome the return of Black-necked Crane *Grus nigricollis* (NT→) to its non-breeding grounds. Similarly, the Aransas National Wildlife Refuge in Texas, USA, hosts a yearly festival to mark the arrival of the Whooping Crane *Grus americana* (EN↗).

Photos © David Fisher, Lars Petersson, Andrey Gulivanov, seventyfourimages, Veronika Andrews, Dave Hutchison, saiko3p/Adobe Stock, bilanol, Jigme Tshering

References 1. Zwolicki *et al.* (2025), 2. Appoo *et al.* (2024), 3. Graham *et al.* (2018), 4. Lovas-Kiss *et al.* (2023), 5. Nyffeler *et al.* (2018), 6. Civantos *et al.* (2012), 7. Nabhan *et al.* (2004), 8. Future Market Insights (2025), 9. Chen *et al.* (2025), 10. Peterson *et al.* (2024), 11. Wing *et al.* (2026), 12. Convention on Wetlands (2025), 13. Balasubramanian & Sangha (2023), 14. UNESCO (2020), 15. EPA (2024), 16. Junk & de Cunha (2005)

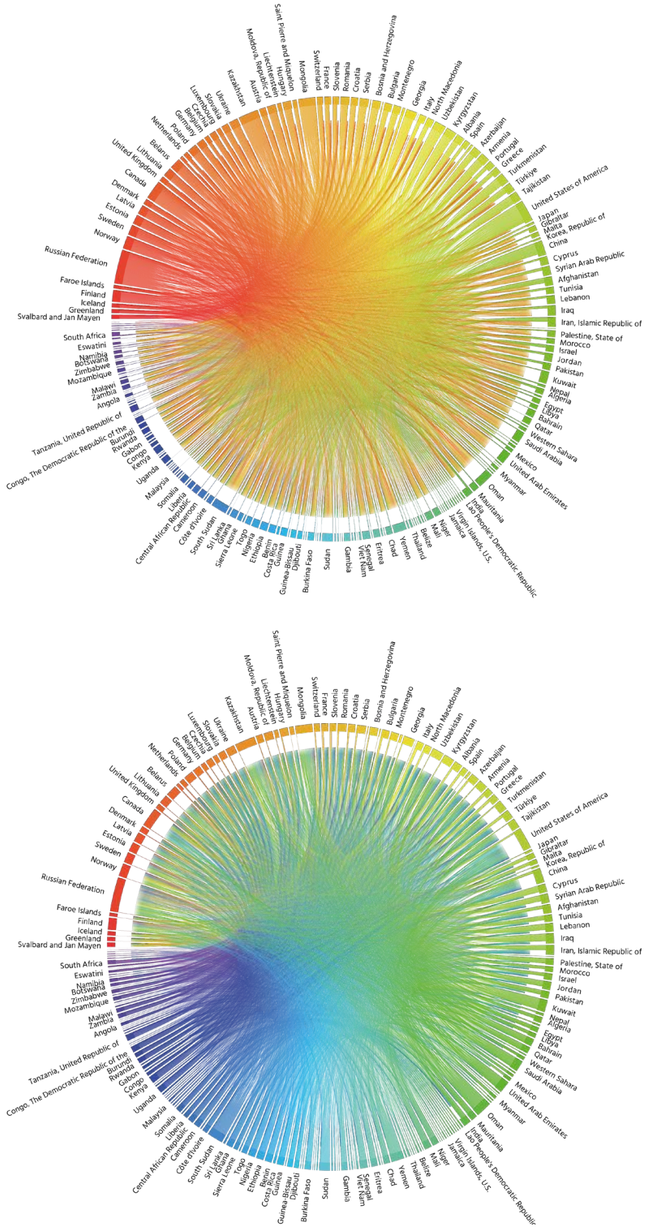
CONNECTING CONTINENTS:

Migratory birds are a shared natural heritage

The major flyways used by migratory birds span entire oceans and continents, collectively connecting every region of the world. Even remote islands and polar regions are part of these vast global ecological networks, and birds are unique in the scale of these connections. Through bird migration, every country is connected to at least one other: birds that breed, stop over on passage or spend the non-breeding period in one country depend on sites in many others throughout their annual cycle. This reliance on a network of interconnected sites leaves migratory birds vulnerable to a wide variety of pressures and means that no single country can conserve them alone, as threats or inaction in one country can quickly undermine conservation efforts elsewhere in the flyway. It also makes them a shared natural heritage, and their conservation a global responsibility.

Migratory birds connect every country in the world

Analysis of seasonal occurrence data for migratory birds in each of the world's terrestrial flyway systems reveals the scale of connectivity between breeding and non-breeding countries. Most countries are linked to many others, often across great distances, with some emerging as particularly well connected. Russia, Canada, the USA and Kazakhstan have the most connections in the breeding range, each linked to more than 100 countries and territories at lower latitudes. In the non-breeding range, countries in sub-Saharan Africa and the Arabian Peninsula are among the most connected, with some such as South Sudan and Oman hosting non-breeding populations of birds that breed in more than 80 countries and territories across Eurasia.



Chord diagrams showing connections between breeding and non-breeding countries (top), and non-breeding and breeding countries (bottom) for migratory birds, based on analysis of seasonal occurrence data from the IUCN Red List. Countries are arranged clockwise from north to south and coloured along a continuous colour gradient (red to purple) corresponding to latitude. Line thickness is proportional to the number of shared species. Note that some labels have been omitted due to space restrictions. Data: BirdLife International (2026)

Guadalquivir Marshes, Spain

Tejo Estuary, Portugal

Wonseradeel & Workum, Netherlands

Black-tailed Godwit *Limosa limosa*.
Photo © RK, Adobe Stock

Networks of thousands of sites support migratory birds across flyways

Migratory birds depend on interconnected networks of sites across their flyways to breed, rest and refuel during migration, and spend the non-breeding season. For example, Black-tailed Godwit *Limosa limosa* (NT↘) breeds in wet grasslands in Europe and Asia, before migrating south to spend the non-breeding season in coastal and inland wetlands across Africa, Europe, Asia and Australasia. Analysis of ringing recoveries, re-sightings and satellite tracking data from more than 10,000 individuals has revealed a network of 1,058 sites used by this species in the East Atlantic Flyway[1]. Some of these sites play a particularly important role in maintaining connectivity of the wider network. On average, the 49 sites ranking highest for connectivity are each linked to 48 other sites and 8 other countries. Three sites—Guadalquivir Marshes (Spain), Tejo Estuary (Portugal) and Wonseradeel & Workum (the Netherlands)—each have more than 200 links to other sites in 12 to 16 countries. Similar research on 35 migratory bird species in the East Asian–Australasian Flyway has demonstrated migratory connectivity between the Zhejiang coast of China and at least 18 other locations across nine countries within the flyway[2].

Migratory connections between three focal sites and other wetlands used by Black-tailed Godwit, based on ringing recoveries, re-sightings and satellite tracking data. Red lines represent direct connections between sites (relocations of an individual within 20 days). Points show site coordinates. Countries containing linked sites are shaded in green. Data: Beal *et al.* (2025)

References 1. Beal *et al.* (2025), 2. Liu *et al.* (2024)

Section 2

Migratory bird populations are in decline 28

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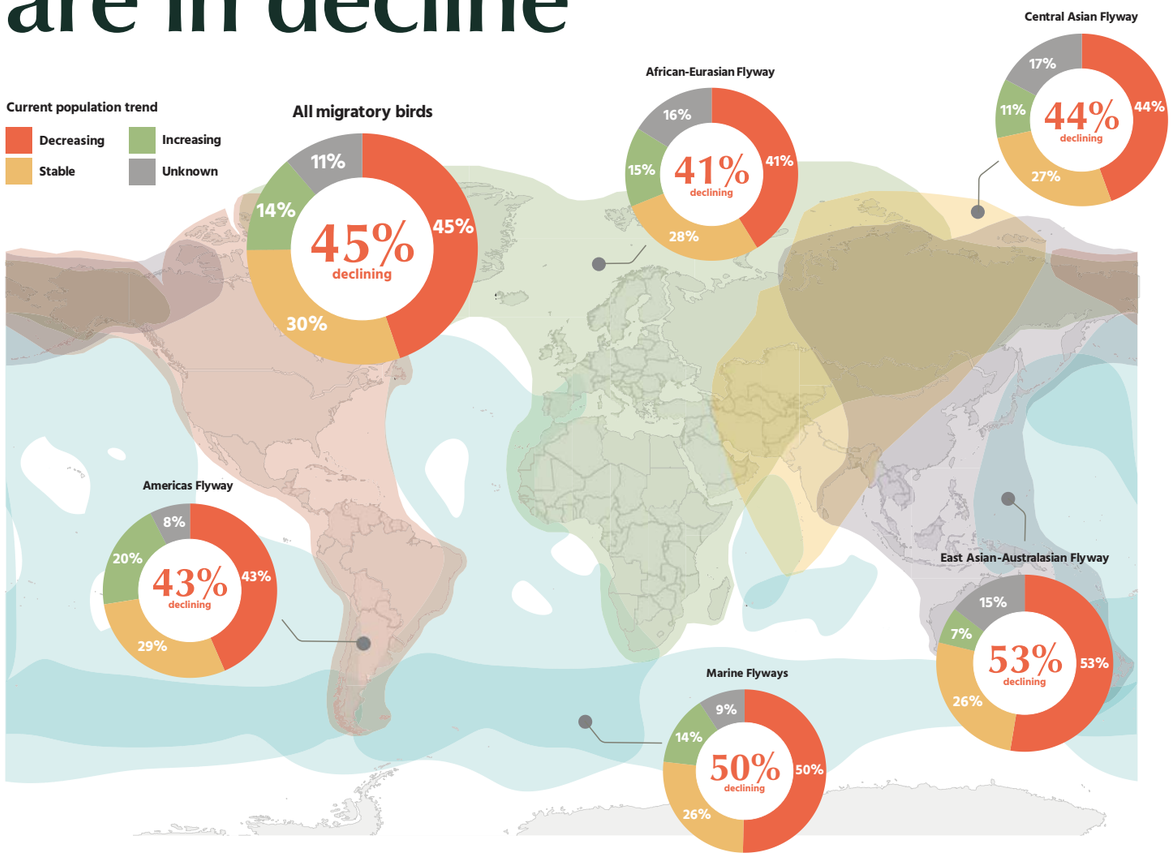
Extinction risk is escalating 32

The network of sites used by migratory birds is degraded and fragmented 34

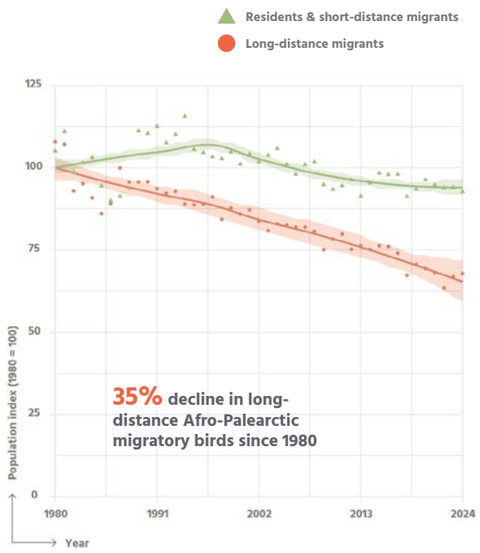
Egyptian Vulture *Neophron percnopterus*.
Photo © Wirestock, Adobe Stock

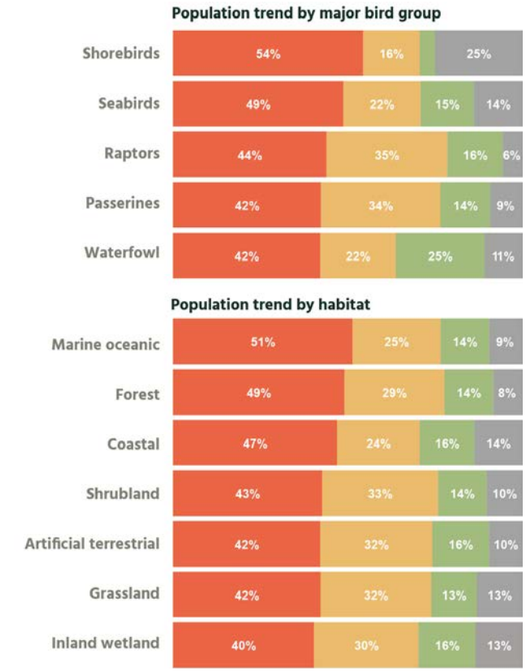
Migratory bird populations are in decline



Data from the IUCN Red List reveal that 45% of all 1,843 migratory bird species have declining global population trends, while 30% are stable, 14% increasing, and 11% have unknown trends[1]. Declines are particularly pronounced in certain flyways. Among the four terrestrial flyway systems, East Asia-Australasia has the highest proportion of declining species (53%), while 50% of all species that use the six marine flyways are in decline. Some groups are especially affected: 54% of migratory shorebirds and 49% of migratory seabirds are declining. Species that use marine habitats, forests and coastal wetlands are also faring poorly, with 47 to 51% experiencing population declines.

Many migratory species with stable or increasing global population trends are nevertheless experiencing declines in at least part of their range. Migratory birds tend to have large geographic ranges, meaning that population declines in one region may be offset by increasing populations elsewhere. In contrast, many non-migratory birds have smaller ranges, meaning that local population declines are more likely to match global trends. Monitoring of migratory birds is also patchy, so there are significant knowledge gaps on the population trends of many species.





Global population trends for migratory birds by flyway, major bird group, and habitat. Coastal includes neritic, intertidal and supratidal habitats. Note that not all habitats and species groups are shown. Data: BirdLife International (2026)

Flyway-scale monitoring reveals concerning losses

Long-term monitoring schemes provide critical insight into regional trends of migratory birds. The Central Asian and East Asian–Australasian Flyways are poorly covered by such schemes, but data are available for the African-Eurasian and Americas Flyways. Data from the Pan-European Common Bird Monitoring Scheme from 1980 to 2024 show a relatively stable trend for residents and short-distance migratory species, but a c.35% decline in long-distance migratory species[2]. In North America, long-term radar and survey data indicate that a total of 419 migratory species suffered a net loss of 2.5 billion individuals during 1970–2017, while 100 resident species showed a small net increase[3].

Population indices showing average relative abundance for long-distance Afro-Palearctic migratory birds (62 species) and short-distance migratory birds and resident breeding birds (108 species). Data: figure from Vickery *et al.* (2023), updated to 2024 using data from 30 countries covered by the Pan-European Common Bird Monitoring Scheme (EBCC/BirdLife International/ RSPB/CSO/European Commission), with thanks to the volunteer observers who collect these data.

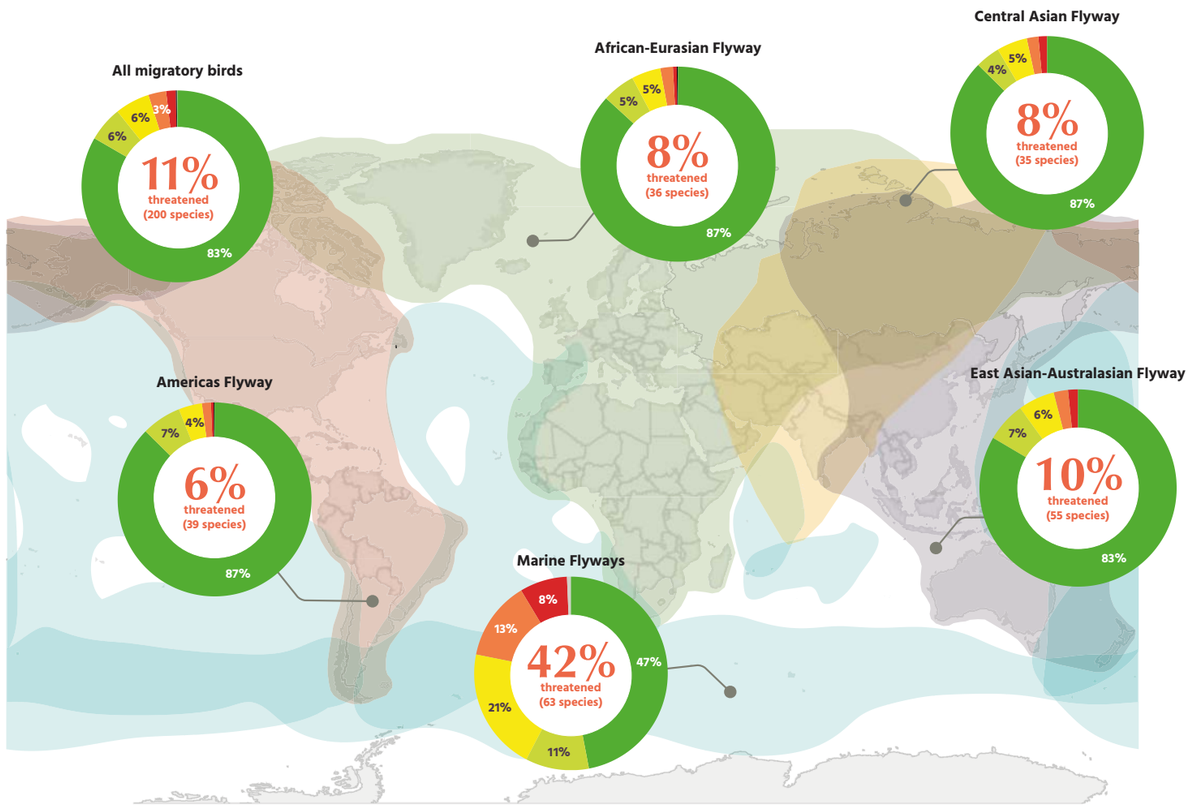
Migratory shorebird populations are collapsing

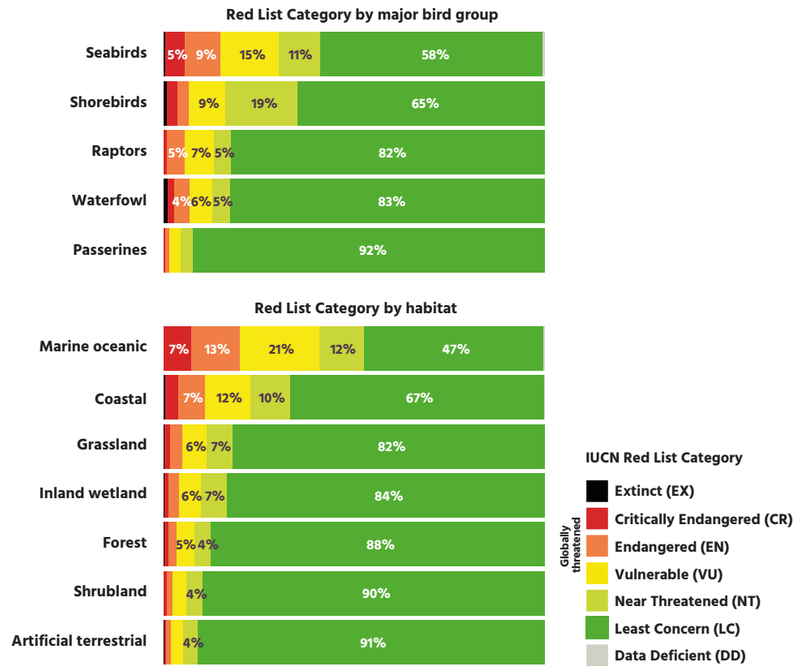
Migratory shorebirds depend on a network of highly productive stopover sites to fuel their long-distance journeys. This reliance on a comparatively small, patchily distributed area of habitat exposes shorebirds to a wide range of threats. Long-term monitoring reveals steep declines across multiple regions. In North America, 26 out of 28 shorebird species (93%) declined in abundance during 1980–2019, with more than half experiencing declines of over 50%[4]. In Australia, 13 of 15 monitored migratory shorebirds have declined over three generations or ten years, including three species that have declined by more than 30%, and four by more than 50%[5]. Similar patterns are evident in the East Atlantic Flyway, where shorebirds comprise the majority of the 35% of migratory waterbirds that have declined over the last decade, and include some of the most rapidly declining species[6]. In Bangladesh, 12 out of 20 shorebird species declined between 2009 and 2023, with species dependent on coastal habitats such as Spoon-billed Sandpiper *Calidris pygmaea* (CR↘) experiencing the greatest declines[7]. In 2024, our annual update to the IUCN Red List reflected these worrying trends, with 16 migratory shorebird species reclassified to higher categories of extinction risk[8].

Dunlin *Calidris alpina*.
Photo © Remo_K, Shutterstock

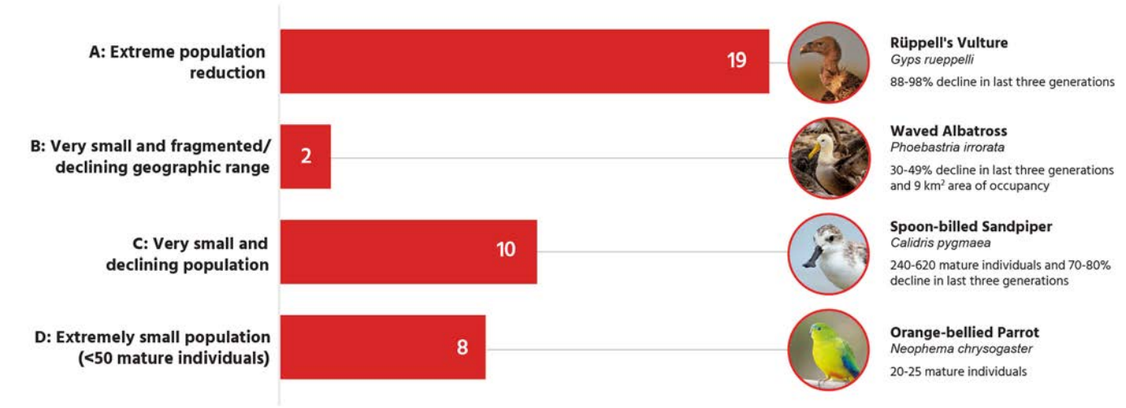
References 1. BirdLife International (2026), 2. Vickery *et al.* (2023), 3. Rosenberg *et al.* (2019), 4. Smith *et al.* (2023), 5. Rogers *et al.* (2023), 6. van Roomen *et al.* (2025), 7. Chowdhury *et al.* (2026), 8. BirdLife International (2025)

Many migratory birds are at risk of extinction





Global Red List categories of extinction risk for migratory birds by flyway, major bird group, and habitat. Coastal includes neritic, intertidal and supratidal habitats. Note that not all habitats and species groups are shown. Data: BirdLife International (2026)



The number of Critically Endangered migratory bird species meeting each Red List criterion, with examples of species in each group. Note that each species may meet multiple criteria. Data: BirdLife International (2026)

The latest global assessments for migratory birds on the IUCN Red List show that 200 species (11%) meet the criteria for listing as threatened: 32 are classified as Critically Endangered, 57 as Endangered, and 111 as Vulnerable[1]. A further 111 migratory species are categorised as Near Threatened, meaning that they are close to qualifying as threatened. Around 17% of the world's migratory birds can therefore be considered of significant conservation concern. Substantial knowledge gaps remain for many migratory species, with monitoring schemes operating in only parts of their often-extensive ranges. Therefore, the true number of species threatened with extinction might be even higher.

Seabirds and shorebirds are among the most threatened migratory species

The proportion of globally threatened species varies markedly between flyways. The highest proportion occurs within the six marine flyways, where 63 (42%) of the 151 migratory seabird species that use these routes are globally threatened. Among the four terrestrial flyway systems, the East Asian–Australasian Flyway supports the greatest proportion of threatened species (55 of 551 species, 10%), while the Americas Flyway has the lowest proportion (39 of 666 species, 6%). There is also significant variation between major bird groups. Migratory seabirds and shorebirds are among the most threatened groups, with 30% and 15% respectively listed as globally threatened, while passerines are the least threatened, at 4%. Reflecting these patterns, marine oceanic and coastal habitats support the highest proportion of threatened migratory species.

More than 30 migratory species are Critically Endangered

A total of 32 migratory bird species are classified as Critically Endangered, meaning that they are at extremely high risk of extinction in the near future. This is because they have a very small and fragmented or declining population or range, are declining extremely rapidly, or have a tiny population. Eight species are suspected to have populations numbering fewer than 50 mature individuals, including Crested Shelduck *Tadorna cristata* (CR(?)) and Fiji Petrel *Pseudobulweria macgillivrayi* (CR(↘)). Another 19 species have experienced or are predicted to experience population declines exceeding 80% over three generations or ten years, including Lesser Florican *Sypheotides indicus* (CR(↘)) and Baer's Pochard *Aythya baeri* (CR(↘)). As threats to migratory species may occur in the breeding, passage and non-breeding range, it can be particularly challenging to identify the causes of decline and implement conservation actions before it is too late.

References 1. BirdLife International (2026)

Photos © Andre Botha, karkozphoto, Butterfly Hunter/Shutterstock, JJ Harrison

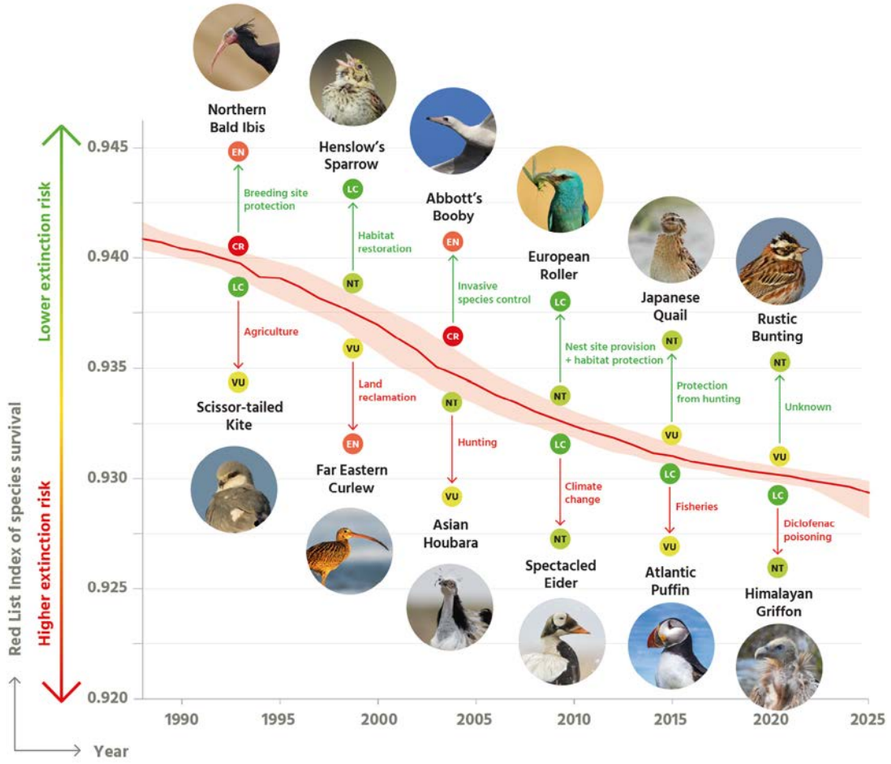
Extinction risk is escalating

Biodiversity loss is one of the greatest challenges facing humanity. Extinction rates are now tens to hundreds of times faster than the average over the last 10 million years, and have accelerated in the last few centuries. Bird extinctions illustrate the growing impact of human pressures. Since 1500, human activities have driven an accelerating wave of extinctions through overexploitation, invasive alien species and, increasingly, habitat destruction. In some cases, species declined so rapidly across large migratory ranges that the causes were difficult to diagnose before populations reached critically low levels. The recent extinction of the Slender-billed Curlew *Numenius tenuirostris* (EX) exemplifies this. Once widespread across the African-Eurasian Flyway, the species declined rapidly during the early 20th century, becoming exceptionally rare before efforts commenced to identify and address the drivers of decline.

The Red List Index shows a net fall in migratory species survival probability

Birds have been comprehensively assessed for the IUCN Red List eight times since 1988, allowing analysis of trends in extinction risk over time using the Red List Index. The index for migratory birds has shown a steady decline over the last four decades, indicating an overall reduction in survival probability. Since 1988, 34 migratory species have qualified for downlisting to a lower Red List category due to a genuine improvement in status. However, these are outweighed by the 102 species that have qualified for uplisting to higher categories of risk owing to genuine deteriorations in status, resulting in a net increase in extinction risk across migratory birds[1].

The last known Slender-billed Curlew *Numenius tenuirostris*, Morocco, 1995. Photo © Chris Gormersall (rspb-images.com)

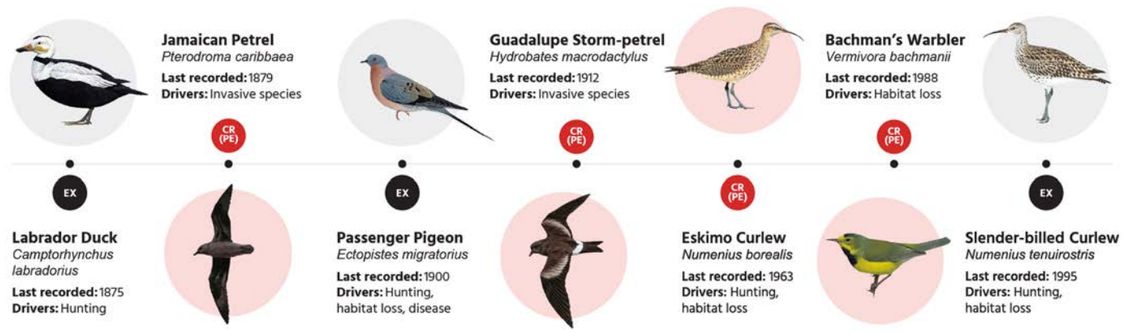


The Red List Index of species survival for migratory birds, with examples of species uplisted and downlisted in different time periods and the main factors driving these changes. Data: BirdLife International (2026)

Some migratory birds have already been driven to extinction

Historically, most documented bird extinctions have involved non-migratory species endemic to oceanic islands. These species often have highly restricted ranges, making them particularly vulnerable to localised threats such as invasive alien species, which can drive rapid population collapses. In contrast, many migratory species have extensive geographic ranges, which can buffer them against threats at a single site. However, as human pressures intensify and expand, even widespread migratory species are suffering severe declines. At least three migratory bird species have gone extinct since 1500, while a further four are suspected to be extinct but require confirmation through further surveys within their former ranges. All but one of these confirmed or suspected extinctions have occurred in the Americas, and all within the last 150 years. In 2025, the first known global extinction of a bird from mainland Eurasia was confirmed: Slender-billed Curlew *Numenius tenuirostris* (EX). The precise causes of its decline are not fully understood, but are thought to include the drainage of its raised bog breeding habitats for agriculture, loss of coastal wetlands in its non-breeding grounds, and hunting[2].

The seven migratory species confirmed or suspected to have gone extinct since 1500. CR(PE) indicates Critically Endangered (Possibly Extinct). Data: BirdLife International (2026)



Photos © Nick Athanas, Brian Woolman, Lars Petersson, WildMedia, Edmond Sham, Wang LiQiang, John Burnside, LouieLea

References 1. BirdLife International (2026), 2. Buchanan *et al.* (2025)

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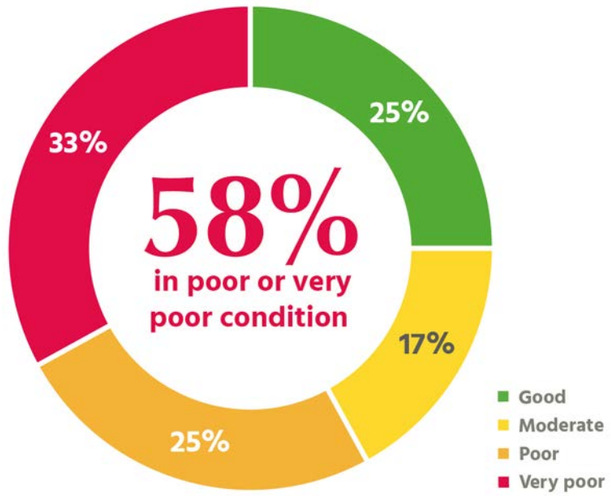
The network of sites used by migratory birds is degraded and fragmented

Migratory birds depend on an interconnected network of sites throughout their annual cycle. As they move between breeding and non-breeding areas, many birds take advantage of highly productive stopover sites to rest and refuel before continuing their journey. This network of habitats allows migration to take place. However, when habitats are lost or degraded due to anthropogenic pressures, the network becomes fragmented. Reduced area, quality or access to suitable habitat in the breeding, non-breeding or passage range of migratory birds decreases connectivity and has negative impacts on survival, reproduction and long-term population trends.

Many crucial sites for migratory birds are in a poor condition

Over the last 10 years (2016–2025), the conservation status of 1,099 Key Biodiversity Areas for migratory birds has been monitored using a systematic protocol. The results show that over half (58%) of these sites are assessed to be in poor or very poor condition, indicating that populations of the bird species that depend on them have become depleted[1].



Conservation status of Key Biodiversity Areas for migratory birds assessed in the last ten years (n = 1,099). Data: BirdLife International (2026)

Wetland habitats for migratory birds are being converted and lost

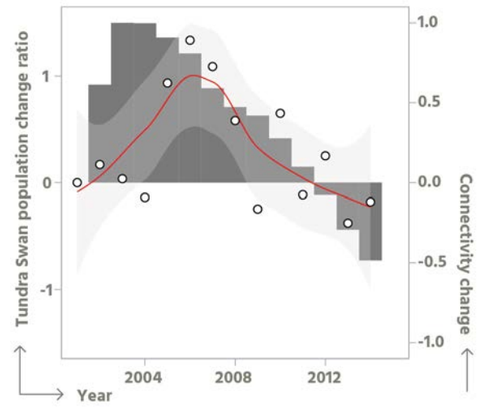
More than half of all migratory bird species occupy wetlands, and nearly a third are highly dependent on them. But these habitats have been heavily altered by humans, with many drained, degraded or converted for agriculture, forestry and development. Over the past three centuries, around 3.4 million km^2 of inland wetlands have disappeared—an area equivalent to the size of India—representing a 21% net loss and making them some of the most threatened habitats in the world[2,3]. Intertidal habitats are also at threat. Approximately 16% of tidal flat extent in East Asia, the Middle East and North America was lost during 1984–2016, driven by a combination of factors including coastal development, increased coastal erosion and sea-level rise[4]. This reduction in habitat availability and associated decline in food sources and safe resting places means that some stopover sites are no longer suitable, weakening the overall site network. Birds may be forced to travel further without stopping or use poorer quality habitats, increasing the energetic cost of migration, with carry-over effects on breeding and survival.

Tundra Swan *Cygnus columbianus*. Photo © Andrey Gulivanov (CC BY 2.0)

Loss of site connectivity accelerates migratory waterbird declines in the East Asian–Australasian Flyway

The East Asian–Australasian Flyway is used by more than 500 migratory species, but has historically been heavily impacted by coastal development, including land claim in key stopover wetlands in the Yellow Sea. Across the flyway, many inland and coastal wetlands have been lost and heavily degraded, threatening the species they support and the ecosystem services they provide to local communities.

For eight waterfowl species, including Tundra Swan *Cygnus columbianus* (LC→), that spend the non-breeding season in the Yangtze River Basin and migrate along this flyway, site network connectivity is a key predictor of population change[5]. As ecological connectivity decreases, populations also decline. Importantly, these effects are immediate and become even stronger when considering delayed responses over time, which suggests that migratory waterfowl cannot fully compensate for the continued loss of well-connected stopover sites. This pattern is also reflected in other migratory species that rely on wetland habitats along the East Asian–Australasian Flyway. For example, Far Eastern Curlew *Numenius madagascariensis* (EN ↘) has declined by 50–79% over the last three generations[6], largely due to habitat loss along this flyway. Safeguarding the entire network of key sites that migratory birds rely on is therefore essential.



Trends in Tundra Swan population size (white points and red line) and connectivity of migration networks (grey bars). Population change ratio is the difference between the population size in a given year and in 2001, divided by the population size in 2001. The red line shows a locally weighted smoothed trend, with grey shading indicating the 95% confidence interval. Connectivity change (grey bars) shows the standardised change in functional connectivity of the migration network relative to 1992, displayed with a 4-year lag because population trends were most strongly associated with earlier changes in connectivity. Data: Xu *et al.* (2019)

References 1. BirdLife International (2026), 2. Fluet-Chouinard *et al.* (2023), 3. Murray (2023), 4. Murray *et al.* (2019), 5. Xu *et al.* (2019), 6. Lilleyman *et al.* (2021)

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Common Crane *Grus grus*.
Photo © Lesny Ludek, Shutterstock.

Human actions threaten the world's migratory birds

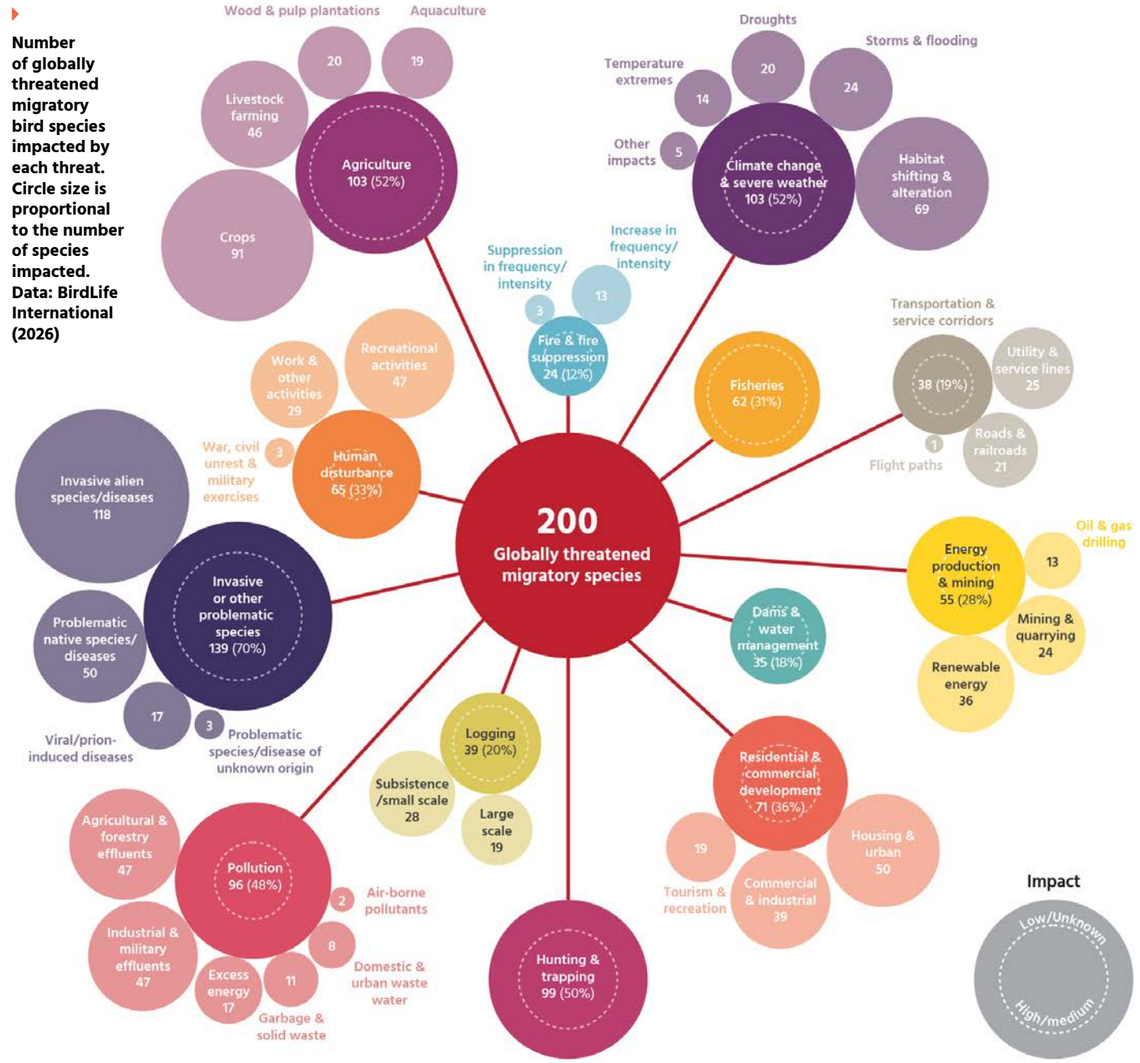
Multiple interconnected, predominantly human-induced threats are driving the extinction crisis. Threats may reduce species survival through habitat loss and degradation, direct mortality of individuals, or indirect effects such as reduced reproductive success. Most species are impacted by more than one threat, and many threats are interrelated—for example, residential development often necessitates expansion of transportation and service corridors, and may result in increased levels of pollution and human disturbance.

Migratory birds face a range of threats

Based on BirdLife's assessments for the IUCN Red List, the threats impacting the greatest number of globally threatened migratory bird species are: invasive and other problematic species and diseases (70%), agriculture (52%), climate change and severe weather (52%), hunting and trapping (50%), and pollution (48%)[1]. The impact of these threats on migratory bird populations varies—some, such as agriculture, have a medium to high impact on the majority of species they affect while others, such as human disturbance, tend to have a lower impact.

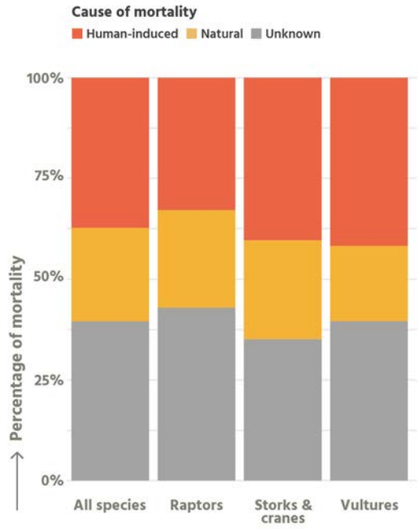
Photo © Bildagentur Zoonar GmbH, Shutterstock

Number of globally threatened migratory bird species impacted by each threat. Circle size is proportional to the number of species impacted. Data: BirdLife International (2026)



Human activities cause high mortality for migrating birds

While migration may provide a buffer against the impacts of highly localised threats at individual sites, it also exposes birds to a wide range of pressures throughout their annual cycle. Threats at migratory bottlenecks, such as land bridges or highly productive stopover sites, may have population-level effects. Satellite tracking technology provides insight into the timing and causes of mortality. The mortality rate for three long-distance migratory raptor species in the African–Eurasian Flyway is around six times higher during migration than during stationary periods, and more than half of all annual mortality occurs during this time[2]. Data from 45 species in the same flyway reveal a higher frequency of human-induced deaths than natural causes across all taxonomic groups, geographical areas and age classes[3]. Electrocution, illegal killing and poisoning are the main causes of human-induced mortality among these species.



Proportion of human-induced, natural and unknown causes of mortality for different groups of migratory birds in the African–Eurasian Flyway, based on satellite tracking data. Data: Serratosa *et al.* (2024)

References 1. BirdLife International (2026), 2. Klaassen *et al.* (2014), 3. Serratosa *et al.* (2024)

Invasive alien species and diseases

Invasive alien species are organisms that are spread by humans, either accidentally or deliberately, and establish beyond their natural range, harming native biodiversity through predation, competition, disease or ecosystem disruption. They occur worldwide and can impact migratory birds at any stage of their annual cycle. Invasive alien species at critical breeding sites can reduce reproductive success, while impacts at key stopover sites can depress survival during migration—a period already characterised by high natural mortality.

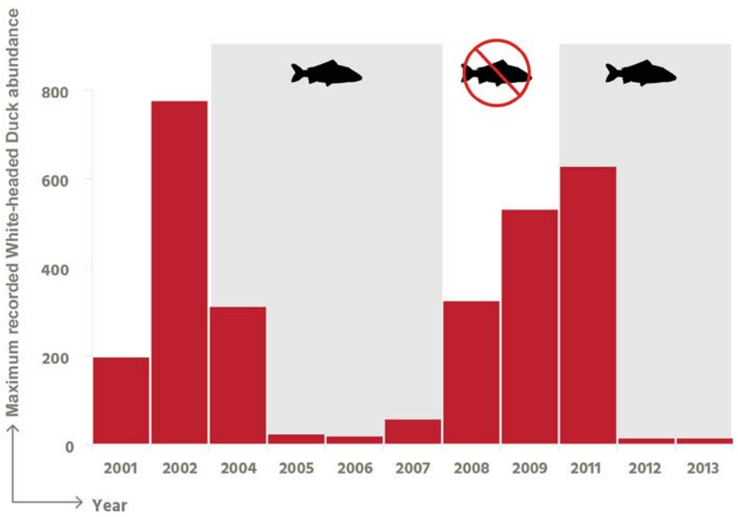
Underlying drivers

Global trade and transport have accelerated the intentional and unintentional introduction of invasive alien species and diseases. Land-use change and climate change compound the issue by facilitating the natural spread of species into new regions, while creating ecological stress that lowers the resilience of native species. Invasive alien diseases can pose particular problems. Intensive poultry production has facilitated the emergence of highly pathogenic strains of avian influenza, which have subsequently spilled over into wild bird populations through lax biosecurity.

Evidence for impact on migratory birds

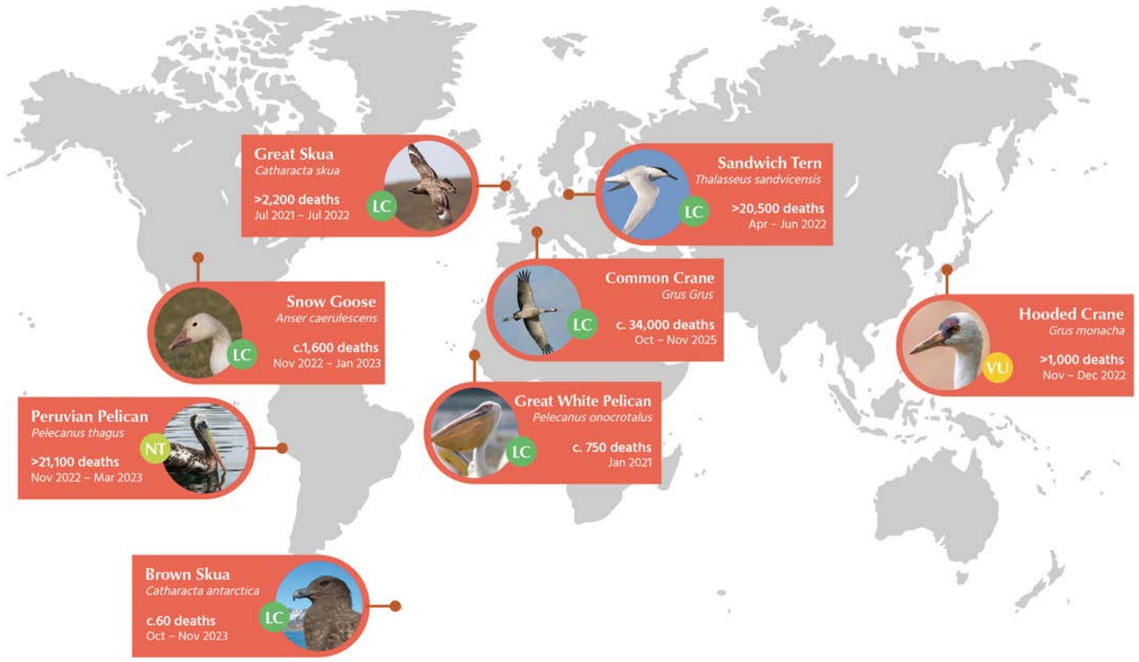
Invasive mammalian predators can significantly reduce survival and breeding success of migratory birds, particularly on remote islands where birds have evolved in the absence of such predators. Sub-Antarctic Marion Island is one of the world's most important nesting sites for migratory seabirds. House Mice *Mus musculus* were introduced to the island in the 19th century and, having exhausted other food sources, started predating seabird chicks. The scale and frequency of predation is increasing—mouse attacks are spreading across the island and impacting an increasing number of seabird species and individuals[1], with adults as well as chicks now affected[2,3]. Left unchecked, it is predicted that the mice will cause the local extinction of 18 out of the 28 migratory seabird species that currently breed on the island, with some, including Grey Petrel *Procellaria cinerea* (NT↘), expected to disappear within the next 30 years[4].

Invasive species may also impact migratory birds indirectly, for example through habitat modification and food-web disruption. Common Carp *Cyprinus carpio* is the most widely established invasive species of freshwater fish, found in more than 20% of the world's river basins[5]. Common Carp feed by vigorously sifting through sediment for invertebrates, resulting in wetland degradation due to increased water turbidity, reduced invertebrate populations and uprooting of aquatic plants. At Medina Lagoon, Spain—a Ramsar site and major breeding and non-breeding area for migratory waterbirds—introduction of Common Carp in 2003 caused significant changes to the waterbird community[6]. Diving ducks such as globally threatened White-headed Duck *Oxyura leucocephala* (EN↘) and Common Pochard *Aythya farina* (VU↘) declined dramatically, while fish-eating birds such as Grey Heron *Ardea cinerea* increased in abundance.



Changes in abundance of White-headed Duck at Medina Lagoon during 2001–2013. Common Carp were introduced to the lagoon in 2003, eradicated in 2007, and reintroduced in 2011. Data: Maceda-Veiga, López & Green (2017)

In recent decades, Highly Pathogenic Avian Influenza (HPAI) has emerged as a major global threat to migratory birds. Having first evolved in intensive poultry farms, HPAI has mutated to become increasingly virulent and better adapted to infecting wild birds. The highly contagious H5N1 strain has spread along flyways, infecting almost 600 wild bird species on every continent, including Antarctica and most recently Australasia. The disease is causing significant mortality of migratory birds, particularly congregatory species such as seabirds and waterbirds.



Examples of mass mortality of migratory birds due to Highly Pathogenic Avian Influenza. Data: Falchieri *et al.* (2022), Günther *et al.* (2025), Knief *et al.* (2024), Lo *et al.* (2022), Colorado Parks & Wildlife (2023), Gamarra-Toledo *et al.* (2023), Kuiken *et al.* (2025), EAAFP (2022)

Solutions

Improved biosecurity measures are crucial for preventing the introduction of invasive alien species and minimising the spread of disease from domesticated to wild birds. Where invasive alien species have already become established, management or, where possible, eradication is needed to reduce or eliminate impacts on native bird populations.

Responses

- p.66 Retain and restore habitats
- p.68 Control and eradicate invasive alien species
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. Dilley *et al.* (2016), 2. Jones *et al.* (2019), 3. Connan *et al.* (2024), 4. Preston *et al.* (2019), 5. Bernery *et al.* (2022), 6. Maceda-Veiga *et al.* (2017)

Agricultural expansion and intensification

Agricultural expansion and intensification are major drivers of land-use change and biodiversity loss. Agriculture now covers 44% of the world's habitable land—an area approximately five times the size of the USA[1]. Most recent agricultural expansion has occurred in the Global South, driving the loss of natural ecosystems and reduction of habitat diversity across the non-breeding ranges of many migratory birds. Low-intensity farmland provides important habitat for some species, for example rice paddies in Asia support many migratory shorebirds and landbirds. However, intensive agricultural systems are significantly less suitable for birds and other biodiversity.

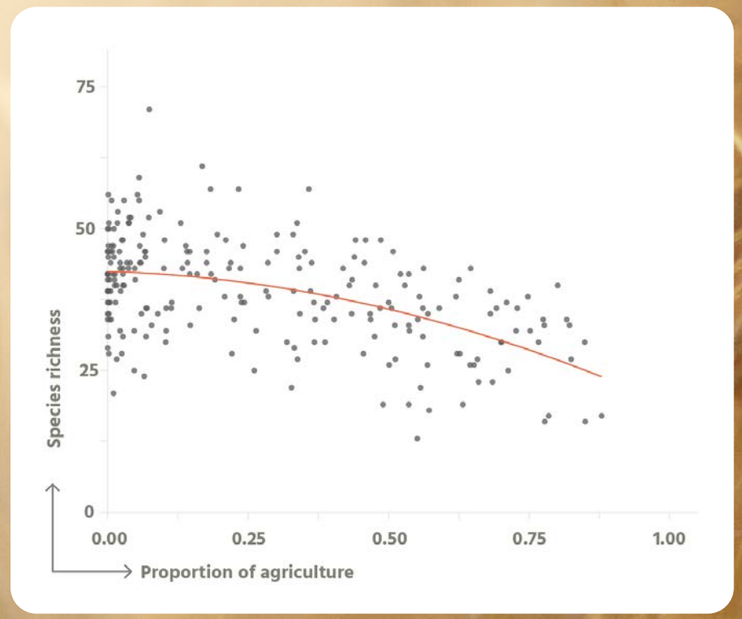
Underlying drivers

Rapid growth in human population size and wealth is driving rising demand for meat, dairy and commodity crops, increasing pressure to expand and intensify production. In many countries, perverse agricultural subsidies incentivise intensive unsustainable farming practices, reinforcing these trends.

Evidence for impact on migratory birds

Expansion of cropland and pasture reduces landscape heterogeneity, driving a decrease in bird diversity. In eastern Canada, studies on forest-breeding birds reveal a homogenisation of the bird community with increasing agricultural extent. As the proportion of agricultural land cover increases, bird communities become dominated by resident species such as Black-capped Chickadee *Poecile atricapillus* (LC↘) and short-distance migratory species like American Robin *Turdus migratorius* (LC→), while Neotropical migratory species such as Bay-breasted Warbler *Setophaga castanea* (LC↗) decline in abundance[2]. A possible explanation is that birds remaining in the vicinity of their breeding grounds throughout the year show a greater flexibility in diet and habitat use, allowing them to utilise multiple food sources during the changing seasons. In contrast, long-distance migratory species often have more specialised diets and foraging strategies and are therefore less able to adapt to changes in land use.

In tropical regions, agricultural expansion is often facilitated through forest clearance, driving declines in forest-dependent migratory birds. In Asia, densities of Siberian Blue Robin *Larvivora cyane* (LC↘) in the non-breeding range are markedly lower in disturbed and agricultural habitats compared with old-growth lowland rainforest[3].

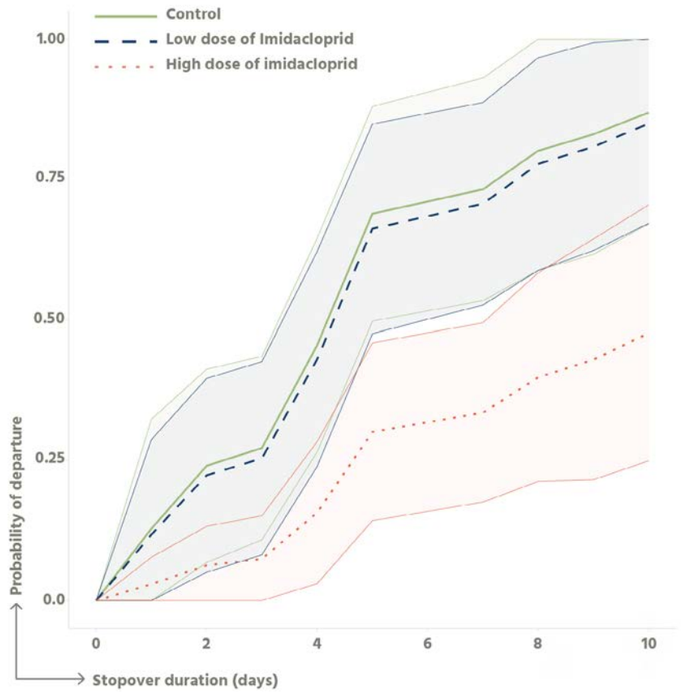


Change in species richness of forest-breeding migratory bird communities in Eastern Canada with increasing proportion of agriculture within a 5 km buffer. Data: Endenburg *et al.* (2019)

Agricultural intensification, particularly increased use of agrochemicals, is the main pressure driving population decline of common birds in Europe[4] and North America[5]. Agrochemicals negatively impact migratory birds in multiple ways. Pesticide use reduces the number of flying insects, resulting in declines in abundance and breeding success of migratory aerial insectivores[6]. Ingestion of insecticides by birds can have immediate, deadly effects. Numerous mass pesticide poisoning events involving migratory birds have been reported, including the deaths of more than 5,000 Swainson's Hawk *Buteo swainsoni* (LC↗) in Argentina during 1995–1996 due to monocrotophos[7], and nearly 1,000 Black Kite *Milvus migrans* (LC→) in southern Israel in 2025 linked to fenamiphos[8]. Ingestion of insecticides can also have non-lethal toxic effects that impact migration. For example, ingestion of the neonicotinoid insecticide imidacloprid by White-crowned Sparrow *Zonotrichia leucophrys* (LC→) causes a rapid reduction in body weight and delays departure from stopover sites[9,10], presumably impacting survival.

Some veterinary drugs used to treat livestock are highly toxic to scavenging birds, including migratory species. Diclofenac, a non-steroidal anti-inflammatory drug used in cattle, drove catastrophic population declines of Asian vultures in the 1990s and 2000s[11]. While veterinary use of diclofenac has now been banned in many South Asian countries, enforcement is often weak and use of other vulture-toxic drugs is still permitted[12]. In 2020, post-mortem examination of a Cinereous Vulture *Aegypius monachus* (NT↘) fledgling confirmed the first case of diclofenac poisoning in Europe[13].

The effect of the insecticide Imidacloprid on stopover duration of White-crowned Sparrow. Shading shows 95% confidence intervals. Data: Eng *et al.* (2019)



Solutions

Balancing food production with biodiversity conservation requires transformative change across food and farming systems. This includes effective spatial planning, shifting incentives to reward sustainable practices, curbing market demand for land-intensive commodities, reducing food waste and promoting shifts to more sustainable diets. Agricultural expansion into natural habitats must be minimised where possible, which may necessitate sustainable intensification where appropriate, and areas of low-intensity farming should be maintained. Agrochemicals and veterinary drugs that cause significant bird mortality must be banned.

Responses

- p.64 Protect and effectively manage key sites
- p.66 Retain and restore habitats
- p.72 Promote sustainable agriculture and forestry
- p.76 Implement nature-safe land use planning
- p.82-90 Enabling actions

References 1. Ritchie & Roser (2024), 2. Endenburg *et al.* (2019), 3. Wells (2007), 4. Rigal *et al.* (2023), 5. Leroy *et al.* (2026), 6. Møller (2019), 7. Goldstein *et al.* (1999), 8. The Media Line (2025), 9. Eng *et al.* (2017), 10. Eng *et al.* (2019), 11. Green *et al.* (2006), 12. Cook *et al.* (2024), 13. Herrero-Villar *et al.* (2021)

Climate change

Migratory species experience a wide range of environmental conditions along their flyways, making them likely to be impacted by climate change at some point in their annual cycle. Climate change is already affecting migratory birds and the network of habitats on which they depend, with impacts most apparent at higher latitudes. Rising temperatures, shifting rainfall patterns, alterations in seasonality and more frequent extreme weather events are transforming ecosystems. Migratory birds are particularly vulnerable to phenological shifts, which can create mismatches between the timing of breeding and peak food availability. Reduced food at stopover sites may increase the time required to refuel during migration, range shifts may extend migratory journeys, and habitat loss along the migratory route can reduce survival. Many species will experience multiple pressures—in North America, models indicate that 97% of 401 migratory bird species will be impacted by two or more climate-related threats under a 3°C warming scenario[1], with two-thirds of species moderately or highly vulnerable to climate change[2].

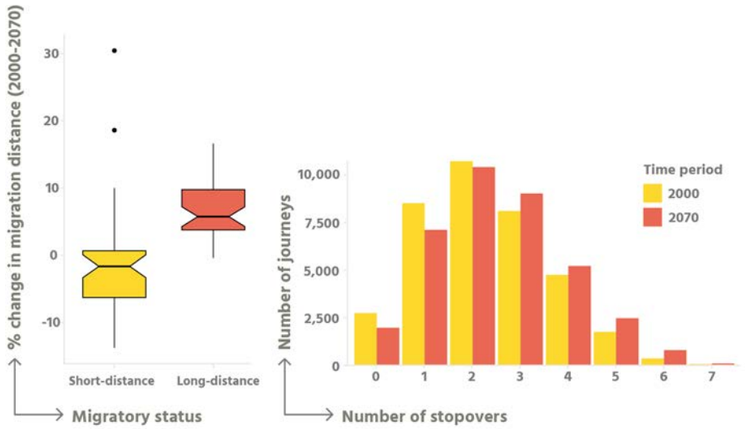
Underlying drivers

Human activities drive greenhouse gas emissions, particularly the use of fossil fuels and intensive agriculture. The loss of natural habitats through land-use change and deforestation further contribute by releasing stored carbon and reducing the planet's ability to absorb carbon dioxide. The impacts of climate change on biodiversity are intensified by other threats such as habitat loss and fragmentation, which limit species' ability to move or adapt to changing conditions. Human responses to climate change also pose severe challenges to other species.

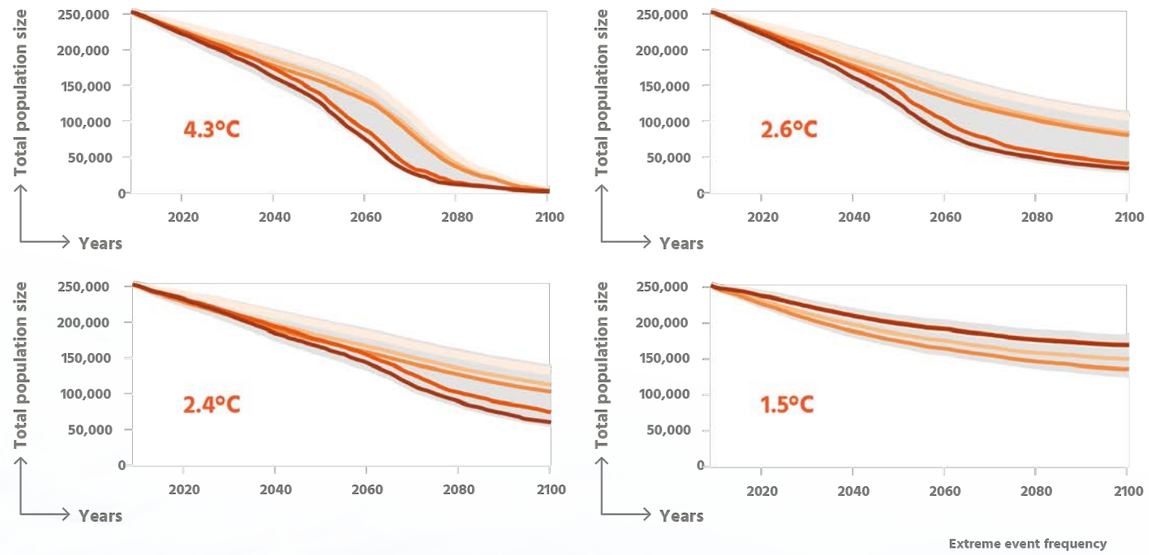
Evidence for impact on migratory birds

Rising temperatures are driving shifts and contractions in the ranges of many long-distance migratory birds. Monitoring data for 32 North American breeding bird species show northward shifts in all species since the early 1970s[3]. Unlike resident birds and short-distance migratory species, Neotropical migratory species have not expanded northward sufficiently to offset contractions at the southern edge of their range, resulting in a net loss of range extent. In the African-Eurasian Flyway, 13 migratory waterbird species—mainly Arctic-breeding shorebirds such as Sanderling *Calidris alba* (LC↘)—are projected to experience range reductions exceeding 30% in at least one season by 2050[4]. In Russia, climate change is driving a northward shift in the treeline, encroaching into tundra[5]. This is expected to cause significant loss of suitable breeding habitat for some tundra-breeding waterbirds in the East Asian–Australasian Flyway such as Curlew Sandpiper *Calidris ferruginea* (VU↘)[6].

Climate change and associated range shifts are also expected to alter migration distances. By 2070, mean migration distance is projected to increase for 37 long-distance African-Eurasian migratory birds such as European Bee-eater *Merops apiaster* (LC→), necessitating additional stopovers for 37% of journeys[7]. Longer journeys may increase energy expenditure, mortality risk and phenological mismatches[7,8].



Predicted change during 2000–2070 in migration distance and number of stopovers required during migration. Box plots show median change in migration distance (horizontal line), upper and lower quartiles (box), minimum and maximum values (verticle line) and outliers (points) for 77 European migratory bird species. Barchart shows the number of stopovers required for 37 species of long-distance migratory birds, based on the results of 1,000 simulations. Data: Howard *et al.* (2018)



Projected breeding population size of Emperor Penguin during 2009–2100 under different climate and extreme event scenarios. Temperatures represent different levels of mean global warming above pre-industrial levels. For each temperature scenario, models were run assuming no extreme events, historical rates of extreme events, or projected future rates of extreme events, and two demographic impacts of extreme events: complete breeding failure, or breeding failure plus a 10% reduction in adult survival. Data: Jenouvrier *et al.* (2021)

Earlier springs are increasing the risk of birds raising young after peak resource availability. Red Knot *Calidris canutus* (NT↘) breeding in the high-Arctic produce smaller offspring with shorter bills during summers with earlier snowmelt. These smaller individuals have reduced survival rates at their tropical non-breeding grounds, as they are unable to forage for deeply buried prey[9]. Globally, birds are advancing spring migration by 2.1 days per decade on average[10], but migration timing often still reflects historical rather than current conditions[11]. Reducing refuelling time at stopover or non-breeding sites may shorten journeys, but this flexibility is limited and may be insufficient given the scale of warming[12].

Sea level rise and ocean warming can have profound effects on coastal and marine ecosystems. In the East Asian–Australasian Flyway, rising sea levels during the 21st century are predicted to inundate up to 40% of intertidal wetland habitat used by ten migratory shorebird species[13]. The impact of this habitat loss on shorebird populations is likely to be magnified by the decline in migratory connectivity. Elevated sea surface temperatures at breeding grounds reduce prey abundance and survival in migratory seabirds[14,15], with ice-dependent species especially vulnerable. Record-low Antarctic sea ice in 2022 caused breeding failure in four of five Emperor Penguin *Aptenodytes forsteri* (NT↘) colonies in the Bellingshausen Sea[16]. Under high-emission scenarios, almost all colonies could become functionally extinct by 2100[17].

Solutions

Emissions must be cut by 45% by 2030 and net zero reached by 2050 in order to limit the global temperature increase to 1.5°C above pre-industrial levels. This can be achieved by shifting to nature-safe renewable energy, improving energy efficiency and transforming transport and food systems. Nature-based solutions enhance carbon storage and support biodiversity. Strong policy, climate finance and public action are essential to drive long-lasting change.

Responses

- p.64 Protect and effectively manage key sites
- p.66 Retain and restore habitats
- p.70 Integrate climate adaptation and biodiversity conservation
- p.72 Promote sustainable agriculture & forestry
- p.82-90 Enabling actions

References 1. Bateman *et al.* (2020a), 2. Bateman *et al.* (2020b), 3. Rushing *et al.* (2020), 4. Nagy *et al.* (2022), 5. Grigoriev *et al.* (2022), 6. Wauchope *et al.* (2017), 7. Howard *et al.* (2018), 8. Sergio *et al.* (2019), 9. van Gils *et al.* (2016), 10. Usui *et al.* (2017), 11. Robertson *et al.* (2024), 12. Linssen *et al.* (2025), 13. Iwamura *et al.* (2013), 14. Cruz-Flores *et al.* (2022), 15. Ramos *et al.* (2012), 16. Fretwell *et al.* (2023), 17. Jenouvrier *et al.* (2021)

Hunting and trapping

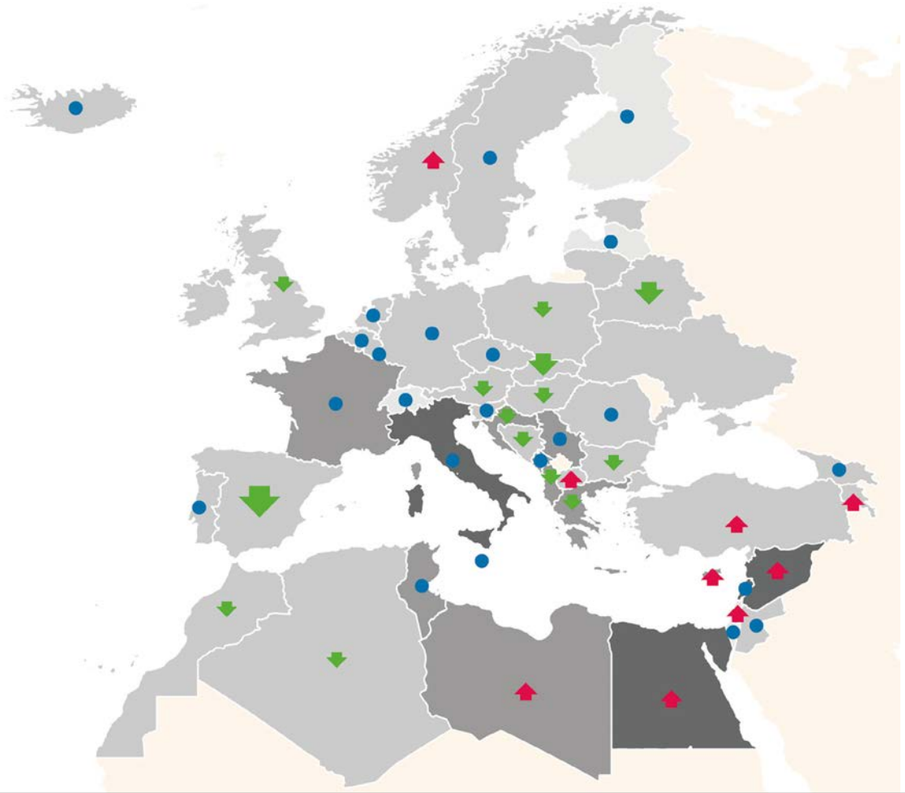
More than 60% of migratory bird species are used in some way by humans, including 62% of globally threatened species. Hunting and trapping of migratory birds is primarily for the pet trade (49%), food (30%) and sport (15%)[1], with many species traded domestically and internationally[2]. Much of this use is unsustainable. Migratory birds are particularly vulnerable because many congregate predictably in large numbers at stopover sites and bottlenecks. Despite regulations in many countries, illegal killing, taking and trade remain widespread across flyways.

Underlying drivers

Hunting and trapping are driven by a combination of economic need or opportunity, market demand, and cultural tradition. Subsistence hunting supports local communities, while demand for pets and meat drives domestic and international trade. Increasingly efficient trapping methods and encroachment into natural habitats intensifies hunting pressure, while weak governance, culturally embedded practices, profit motivations and limited alternative livelihoods sustain illegal exploitation.

Evidence for impact on migratory birds

Overexploitation of migratory birds occurs in all flyways, but the scale, methods and motivations vary regionally. In the African-Eurasian Flyway, data collected during 2014 to 2017 revealed that an estimated 13.1 to 42.7 million migratory birds are illegally killed or taken every year in Europe, the Mediterranean, the Causasus and the Arabian Peninsula[3,4,5]. Many are migratory songbirds caught in mist nets or on 'lime-sticks' for consumption. Despite commitments under the Rome Strategic Plan to halve illegal killing by 2030, only 17% of countries are on track or maintaining consistently low levels[6]. For vultures, poisoning is the main cause of human-induced mortality in the flyway[7]. Poisoning may be intentional, for example to prevent vultures alerting authorities to illegal poaching activities, or an unintended consequence of herders lacing carcasses with poison to kill predators in retaliation for livestock losses.

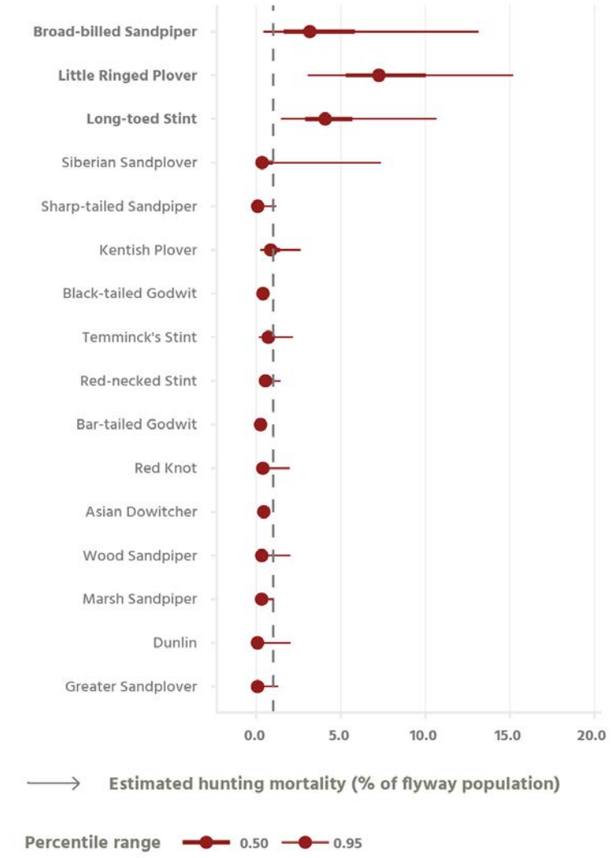


Estimated level of illegal killing, taking and trade of wild birds (grey shading) and the trend during 2020–2024 (coloured symbols) for countries in Europe and the Mediterranean region. Countries coloured in cream were not assessed. Note that trend data is not available for some countries. Data: BirdLife International & EuroNatur (2025)

In the Americas Flyway, hunting for recreation and food is widespread. While harvest is regulated in North America, other parts of the flyway lack regulations or sufficient enforcement. Annual harvest in these countries is poorly understood, but may exceed sustainable levels for some species. For example, shorebird hunting is a traditional practice in parts of northern South America and the Caribbean. Surveys of two coastal sites and one community market in Guyana in 2020 estimated that around 37,000 shorebirds are harvested annually, suggesting a much higher national total[8]. Species recorded for sale included globally threatened White-rumped Sandpiper *Calidris fuscicollis* (VU↘) and Lesser Yellowlegs *Tringa flavipes* (VU↘).

In Asia, nets are widely used to trap birds for meat, the pet trade and recreation, and may also cause unintentional mortality when used for deterrence and fishing, affecting at least 211 migratory species in the East Asian–Australasian Flyway[9]. Around 48,000 migratory shorebirds are estimated to be killed annually at 19 stopover sites in China through hunting (32%), entanglement in deterrence nets (62%) and fisheries bycatch (5%)[10]. Annual mortality from hunting exceeds 1% of the total flyway population for three species and approaches unsustainable levels for five species, including globally threatened Siberian Sand Plover *Charadrius mongolus* (EN↘). In Southeast Asia, millions of birds are hunted each year, including up to 2.6 million swallows, particularly Barn Swallow *Hirundo rustica* (LC↘), in Laos and Vietnam alone[11]. Along the Central Asian Flyway, at least seven million migratory birds are estimated to be taken annually for food, although actual numbers are likely far higher[12].

Percentage of the flyway population size estimated to be killed annually from hunting for 16 migratory shorebirds at coastal stopover sites in China. Points represent median values. Dashed line indicates 1% of the total flyway population. Species with estimated hunting mortality exceeding this value are shown in bold. Data: Liang *et al.* (2025)



Solutions

Sustainable management requires strong national and international legislation, enforcement and judicial processes to implement zero tolerance of illegal killing, taking and trade of wild birds and improved regulation, enforcement and monitoring to reduce unsustainable hunting. Engagement with local communities is essential to raise awareness and provide alternative livelihoods where needed.

Responses

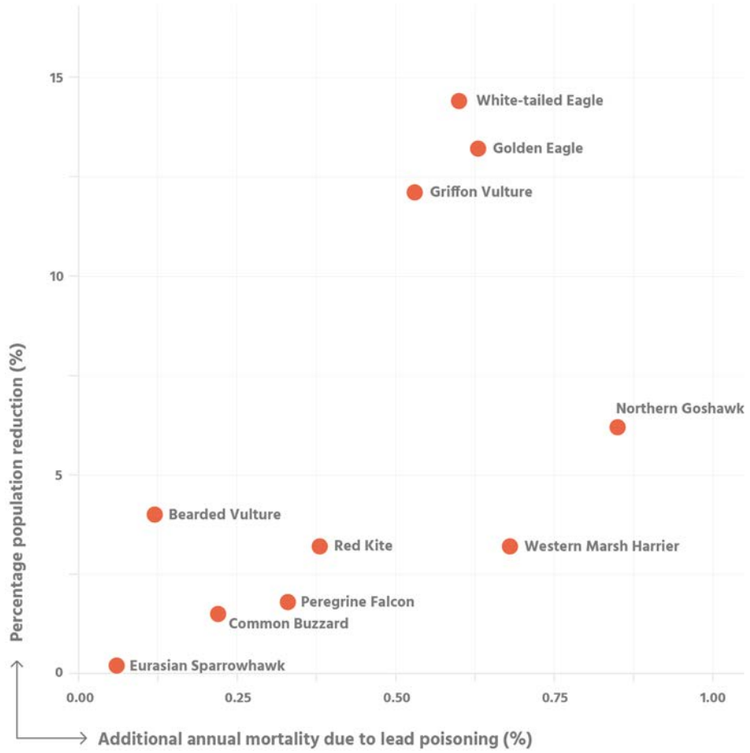
- p.64 Protect and effectively manage key sites
- p.74 Prevent overexploitation and illegal killing
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. BirdLife International (2026), 2. Donald *et al.* (2024), 3. Brochet *et al.* (2016), 4. Brochet *et al.* (2019a), 5. Brochet *et al.* (2019b), 6. BirdLife International & EuroNatur (2025), 7. Serratosa *et al.* (2024), 8. Andres *et al.* (2022), 9. Angkaew *et al.* (2026), 10. Liang *et al.* (2025), 11. Yong *et al.* (2023), 12. Mundkur *et al.* (2023)

Pollution

Pollution is a pervasive threat to migratory birds worldwide, reaching even the most remote regions. It occurs in many forms, including contamination of air, water and soil, as well as excess noise and light. The scale of the threat is escalating: each year, up to 23 million tonnes of plastic enter aquatic ecosystems[1]; artificial lighting increases global night-sky brightness by around 10%[2]; and 200 million tonnes of reactive nitrogen from agricultural land leach into the environment[3]. Exposure to these pollutants may negatively impact migratory birds through direct mortality, reduced reproductive success, habitat degradation, or disruption of behaviour.

Photo © lightrain, Shutterstock



Relationship between modelled percentage reduction in adult population size (relative to a lead-free scenario) and additional annual mortality attributed to lead poisoning for 10 migratory raptor species in Europe. Data: Green *et al.* (2022)

Underlying drivers

Rapid industrialisation, agricultural intensification and urbanisation—often coupled with inadequate waste management systems and weak regulatory enforcement—have led to increasing release of pollutants from factories, farms, and cities.

Evidence for impact on migratory birds

Research shows that pollution is a significant driver of mortality in migratory birds, with measurable impacts at the population level. Ingestion of toxic pollutants is among the most significant and well-documented pathways. Lead poisoning from spent ammunition alone is estimated to kill around one million waterfowl in Europe every year, including more than 56,000 Common Pochard *Aythya ferina* (VU↘)—more than a fifth of Europe's non-breeding population[4]. Another three million may experience sub-lethal poisoning[5]. Lead exposure contributes to population declines—models indicate that adult populations of 10 migratory raptors in Europe are, on average, 6% smaller than they would be in the absence of lead poisoning[6]. The greatest impacts are seen in long-lived scavengers and predators that feed on hunted game, particularly in countries with higher densities of hunters.

In marine ecosystems, plastic pollution poses a serious threat to migratory seabirds. Many species frequently ingest plastic debris, which can cause chemical contamination, gut blockages, and other internal damage. The extent of plastic accumulation varies with species' foraging behaviour, at-sea distribution, and gut morphology. Albatrosses and petrels often carry particularly high loads, ingested directly or through their prey[7]. Petrels are especially vulnerable because they retain plastic in their digestive systems for long periods[8], while smaller-bodied species such as storm-petrels face greater physical damage and metabolic costs relative to larger birds[9]. Exposure risk is highest near densely populated coastlines, fisheries, shipping lanes, and mid-ocean gyres where debris accumulates[10].

Pollution can also alter the sensory landscapes through which migratory birds travel. Artificial light at night can disorientate nocturnal migrating birds—especially inexperienced juveniles—drawing them into cities where millions die each year from collisions with illuminated buildings and communication towers[11]. Even low-intensity lighting can subtly alter flight paths[12]. Bright lights may also cause birds to avoid illuminated areas within stopover sites, potentially disrupting access to important feeding habitats[13].

Solutions

Reducing the impact of pollution on migratory birds requires strengthening wastewater treatment, reducing agricultural runoff, improving plastic waste management, tightening regulations, and minimising light pollution. Highly toxic substances that cause significant wildlife mortality, such as lead ammunition, must be banned. With ongoing chemical development, new pollutants regularly emerge. Monitoring and early warning systems are necessary for these to become regulated before damaging the environment.

Responses

- p.64 Protect and effectively manage key sites
- p.72 Promote sustainable agriculture & forestry
- p.76 Implement nature-safe land use planning
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. UNEP (2025), 2. Kyba *et al.* (2023), 3. UNEP (2019), 4. Andreotti *et al.* (2018), 5. Pain *et al.* (2019), 6. Green *et al.* (2022), 7. Kühn & Van Franeker (2020), 8. Ryan (2015), 9. Senko *et al.* (2020), 10. Clark *et al.* (2023), 11. Van Doren *et al.* (2021), 12. Cabrera-Cruz *et al.* (2021), 13. Cabrera-Cruz *et al.* (2020)

Residential and commercial development

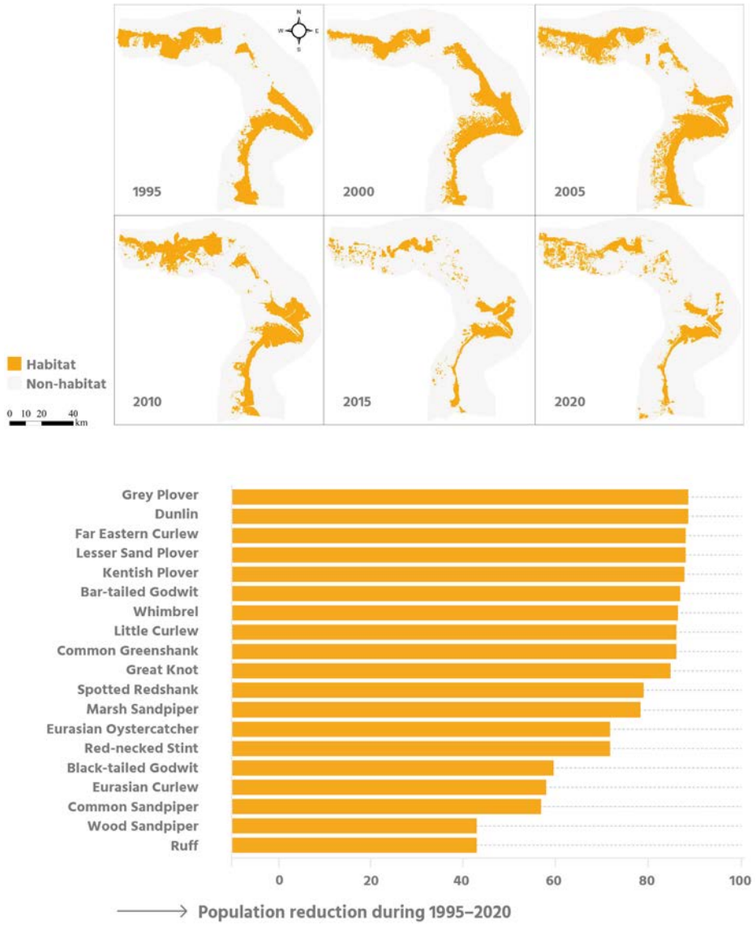
Although towns and cities cover less than 2% of Earth's terrestrial area, global urban land cover more than doubled between 1985 and 2015[1]. This urban growth drives loss and degradation of natural habitats, and is often associated with an increase in other pressures such as pollution, disturbance and collision with buildings, posing a threat to over a third of globally threatened migratory bird species.

Underlying drivers

The human population has grown from fewer than 1 billion in 1800 to over 8 billion today[2]. This has been accompanied by a rise in urbanisation—more than 50% of people currently live in urban areas, and this figure is expected to grow to 68% by 2050[3], necessitating rapid urban expansion. Insufficient consideration of biodiversity in land-use planning has resulted in the loss and degradation of natural habitats.

Evidence for impact on migratory birds

Land claim for coastal development has altered many habitats used by migratory waterbirds. Wetlands along the eastern coast of China provide crucial stopover and non-breeding sites for shorebirds in the East Asian–Australasian Flyway, with multiple Key Biodiversity Areas (KBAs) identified in this region. However, more than half of the natural wetland area in these KBAs has undergone modification due to land claim[4]. At the Yellow River Delta KBA, historical land claim drove declines of over 90% in shorebird abundance for some species between 1995 and 2020[5]. Larger-bodied species were most severely affected, including major declines in threatened species such as Far Eastern Curlew *Numenius madagascariensis* (EN↘).



Changes in habitat distribution and abundance of 19 migratory shorebird species in the Yellow River Delta from 1995 to 2020. Data: Duan *et al.* (2022)

White Stork *Ciconia ciconia* Photo © elebeZoom, Shutterstock

Urbanisation also negatively impacts some species of migratory landbirds. In the Cuitzeo watershed in Mexico, density and species richness of Neotropical migratory birds decline sharply toward urban centres, with densities more than twice as high in native forest than in cities[6]. The negative responses of migratory bird communities to urbanisation appear to be stronger than those of resident birds.

Development of urban areas is nearly always accompanied by an increase in other related pressures. In São Paulo, Brazil, variation in species richness of 14 urban migratory birds is better explained by ambient noise level than by other correlates of urbanisation such as tree cover and human population size, suggesting that noise pollution reduces habitat suitability for these species[7]. Development may also increase direct mortality of birds through collisions with buildings and other infrastructure. In the USA, building strikes kill an estimated 365–988 million birds annually[8], although this figure is likely to exceed 1 billion when considering delayed mortality[9]. Migratory birds are particularly vulnerable to building strikes as they are attracted towards urban areas by light pollution while flying at night. Four species of long-distance migratory birds make up 35% of all recorded fatal building collisions in the USA—White-throated Sparrow *Zonotrichia albicollis* (LC↘), Dark-eyed Junco *Junco hyemalis* (LC↘), Ovenbird *Seiurus aurocapilla* (LC→), and Song Sparrow *Melospiza melodia* (LC↘)[8].

Solutions

Data on threatened migratory species and important sites for biodiversity must be integrated into land-use planning, ensuring critical habitats are safeguarded from development. Incorporating green spaces into urban design can help to retain connectivity between natural habitats, and collision risk can be partially mitigated through bird-safe building design and the reduction of light pollution.

Responses

- p.64 Protect and effectively manage key sites
- p.76 Implement nature-safe land use planning
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. Chakraborty *et al.* (2024), 2. Roser *et al.* (2023), 3. United Nations Department of Economic and Social Affairs, Population Division (2019), 4. Ma *et al.* (2019), 5. Duan *et al.* (2022), 6. MacGregor-Fors *et al.* (2010), 7. de Camargo Barbosa *et al.* (2020), 8. Loss *et al.* (2014), 9. Kornreich *et al.* (2024)

Human disturbance

When people spend time in natural environments, for example for recreation, work, or military activities, this can affect the behaviour of wildlife and influence species' population dynamics. Even activities that do not directly harm birds may trigger stress responses, particularly in species that are less tolerant of human presence. Migratory birds are particularly susceptible to the impacts of disturbance, as it can hinder their ability to efficiently rest and refuel during migration, impacting body condition and survival. Repeated encounters with people can lead to avoidance of otherwise suitable areas, exacerbating the impacts of habitat loss.

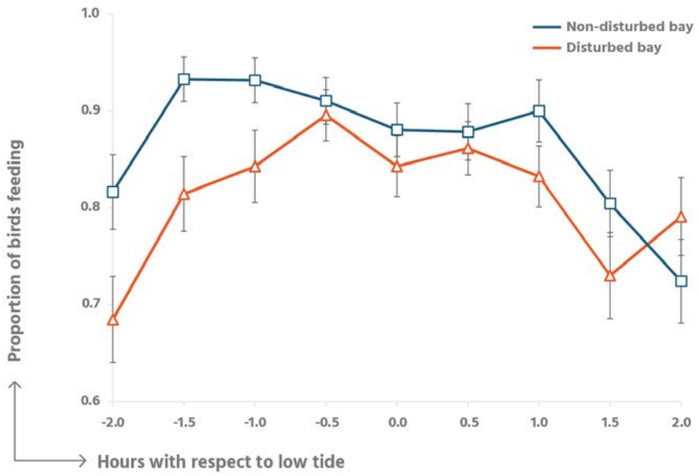
Dunlin *Calidris alpina*. Photo © Lars Petersson - My World of Bird Photography

Underlying drivers

Rapid expansion of commercial and residential areas, military activity, and increasing outdoor recreation in many parts of the world are driving a rise in human activity in wild spaces. Many people are unaware that their presence can disturb wildlife, and limited regulation allows overcrowding and intrusion to become major sources of disturbance.

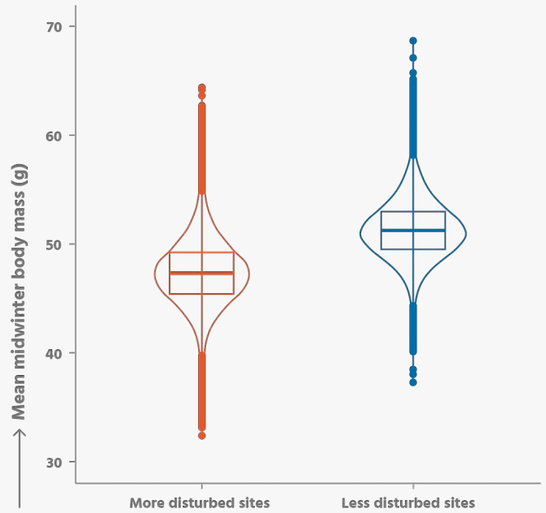
Evidence for impact on migratory birds

Human disturbance affects migratory birds through interrelated impacts on behaviour, habitat use, and demography. Birds using sites with high levels of anthropogenic disturbance may exhibit reduced foraging rates due to the need for increased vigilance and avoidance behaviour, or experience reduced foraging and roosting opportunities and increased competition for resources through displacement from suitable habitat. For example, at Caulín bay on Chiloé Island, Chile, unregulated recreation and seaweed collection—often accompanied by unleashed dogs—results in a reduction in feeding time for Hudsonian Godwit *Limosa haemastica* (VU↘) of up to 17 minutes per low tide compared to a bay without these disturbances[1]. Effects are evident even at very low densities of people and dogs.



Variation (mean ± standard error) in the proportion of Hudsonian Godwit individuals foraging during low tide at a disturbed (triangles and orange line) and non-disturbed (squares and blue line) bay on Chiloé Island. Data: Navedo *et al.* (2019)

Repeated daily disturbance during energetically demanding periods such as migration can significantly reduce refuelling time and increase energy expenditure, potentially affecting body condition and long-term fitness. Piping Plover *Charadrius melodus* (NT↗) that spend the non-breeding season at disturbed sites along the southeastern coast of North America are around 7% lighter and have lower annual survival than those using less disturbed sites[2]. Disturbance may also reduce survival through increased predation of unattended nests. For example, disturbance by people and dogs increases the risk of predation of young Slender-billed Gull *Larus genei* (LC?) chicks by Yellow-legged Gull *L. michahellis* (LC↗) in Tunisia[3].



Body mass of non-breeding Piping Plover at more disturbed (orange) and less disturbed (blue) coastal sites in North America. Violin plots show the median as a horizontal line, lower and upper quartiles as a box and outliers as points. Data: Gibson *et al.* (2018)

Species that are less tolerant of human presence may avoid sites with high disturbance altogether, compounding the impacts of habitat loss and reshaping bird communities. In São Paulo, Brazil, surveys of 20 migratory shorebirds reveal higher species richness and abundance on beaches with less disturbance[4]. For example, the mean abundance of Semipalmated Plover *Charadrius semipalmatus* (LC↘) is around twice as high on Praia do Tanigwá, where native coastal vegetation reduces the impacts of human disturbance, than on the highly urbanised Praia do Ruínas.

Solutions

Key sites for migratory birds must be protected and effectively managed using buffer zones, temporal restrictions and controls on dogs where necessary to reduce disturbance during critical periods. Retaining and restoring natural habitats provides refuges from disturbance. Awareness campaigns and engagement with local communities and stakeholders can promote responsible use of outdoor spaces and site stewardship.

Responses

- p.64 Protect and effectively manage key sites
- p.66 Retain and restore habitats
- p.76 Implement nature-safe land use planning
- p.80 Target species recovery actions
- p.82-90 Enabling actions

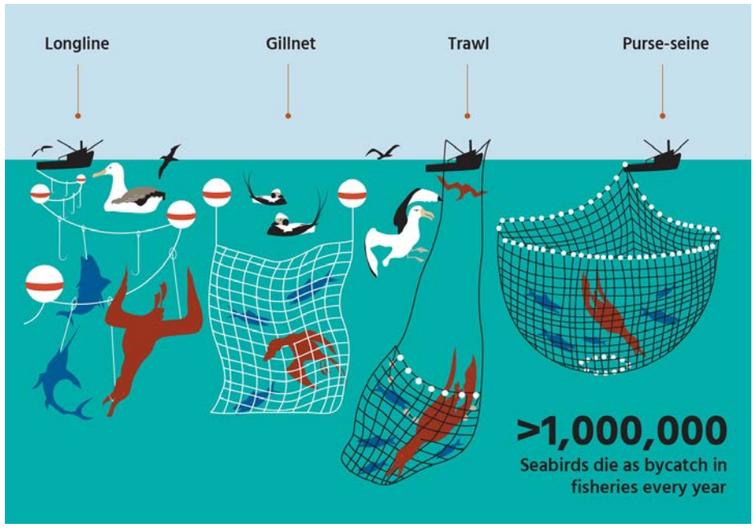
References 1. Navedo *et al.* (2019), 2. Gibson *et al.* (2018), 3. Chokri *et al.* (2023), 4. Esparza *et al.* (2025)

Fisheries

Three-quarters of all seabird species are migratory, allowing them to exploit seasonal food abundance throughout the year. But travelling vast distances across multiple jurisdictions increases the likelihood of encountering fishing vessels. Fisheries have a profound impact on marine ecosystems, depleting populations of both target and non-target species, including food sources for seabirds. Injury or death of non-target fauna in fisheries (bycatch) is the greatest at-sea threat to seabirds: over one million are estimated to die annually from becoming hooked on longlines, struck by trawl cables, or entangled in gillnets and purse-seines.

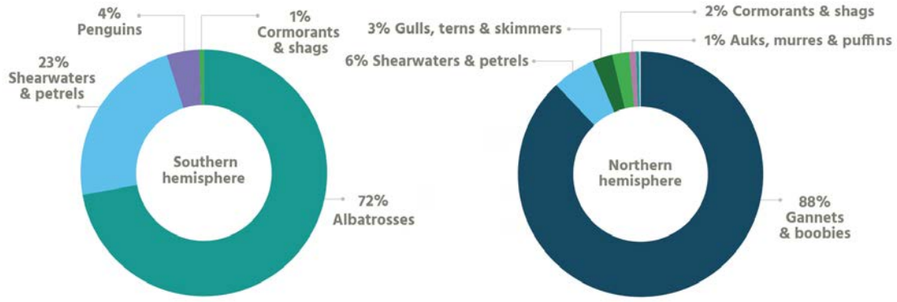
Underlying drivers

Rising global demand for seafood, advances in fishing technology, and harmful subsidies have driven the rapid expansion of industrial fleets. Enforcing regulations at sea poses a significant challenge, especially in areas beyond national jurisdiction, so illegal, unreported, and unregulated fishing continues to deplete both target and non-target species.



Evidence for impact on migratory birds

Every year, an estimated 160,000–320,000 seabirds are killed by longline fisheries[1], c.400,000 by gillnets[2], and at least 44,000 by trawl fisheries[3]. Migratory species are experiencing some of the highest bycatch rates. In southern hemisphere trawl fisheries, 35 out of 37 seabird species recorded as bycatch are migratory, of which more than a third are globally threatened[3]. Albatrosses and petrels are among the species with highest estimated annual mortality in these fisheries, while Northern Gannet *Morus bassanus* (LC ↗) is the most frequently captured species in northern hemisphere trawl fisheries. Albatrosses, petrels and shearwaters are also the species most impacted by longline fisheries, with Northern Fulmar *Fulmarus glacialis* (LC ↗), Great Shearwater *Ardenna gravis* (LC →) and White-chinned Petrel *Procellaria aequinoctialis* (VU ↘) among those caught in the highest numbers[1]. For many of these long-lived species, bycatch is driving global population declines[4].



Composition of migratory seabird bycatch by family in monitored northern and southern hemisphere trawl fisheries. Values show the percentage of total individuals killed that belonged to each family. Groups comprising <1% are not labelled. Data: Phillips *et al.* (2024)

Fishing trawler. Photo © Conny Pokorny, Adobe Stock

Fisheries also indirectly affect migratory seabirds by depleting prey stocks. Annual fishery catches of seabird prey species rose from 59 million metric tonnes during 1970–1989 to 65 million tonnes during 1990–2010[5]. During the same period, population declines led to a 19% fall in consumption of these species by seabirds, from 70 to 57 million metric tonnes[5]. Declines were greatest in the Southern and North Atlantic Oceans, particularly among diving petrels (66%), terns (48%) and frigatebirds (47%). Despite decreases in global seabird populations, resource overlap between seabirds and fisheries remains largely unchanged, indicating persistent competition for shared prey.

The combined effects of competition and bycatch may cause declines in even the most resilient of species. For example, Northern Gannet is experiencing population increases across much of its range, even in areas of high anthropogenic pressure. However, recent declines in the southernmost breeding colony on Rouzic Island, France, have been attributed to bycatch and competition with fisheries for natural food sources[6].

Solutions

Key sites used by migratory seabirds during breeding and non-breeding seasons must be identified and safeguarded from conflict with fisheries through the designation and effective management of Marine Protected Areas. Where fisheries are in operation, seabird bycatch should be minimised through collaboration with the fishing industry and implementation of proven mitigation measures, supported by effective monitoring and enforcement of regulatory compliance.

Responses

- p.64 Protect and effectively manage key sites
- p.78 Mitigate seabird bycatch
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. Anderson *et al.* (2011), 2. Žydelis *et al.* (2013), 3. Phillips *et al.* (2024), 4. Votier *et al.* (2023), 5. Grémillet *et al.* (2018), 6. Grémillet *et al.* (2020)

Energy production and infrastructure

Global energy consumption has increased almost every year for over 50 years[1]. To meet this growing demand while simultaneously reducing greenhouse gas emissions, a rapid transition away from fossil fuels is underway, with renewable energy capacity more than doubling during 2022–2025[2]. While essential for climate mitigation, this shift requires extensive transmission networks and large-scale wind and solar developments, which can pose substantial risks to birds if poorly planned. Migratory species repeatedly encounter energy infrastructure along their flyways, elevating the risk of collision and electrocution.

Underlying drivers

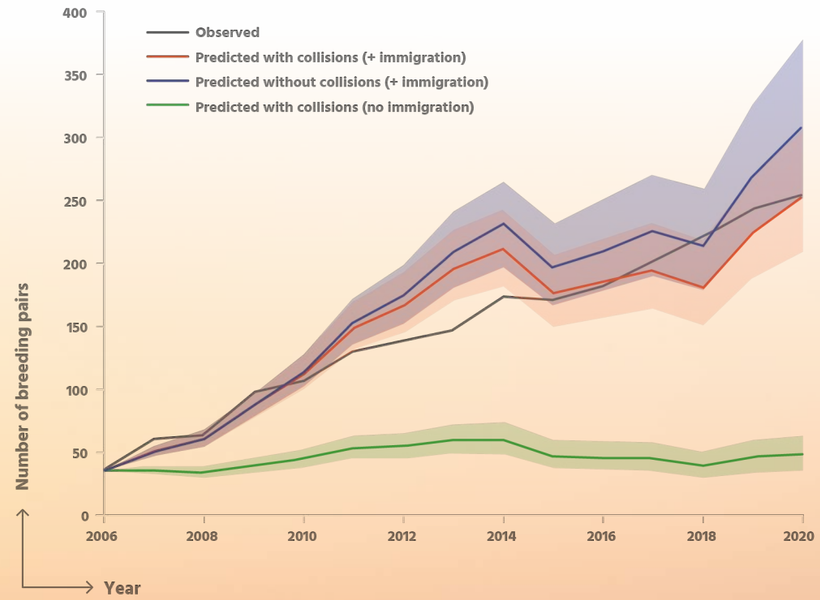
Electricity demand continues to rise because of population growth, urbanisation, industrialisation, and the increasing use of technologies such as electric cars and artificial intelligence. Simultaneously, efforts to reduce greenhouse gas emissions are accelerating renewable energy deployment. Meeting these combined demands requires rapid expansion of energy generation and transmission infrastructure. Impacts on nature are often insufficiently considered during the planning stages of development.

Evidence for impact on migratory birds

Energy infrastructure is a major source of anthropogenic mortality for migratory birds. Across the African-Eurasian Flyway, it accounts for 49% of all human-induced mortality in large soaring birds (such as storks, eagles and vultures), with electrocution alone responsible for 41% of deaths[3]. These species are particularly vulnerable to electrocution as they perch on pylons and can span conductors with their large wings. Deaths from electrocution can drive population declines—in the Caspian Steppe region of Kazakhstan and southern Russia, the globally threatened Steppe Eagle *Aquila nipalensis* (EN↘) declined from 20,000 pairs in the 1990s to 1,100 pairs in 2016, with carcass recovery data identifying electrocution as a primary driver[4].

Collisions with power lines also pose a significant risk, especially for species with limited frontal vision or low manoeuvrability, such as waterfowl, cranes, storks and grouse. Bustards are particularly vulnerable—a recent review found that across six migratory species, 779 collision events had been recorded globally by 2021 (although the true total was likely considerably higher), with evidence of population-level impacts in some cases[5]. In the Northern Tonle Sap Protected Landscape, Cambodia, six confirmed cases of collision mortality in Bengal Florican *Houbaropsis bengalensis* (CR↘) were recorded following transmission line construction in 2019, with total mortality likely to be higher due to undetected injured birds[6].

Windfarms add further pressure. At least 362 bird species have been recorded as turbine collision victims, with migratory species experiencing higher collision rates than non-migratory species[7]. Mortality of smaller species is likely underestimated due to carcass detection limitations[8]. Population-level effects of turbine collision mortality have been documented. In Hérault, France, collisions during 2013–2020 killed around 3% of Lesser Kestrels *Falco naumanni* (LC→) each year, resulting in the breeding population in 2020 being 22% smaller than it would have been in the absence of turbines[9]. Population growth during this period was only possible due to immigration of new individuals from nearby areas, so any future reduction in immigration rate may result in population decline. Beyond direct mortality, turbines can also displace birds from preferred airspace and habitats. Migratory Black Kites *Milvus migrans* (LC→) alter their flight behaviour near windfarms in the Strait of Gibraltar, while Whooping Cranes *Grus americana* (EN↗) in North America avoid turbines over distances of several kilometres, resulting in functional habitat loss along migration routes[10,11,12].



Number of breeding pairs of Lesser Kestrel in Hérault, France, observed (grey line) and predicted using population modelling with turbine collisions (blue line) and without turbine collisions (red line). Shaded areas show 95% confidence intervals. Data: Duriez *et al.* (2022)

Solutions

Impacts can be reduced through strategic planning of energy infrastructure that avoids high-risk areas such as migratory bottlenecks and key habitats, alongside the incorporation of proven mitigation measures into both new and existing infrastructure. Robust long-term monitoring and adaptive management are essential to ensure that impacts are detected and effectively mitigated.

Responses

- p.64 Protect and effectively manage key sites
- p.76 Implement nature-safe land use planning
- p.82-90 Enabling actions

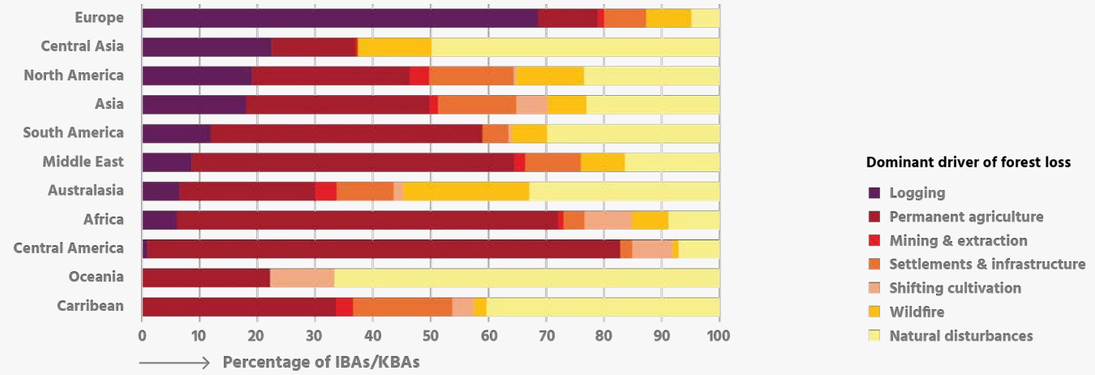
Photo © chuyu2014

References 1. Ritchie *et al.* (2020), 2. IEA (2026), 3. Serratosa *et al.* (2024), 4. Dwyer *et al.* (2022), 5. Silva *et al.* (2023), 6. Mahood *et al.* (2022), 7. Thaxter *et al.* (2017), 8. Nilsson *et al.* (2023), 9. Duriez *et al.* (2023), 10. Santos *et al.* (2021), 11. Pearse *et al.* (2021), 12. Ellis *et al.* (2022)

Logging

Over half of all migratory bird species use forests during their annual cycle, and around one third are dependent on them. These habitats have been profoundly impacted by humans, with around one third of the world's forests cleared since the last ice age—an area two and a half times the size of Australia. Approximately half of this deforestation has occurred in the last century, driven predominantly by clearance for agriculture, but also by logging, wildfire and residential and commercial development. Many remaining forests, particularly in lowland areas, are heavily degraded and fragmented due to ongoing forestry operations.

Photo © Frances Cosgura



Dominant driver of forest loss in Key Biodiversity Areas for migratory birds in each region during 2001–2024. Data: Sims *et al.* (2025) and BirdLife International (2026)

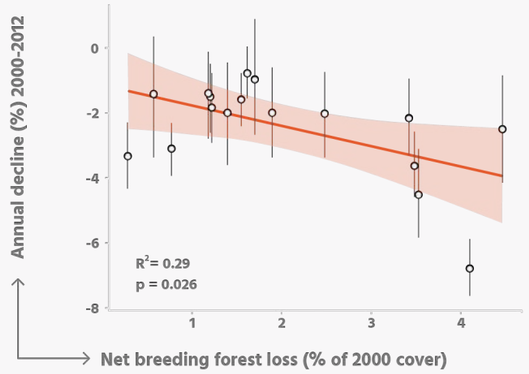
Underlying drivers

Demand for timber and other forest products drives commercial and small-scale forestry operations. Mechanisation facilitates increasingly high rates of extraction, while weak enforcement of regulations allows illegal logging to persist. Underpinning these issues is the fact that those who benefit from unsustainable logging and clear-felling rarely pay the resulting wider costs to society.

Evidence for impact on migratory birds

Globally, 43% of Key Biodiversity Areas for migratory birds that contain forest have lost more than 5% of their tree cover since the start of the 21st century. Agriculture is the main driver of forest loss and disturbance in the tropics, but logging is the dominant driver in many temperate and boreal countries[1]. Tree cover loss associated with timber extraction is often temporary, with periods of harvest followed by regrowth or planting. However, some species cannot tolerate even selective logging, which often removes old-growth trees. Forestry operations may lead to habitat degradation and fragmentation, disturbance, and increased risk of other threats such as wildfires.

In the East Asian–Australasian Flyway, 41% of 46 forest-breeding migratory bird species with available trend data are in decline, and 93% have experienced forest loss in some part of their range in recent decades[2]. Changes in temperate broadleaf forest extent in the breeding range appear to influence population trends more strongly than forest loss in the tropical non-breeding range, with most species having a higher preference for forest habitats during the breeding season. Logging in temperate regions may therefore have population-level impacts on these species.



Relationship between net forest loss at North American breeding grounds and population trends for 17 Wood Thrush populations. Each point represents a population. Vertical lines indicate 95% confidence intervals around population trend estimates. Red line shows the modelled relationship, with shading to indicate 95% confidence interval. Data: Rushing *et al.* (2016)

Similar patterns have been observed for two long-distance migratory songbirds in the Americas Flyway. Population declines in Connecticut Warbler *Oporornis agilis* (LC↘) correlate more strongly with rates of forest loss in the North American breeding range than at stopover sites or tropical non-breeding areas[3]. For Wood Thrush *Hylocichla mustelina* (LC↘), the relative impact of forest loss on population trends is at least three to six times greater in breeding areas than non-breeding areas—contributing to annual population declines of 0.62% and 0.2% respectively per 1% of forest lost[4].

Forestry operations may also directly impact birds through incidental nest destruction and disturbance. Commercial timber harvesting in Canada's boreal forests is estimated to result in the loss of 0.6–2 million migratory bird nests annually, leading to a significant reduction in new recruits to the population[5].

Solutions

Old growth forests must be safeguarded, and degraded forests restored to maintain connectivity along flyways. Sustainable forest management techniques should be promoted and incentivised, including limiting clear-cutting and the establishment of tree monocultures, while supporting approaches such as selective harvesting, agroforestry and restoration of native forest. Monitoring and enforcement must also be strengthened to curb illegal logging.

Responses

- p.64 Protect and effectively manage key sites
- p.66 Retain and restore habitats
- p.72 Promote sustainable forestry and agriculture
- p.76 Implement nature-safe land use planning
- p.80 Target species recovery actions
- p.82-90 Enabling actions

References 1. Sims *et al.* (2025), 2. Ko *et al.* (2023), 3. Hallworth *et al.* (2021), 4. Rushing *et al.* (2016), 5. Hobson *et al.* (2013)

Kirtland's Warbler *Setophaga kirtlandii*.
Photo © Mason Maron

4 RESPONSE

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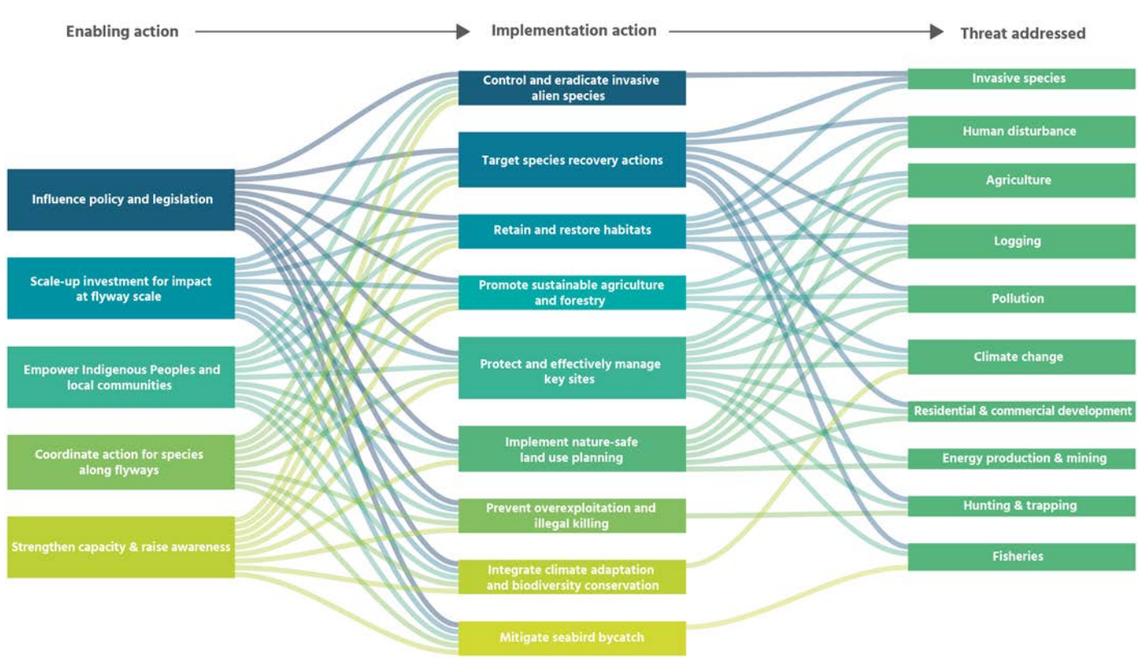
The actions needed to conserve migratory birds

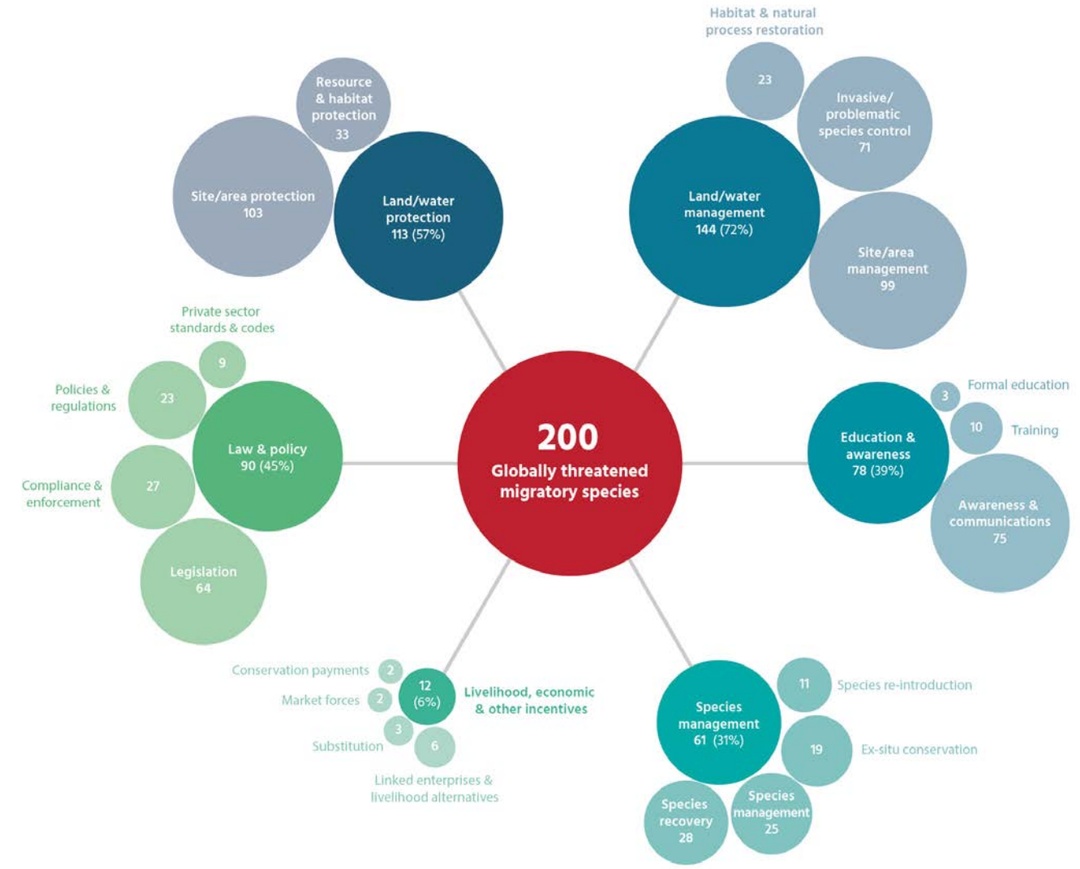
In most cases, the solutions needed to mitigate threats to migratory birds are already known. Successful conservation programmes demonstrate that evidence-based interventions can restore habitats, prevent extinctions, and support population recovery. Interventions may be focussed on specific sites, species, threats, or a combination of these. However, implementing these solutions at scale requires sufficient political will, financial resources, and local capacity. On-the-ground action alone is not sufficient to achieve long-term protection of migratory birds and their habitats—transformative change is needed across sectors to address the underlying societal and economic drivers of biodiversity loss.

Both implementation (direct) and enabling (indirect) actions are needed

Mapping the top 10 threats to threatened migratory bird species against the actions required to address them shows that each requires a combination of complementary responses. For example, tackling invasive alien species requires not only controlling problematic species, but also restoring habitats degraded by invasions and implementing targeted recovery actions to reverse declines of highly threatened native birds, while strengthening biosecurity to prevent further invasions. Delivering these actions at scale depends on a suite of enabling measures. These include stronger invasive alien species legislation, sustained financial investment, support for community-led surveillance and control, development of technical capacity, and coordinated action across countries to manage shared risks. These efforts must be supported by robust monitoring programmes to enable early detection of invasions and assess the effectiveness of interventions.

Similarly, most actions contribute to addressing multiple threats. Protection and effective management of critical sites can safeguard against a wide range of pressures, while habitat restoration boosts connectivity and species' resilience and contributes to carbon sequestration. Implementing nature-safe land-use planning helps prevent the development of agriculture, energy infrastructure, logging, or urban expansion within key sites. Adoption of sustainable agriculture and forestry practices can also reduce pollution and lower carbon emissions. Where threats have caused significant population declines, targeted recovery actions can help bring species back from the brink of extinction and reverse negative trends.





Actions needed for the recovery of globally threatened migratory bird species. Circle size is proportional to the number of species needing each type of action. Percentages indicate the proportion of all threatened migratory species requiring each action. Data: BirdLife International (2026)

The main enabling and implementation actions needed to tackle each threat to migratory birds. Linkages show which threats require which implementation actions, and which of these require different enabling actions.

Protection and effective management of land, freshwater and marine habitats is crucial

The conservation actions required for each migratory species are documented as part of BirdLife's IUCN Red List assessments. For globally threatened migratory birds, land and water management and protection are the most frequently reported actions needed (identified for 72% and 57% of species respectively)[1]. Within these broad categories, protection and effective management of key sites and control of invasive or other problematic species emerge as particularly important. Almost a third (31%) of species require targeted actions such as trade or harvest management, captive breeding, or reintroduction.

Andean Flamingo *Phoenicoparrus andinus*.
Photo © Delpixel, Shutterstock

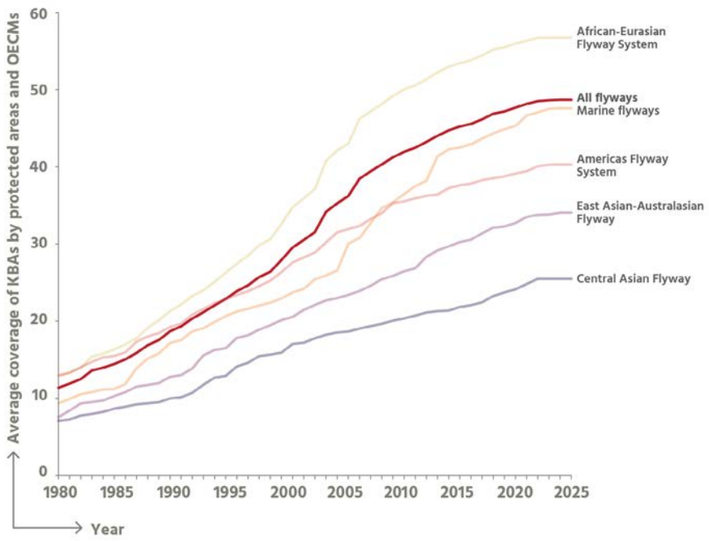
References 1. BirdLife International (2026)

Protect and effectively manage key sites along flyways

Under Target 3 of the Kunming-Montreal Global Biodiversity Framework, governments committed to conserving 30% of land, inland waters, and oceans by 2030, especially areas of particular importance for biodiversity[1]. Key Biodiversity Areas (KBAs) represent the most comprehensive network of such sites. Currently, 18% of terrestrial and 10% of marine areas are conserved through protected areas or Other Effective Area-based Conservation Measures (OECMs)[2], with 44% of each KBA covered by these protections on average. However, conserving migratory birds is challenging because they depend on multiple sites along their flyways. Gaps in the protection of key sites anywhere along these routes, particularly at migratory bottlenecks, can undermine population stability and connectivity. Only around 9% of migratory bird species are adequately protected in terms of site coverage across their full annual cycle, compared with 45% of non-migratory species[3]. Furthermore, protected areas are often under-resourced and poorly managed. Many migratory birds spend much of their lives widely dispersed beyond protected areas, meaning that site protection alone will not be sufficient to halt declines. Safeguarding them, therefore, requires sustainable management of the wider landscapes and seascapes on which they depend, alongside coordinated international action to designate and effectively manage protected areas at key breeding, stopover and non-breeding sites.

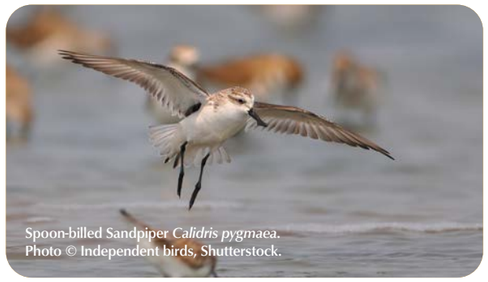
Benefits to migratory birds: insights from research

Coverage of KBAs identified for migratory birds by protected areas and OECMs has increased substantially, from an average of 11% of each site in 1980 to 49% today[4]. Coverage is highest in the African-Eurasian Flyway (57%) and lowest in the Central Asian Flyway (25%). In marine systems, protection of KBAs for migratory species has expanded rapidly since the early 2000s, aided by advances in satellite tracking technology that have identified important at-sea foraging areas such as the North Atlantic Current and Evlanov Sea-basin (NACES), providing crucial evidence to support designation of Marine Protected Areas.



Trends in mean coverage of Key Biodiversity Areas for migratory birds by protected areas and OECMs. Data: BirdLife International (2026)

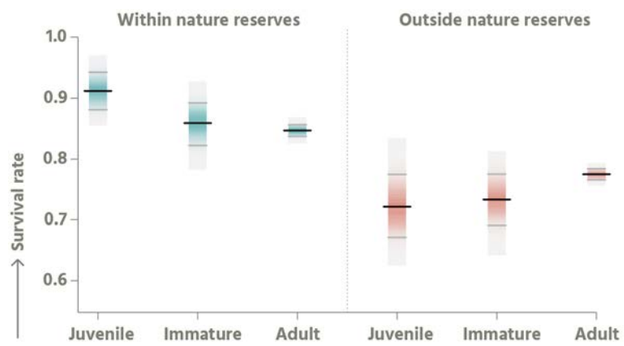
There is growing evidence that well-managed protected areas benefit migratory birds. Studies of 30 Afro-Palearctic migratory landbirds show that greater overlap between species' distributions and European protected areas is associated with more positive long-term population trends, likely due to reduced agricultural impacts and the retention of natural habitats[5]. Similarly, a 30-year study of Whooper Swan *Cygnus cygnus* (LC↗) spending the non-breeding season in the UK found significantly higher survival rates inside nature reserves than outside them, leading to a 30-fold higher annual population growth rate[6]. Overall, these nature reserves could help double the UK non-breeding population of Whooper Swan between 1985 and 2030.



Spoon-billed Sandpiper *Calidris pygmaea*. Photo © Independent birds, Shutterstock.

CASE STUDY: Protecting wetlands along the Yellow Sea coast through the World Heritage Convention

The intertidal wetlands along the Yellow Sea coast of China and the Korean Peninsula provide vital stopover sites in the East Asian–Australasian Flyway, supporting species such as Spoon-billed Sandpiper *Calidris pygmaea* (CR↘). These wetlands also provide ecosystem services for approximately 200 million people, but have historically experienced severe loss and degradation due to coastal land claim[7]. Since 2019, China and Korea have demonstrated strong leadership in inscribing several of these key coastal sites on the UNESCO World Heritage List, recognising their outstanding global importance and strengthening their long-term protection, with over 400,000 hectares safeguarded and additional sites under consideration[8]. Combined with stronger legislation for environmental protection in China, including the Wetland Protection Law introduced in 2022 and the Ecological Conservation Red Line policy implemented in 2017, these actions have helped slow the annual rate of population decline of Spoon-billed Sandpiper from 26% to around 5%[9].



Whooper Swan survival rates within and outside nature reserves in the UK. Black lines represent the mean, grey lines are 95% confidence intervals, and the extent of the grey shaded box denotes the maximum and minimum values. Data: Soriano-Redondo *et al.* (2023)

CASE STUDY: Supporting locally driven protection of Key Biodiversity Areas in Latin America and the Caribbean

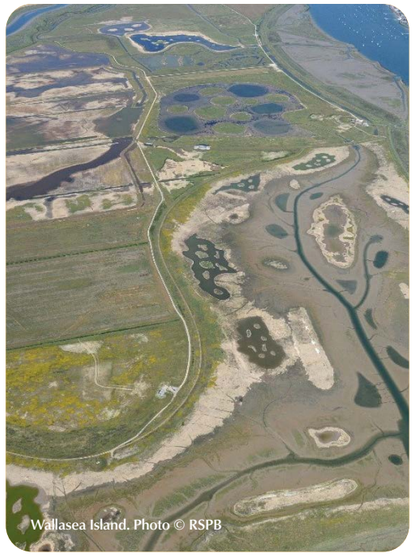
In 2021, BirdLife International and Partners—including the American Bird Conservancy, National Audubon Society, and Birds Canada—as well as RedLAC, a network of 27 environmental funds in Latin America and the Caribbean, established the Conserva Aves initiative. This aims to strengthen the protection of KBAs across eight countries in Central and South America by supporting local communities and NGOs to establish and manage subnational protected areas, while securing sustainable financing. To date, 43 protected areas and OECMs have been designated and recognised, covering over 1.2 million hectares and supporting more than 350 migratory bird species.

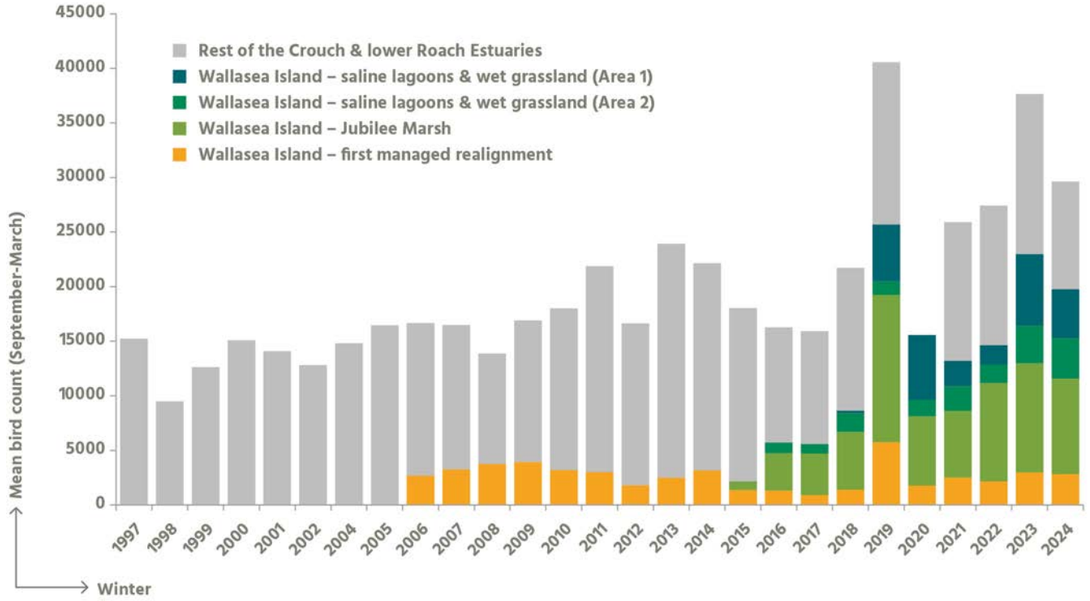
Tropical Andes. Photo © Sarah Brady

References 1. Secretariat of the Convention on Biological Diversity (n.d.), 2. UNEP-WCMC & IUCN (2026), 3. Runge *et al.* (2015), 4. BirdLife International (2026), 5. Border *et al.* (2025), 6. Soriano-Redondo *et al.* (2023), 7. IUCN (2023), 8. UNESCO (n.d.), 9. Zöckler *et al.* (2025)

Retain and restore habitats

The loss and degradation of natural and semi-natural habitats remains one of the greatest threats to birds and wider biodiversity. Addressing this threat requires both the retention of intact habitats and the restoration of those already lost. Restoration should aim to recover the ecological integrity of individual sites while also reconnecting fragmented landscapes, providing migratory birds with more opportunities to rest and refuel along their flyways. Retaining and restoring habitats throughout the breeding, non-breeding and passage ranges of migratory birds is crucial to their long-term conservation.


Wallasea Island. Photo © RSPB



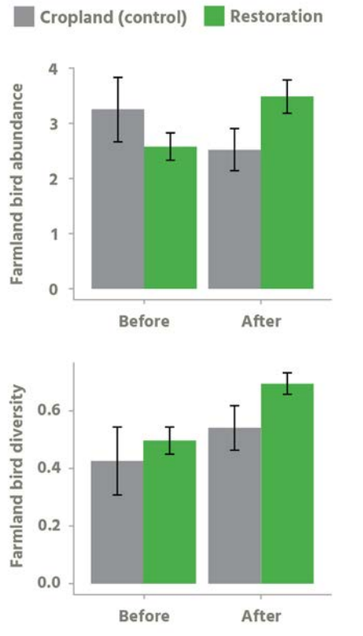
Number of non-breeding and passage waterbirds, excluding gulls, on different areas of wetland created on Wallasea Island and across the wider Crouch and lower Roach Estuaries in Essex, UK. Data: M. Ausden, unpublished data (2026)

Benefits to migratory birds: insights from research

Research highlights the importance of retaining natural and semi-natural habitats for biodiversity conservation. Although restoration can increase biodiversity and ecosystem services, restored ecosystems often continue to support lower levels of biodiversity than intact habitats[1]. As most birds migrate on a broad front, conserving a connected network of suitable habitats at the landscape scale is essential. Radar studies from the eastern USA show that migratory landbirds are more likely to stop over in areas with greater forest cover, while stopover probability declines as the proportion of pasture and cultivated cropland in the landscape increases[2]. In heavily deforested landscapes, migratory birds concentrate in remnant deciduous forest patches.

Retention of human-modified habitats used by migratory birds may also be important, as these can help compensate for the loss or degradation of natural habitats. In the Inner Gulf of Thailand, traditional saltpans provide supplementary roosting and feeding habitat during high tide for shorebirds such as Spotted Greenshank *Tringa guttifer* (EN↘) during the non-breeding season[3,4]. Retention and strategic management of these artificial wetlands therefore plays a key role in conserving birds in the East Asian–Australasian Flyway[5].

Where habitats have already been lost or degraded, restoration can support biodiversity recovery. For example, in Sweden, wetland restoration across 30 agricultural landscapes during 1969–2016 led to increases in population abundance of up to 159% in around half of migratory bird species[6]. In Costa Rica, sampling of migratory birds at sites under different forest restoration treatments revealed higher bird species richness and abundance at locations where seedlings had been planted than at control sites with no restoration efforts[7]. Similarly, surveys of migratory farmland birds before and after grassland restoration in Hungary found that bird abundance increased by 35% during the survey period (2004–2011) and bird species diversity increased by 40%[8].



Adjusted mean abundance and diversity of migratory farmland birds before and after grassland restoration at control sites (no restoration activities carried out) and treatment sites (restoration activities carried out) in Hungary. Error bars show standard errors. Data: Lengyel *et al.* (2023)

CASE STUDY: Restoring the grassland steppes of Georgia and Kazakhstan

The Eurasian Steppe stretches from Hungary to China and provides critical breeding, stopover and non-breeding habitat for migratory birds in the African-Eurasian and Central Asian Flyways. However, large areas have been lost or degraded through conversion to agriculture and overgrazing. Our Partners ACBK in Kazakhstan and SABUKO in Georgia are working to retain and restore these important grasslands. Through the Altyn Dala Conservation Initiative, over five million hectares of the Kazakh Steppe have been protected, and numbers of Saiga Antelope *Saiga tatarica*, a key ecosystem engineer, have recovered from 20,000 individuals in 2003 to 3.9 million individuals in 2025. In Georgia, efforts are underway to restore, protect and sustainably manage 100,000 hectares of the Kakheti Steppes, benefitting globally threatened migratory birds such as Eastern Imperial Eagle *Aquila heliaca* (VU↘) and Egyptian Vulture *Neophron percnopterus* (EN↘).

CASE STUDY: Wetland restoration for migratory waterbirds in the UK

Wallasea Island was once part of an extensive wetland network along the east coast of the UK, but much of this habitat was drained for agriculture from the 1500s onwards. In the early 2000s, with rising sea-levels threatening the low-lying agricultural land, an ambitious project was developed to restore the coastal wetlands at Wallasea Island. This included an area of managed realignment, where sea walls were breached to allow the tide to reclaim the land. This project was led by our Partner in the UK, the RSPB, in partnership with Crossrail, Defra, the Environment Agency and Natural England. Before breaching the sea walls, land levels were raised using material excavated by Crossrail during construction of railway tunnels. This helped minimise adverse impacts on the surrounding area and facilitated landscaping to produce a variety of habitats. In total, 480 hectares of wetland habitat has been created at Wallasea Island, including saline lagoons, islands, mudflats and saltmarsh. These now provide important feeding, roosting and breeding areas for migratory waterbirds. Ongoing monitoring has recorded average peak counts of more than 32,000 waterbirds over the last five years, including up to 11,270 Red Knot *Calidris canutus* (NT↘)[9]. The site now supports nationally important populations of nine species of waterbirds and internationally important populations of a further four species.

References 1. Benayas *et al.* (2009), 2. Guo *et al.* (2023), 3. Yu *et al.* (2019), 4. Sripanomyom *et al.* (2011), 5. Lei *et al.* (2025), 6. Kačergytė *et al.* (2022), 7. Lindell *et al.* (2012), 8. Lengyel *et al.* (2023), 9. M. Ausden, in litt. (2026)

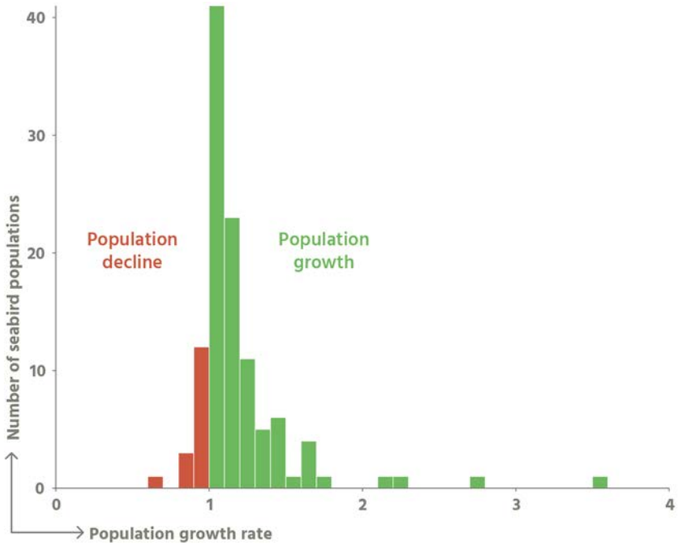
Control and eradicate invasive alien species

Addressing the threat of invasive alien species to migratory birds requires implementing a broad suite of actions. Enhanced biosecurity measures help prevent new invasions and minimise disease transmission, while surveillance in highly sensitive areas facilitates early detection and rapid response. Invasive alien species that have already become established should be controlled or, where possible, eradicated, particularly on islands and at key breeding sites. Habitat lost or degraded due to invasions may require restoration to facilitate recovery of native species, and targeted recovery actions may be needed to prevent extinctions.

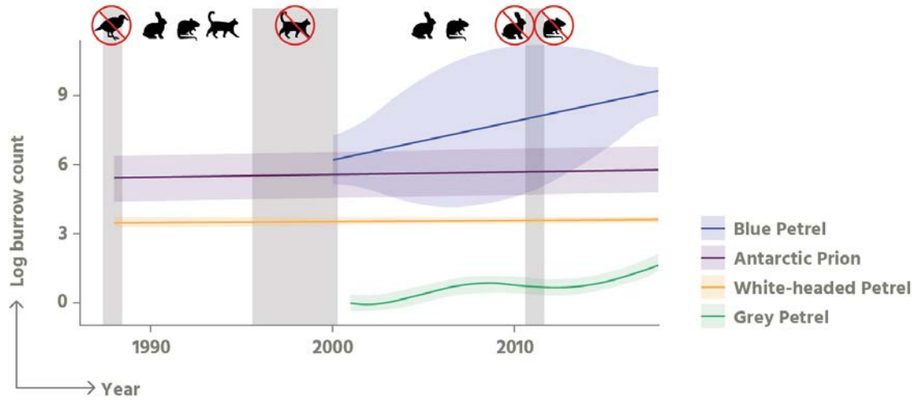
Grey-headed Albatross *Thalassarche chrysostom*. Photo © Stephanie Prince

Benefits to migratory birds: insights from research

At least 1,633 successful eradications of invasive alien animals have been carried out on more than 1,000 islands to date[1]. These have delivered significant positive outcomes for birds, with one review finding benefits to at least 62 migratory seabirds and 15 migratory landbirds in the form of recolonisation (34 migratory species), new colonisations (22 species), reintroductions (11 species) and positive population trends (40 species)[2]. Analysis of observed or projected growth rates of migratory seabird populations following successful invasive alien species control reveals that the vast majority (>85%) of these native populations grow following eradication of invasive species, despite multiple other ongoing threats[3,4]. Recovery is particularly strong at newly established colonies and where multiple invasive alien species are removed[3].



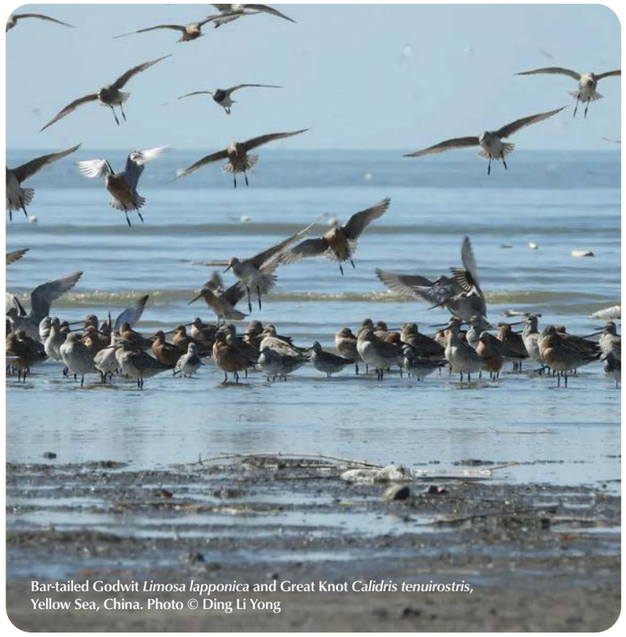
Growth rates of 112 migratory seabird populations following eradication of invasive alien species. Data: Brooke *et al.* (2018)



Trends in overall burrow numbers of four migratory seabird species on Macquarie Island following eradication of invasive vertebrates. Shading shows 95% confidence intervals. Grey vertical bars indicate timings of invasive species eradication. Data: Bird *et al.* (2024)

CASE STUDY: Invasive vertebrate eradication on Macquarie Island

Macquarie Island, Australia, is an important sub-Antarctic breeding site for thousands of migratory seabirds, including globally threatened species such as Grey-headed Albatross *Thalassarche chrysostoma* (EN↘) and Snowy Albatross *Diomedea exulans* (VU↘). Invasive alien rabbits, cats, rodents and Weka *Gallirallus australis* caused significant damage to the island's flora and fauna until their phased eradication, with species removed sequentially between 1988 and 2014. Surveys show that following control of these invasive vertebrates, Antarctic Prion *Pachyptila desolata* (LC↘) and White-headed Petrel *Pterodroma lessonii* (LC↘) populations on the island increased by ~1% per year[5]. Blue Petrel *Halobaena caerulea* (LC↘) and Grey Petrel *Procellaria cinerea* (NT↘), once extirpated from the main island, recolonised and have increased rapidly at 14% and 10% per year respectively since 2001[5].



Bar-tailed Godwit *Limosa lapponica* and Great Knot *Calidris tenuirostris*, Yellow Sea, China. Photo © Ding Li Yong

CASE STUDY: Controlling invasive plants at key sites along China's coast

Smooth Cordgrass *Spartina alterniflora*, native to North America, was introduced to China in 1979 to stabilise coastal mudflats for development and has since spread rapidly to cover around 68,000 hectares of China's coast, degrading vital habitat for migratory shorebirds[6]. In 2023, China launched an ambitious nationwide campaign to control the invasive plant, aiming to remove over 90% by 2025. Monitoring during the first year of the project showed that a total of 37,553 ha had been removed—more than half of the total area—with some provinces achieving removal rates of up to 86%[7]. Field observations along the Jiangsu coast in 2025 suggest that the programme—at least initially—has been highly successful, with large areas of *Spartina* removed and replaced by open mud. Ongoing monitoring is needed to evaluate the long-term success of the eradication, including the rate of recolonisation of these areas by shorebirds and the likelihood of further *Spartina* control being necessary in the future.

References 1. DIISE (2026), 2. Jones *et al.* (2016), 3. Brooke *et al.* (2018), 4. Borrelle *et al.* (2023), 5. Bird *et al.* (2024), 6. Okoye *et al.* (2020), 7. Min *et al.* (2025)

Integrate climate adaptation and biodiversity conservation

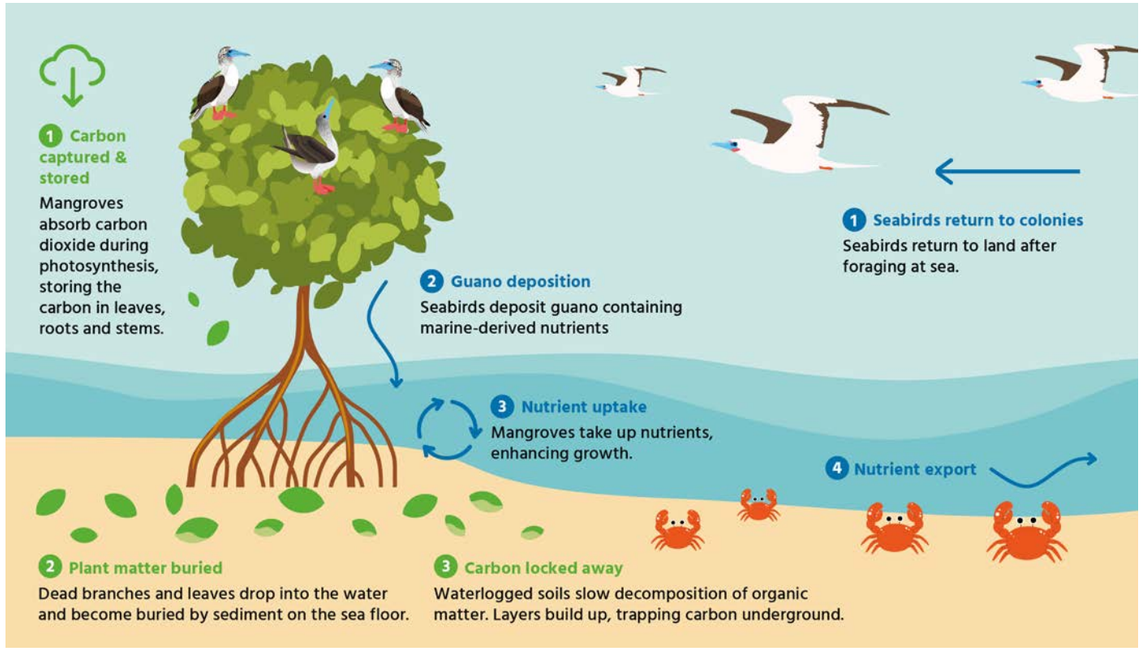
The climate and biodiversity crises are closely interrelated and must be addressed together, including through nature-based solutions. Conserving and restoring ecosystems can improve the resilience of birds to climate change while maintaining vital ecosystem services for people, such as carbon sequestration and flood defence. Effective conservation of migratory species under climate change requires evidence-based interventions coordinated along flyways, supported by robust long-term monitoring to track changes over time.

Benefits to migratory birds: insights from research

Research shows that evidence-based conservation actions can help species adapt to climate change[1,2]. Climate models projecting future shifts in species' ranges are essential for guiding protected area designation and management. Existing protected area networks are expected to play an important role in safeguarding migratory bird habitats under future warming scenarios. For example, protected areas currently encompass an average of 21% of the climatically suitable breeding habitat for 24 Arctic migratory shorebird species, and are projected to cover a similar proportion of suitable habitat for these species under future climate scenarios[3]. However, important gaps remain, particularly in the Canadian Arctic islands, which are likely to become climate refugia for many shorebirds as warming here is slower than other parts of the Arctic. In areas where formal protection is limited, recognising and effectively managing climate-resilient Other Effective Area-based Conservation Measures (OECMs), such as some Indigenous territories, could improve connectivity and strengthen conservation networks[4].

Species-focused interventions can also deliver swift benefits. Floating artificial nest platforms have been used to reduce flooding of ground-nesting waterbird colonies in Europe caused by sea-level rise, benefitting species such as Common Tern *Sterna hirundo* (LC?)[5]. In Argentina, restoring native vegetation around Magellanic Penguin *Spheniscus magellanicus* (LC↘) colonies has helped to lower nest temperatures and reduce egg and chick predation, improving breeding success[6].

There is also growing evidence that migratory birds and their habitats contribute directly to climate mitigation and ecosystem resilience. Mangroves are among the most carbon-dense forests in the world, containing on average 1,023 Mg of carbon per hectare—around three times more than boreal, temperate and tropical upland forests[7]. Migratory seabirds such as Red-footed Booby *Sula sula* (LC↘) play a key role in enhancing mangrove productivity and resilience[8]. After foraging at sea, birds deposit large quantities of guano at their colonies on land, providing nutrients that enrich mangroves as well as other coastal habitats. Conserving migratory seabirds is therefore vital to preserving and enhancing the carbon sequestration services provided by mangrove forests.



Making woven handicrafts at Koshi Tappu Wildlife Reserve.
Photo © Birat Anupam/Dialogue Earth

CASE STUDY: Implementing nature-based solutions for migratory birds and climate mitigation in Nepal

Koshi Tappu Wildlife Reserve in Nepal is an important non-breeding site for migratory birds in the Central Asian Flyway, including threatened species such as Yellow-breasted Bunting *Emberiza aureola* (CR↘). Unsustainable resource extraction has reduced biodiversity and weakened ecosystem resilience to climate change. In response, our Partner Bird Conservation Nepal, together with Koshi Tappu Wildlife Reserve and local community institutions, are working to reduce human pressure in the core reserve by shifting resource use to sustainable co-managed buffer zones. By designing alternative, nature-positive livelihoods that build directly upon existing local knowledge, such as transitioning wild river fishers to aquaculture and transforming invasive wetland plants into woven handicrafts, the initiative aims to restore ecosystem integrity while simultaneously empowering communities and boosting their climate resilience.

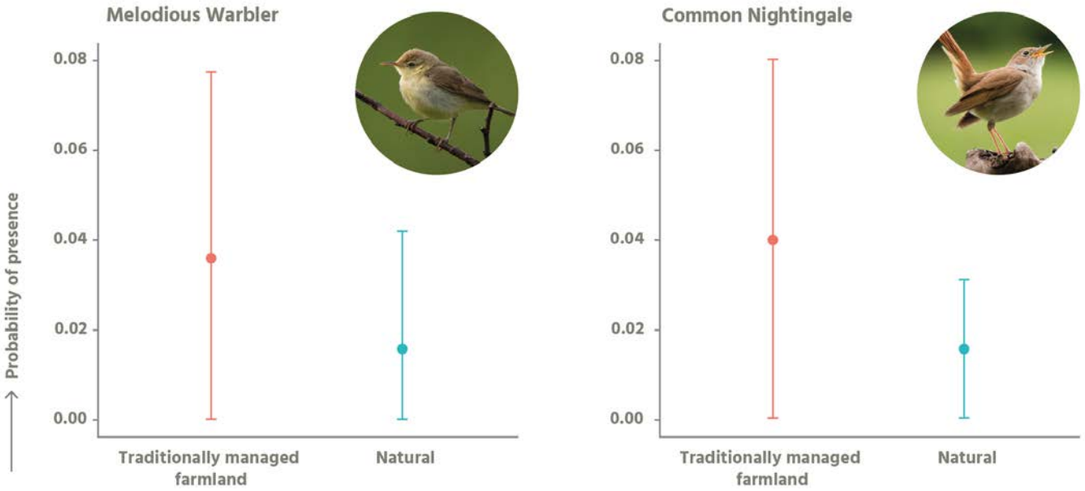
CASE STUDY: Facilitating climate adaptation for Eleonora's Falcon in Greece through targeted action

More than 85% of the global population of Eleonora's Falcon *Falco eleonorae* (LC↗) breeds in Greece, before migrating south to Madagascar for the non-breeding season. The species is highly vulnerable to climate change, as rising temperatures increase egg infertility and changes in autumn passerine migration affect prey availability during the falcon's peak breeding season[9]. Our Partner in Greece, The Hellenic Ornithological Society, in partnership with the University of Patras, has implemented targeted actions to facilitate the species' adaptation to climate change. Interventions include the installation of more than 1,000 artificial nests, planting fruit trees, bushes and cereals to attract migrating passerines, and eradication of invasive rats. These interventions have increased breeding success in the project area by 42%.

Eleonora's Falcon *Falco eleonora*.
Photo © Lars Petersson - My World of Bird Photography

References 1. Bowgen *et al.* (2022), 2. Barton *et al.* (2023), 3. Wauchope *et al.* (2017), 4. Lin *et al.* (2026), 5. Manikowska-Ślepowrońska *et al.* (2022), 6. Stokes & Boersma (1998), 7. Donato *et al.* (2011), 8. Appoo *et al.* (2024), 9. European Commission (2019)

Promote sustainable agriculture and forestry



The probability of occurrence of Melodious Warbler and Common Nightingale in low-intensity farmland and natural areas in West Africa, with error bars representing 95% confidence intervals. Data: Agger *et al.* (2024)

Sustainable agriculture and forestry emphasise the long-term stewardship of land, balancing productivity with the protection of natural resources. Practices such as agroforestry, reduced chemical use, and the retention of natural habitat features can transform working landscapes into spaces that support biodiversity as well as production. When effectively managed, these landscapes provide important breeding, non-breeding, and stopover sites for migratory birds. Sustainable management not only helps safeguard bird populations but also strengthens ecosystem resilience and supports local livelihoods, delivering lasting benefits for both people and nature.

Benefits to migratory birds: insights from research

A growing body of research shows that working landscapes can play a vital role in supporting migratory birds. Low-intensity farmland can support high species richness and abundance, particularly in agricultural mosaics that include scrub and fallow areas. In West Africa, these habitats are important for Afro-Palaearctic migratory species such as Melodious Warbler *Hippolais polyglotta* (LC↗) and Common Nightingale *Luscinia megarhynchos* (LC→), which may even favour early successional habitats maintained by traditional farming practices over natural habitats[1]. In Japan, sustainable rice farming landscapes have contributed to the recovery of Oriental White Stork *Ciconia boyciana* (EN↘), a species that became extinct in the wild in Japan in 1971. The "White Stork Friendly Farming method" reduces or eliminates agrochemical use and employs practices such as winter flooding, deep water management and delayed summer drainage, creating wetland-like conditions that increase food availability for the re-established population[2].

Banning the use of agrochemicals and veterinary drugs that are toxic to migratory birds or significantly reduce the availability of insect prey can halt or reverse population declines. Prior to France's ban on the pesticide imidacloprid in 2018, bird abundance was 12.7% higher in areas that had not been treated with the pesticide than in treated areas. Four years after the ban, bird abundance at formerly treated sites remained lower than in untreated areas, but the disparity reduced to 9%[3]. This narrowing of the gap suggests that reducing harmful pesticides may help alleviate population declines. In Nepal, threatened vulture populations are recovering following bans on veterinary use of diclofenac and other vulture-toxic drugs[4,5]. In 2021, the world's first Vulture Safe Zone was declared near Chitwan National Park, recognising the success of actions led by our Partner Bird Conservation Nepal, working under the Saving Asia's Vultures from Extinction (SAVE) consortium, to end the sale of diclofenac and advocate for vulture conservation[6]. The Vulture Safe Zone concept has since been extended to Africa, with actions underway to safeguard migratory species such as Cape Vulture *Gyps coprotheres* (VU↘)[7].

Although primary forests in many regions have been lost and degraded, forestry plantations can play a role in providing habitat. In Guatemala, mixed-native hardwood plantations support higher richness and diversity of Neotropical migratory birds than secondary forest, while teak plantations support conservation priority species[8]. Across plantation types, structural complexity—particularly the presence of tall overstorey trees—increases migratory bird abundance, richness and diversity, highlighting the importance of retaining key habitat features in production forests.

Cattle rancher. Photo © Aves Argentinas

CASE STUDY: Community-led sustainable land management in Mole National Park, Ghana

The wooded savannahs of Mole National Park, Ghana, provide vital non-breeding and stopover habitat for Palearctic migratory birds, including European Pied Flycatcher *Ficedula hypoleuca* (LC↘), Willow Warbler *Phylloscopus trochilus* (LC↘) and Common Cuckoo *Cuculus canorus* (LC→). However, the landscape in and around the park is threatened by unsustainable farming practices and illegal tree felling[10]. Our Partner Ghana Wildlife Society, supported by the RSPB, is working with farming communities adjacent to the park to promote sustainable land management techniques such as integration of native trees into agricultural lands, farmer-managed natural regeneration, and restoration of degraded riparian and woodland habitats. A key component is the 'Modified Taungya System', which enables communities to restore degraded forest areas while cultivating food crops during the early years of plantation establishment. Field observations and bird surveys suggest that agroforestry plots and restored woodlands support a diversity of bird species, particularly migratory insectivores associated with wooded savannah and farmland mosaics[11].

CASE STUDY: Conserving grassland birds in South America's rangelands

The Southern Cone grasslands of Brazil, Argentina, Paraguay and Uruguay provide vital non-breeding habitat for migratory birds, but these habitats have been severely degraded through agricultural expansion and overgrazing. The Alianza del Pastizal (Grassland Alliance), a BirdLife International initiative, is working alongside more than 800 producers to sustainably manage 1.3 million hectares of this working grassland landscape, benefiting biodiversity and ensuring resilient livelihoods. Grasslands managed using these sustainable ranching practices display greater habitat heterogeneity and support more grassland bird species than those under continuous grazing regimes, with some migratory species such as American Golden Plover *Pluvialis dominica* (LC↘) found exclusively at these sites during surveys in 2018 and 2019[9].

References 1. Agger *et al.* (2024), 2. Fukushima & Naito (2024), 3. Perrot *et al.* (2025), 4. Galligan *et al.* (2020), 5. Mallord *et al.* (2024), 6. SAVE (2021), 7. Endangered Wildlife Trust (2025), 8. Bennett *et al.* (2018), 9. Vaccaro *et al.* (2020), 10. Land Use Dialogue (2018), 11. K. Boafo, in litt. (2026)

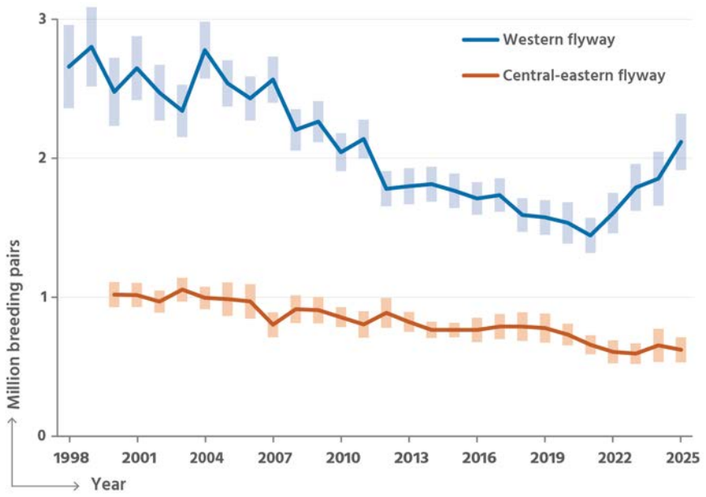
Prevent overexploitation and illegal killing

Overexploitation is one of the leading drivers of declines in migratory species[1]. Coordinated international action, effective legislation, sustained enforcement efforts, community engagement and long-term monitoring are key to reducing illegal and unsustainable use of migratory birds across flyways. The BirdLife Partnership supports these efforts through research and monitoring to strengthen the evidence base, advocacy for improved legislation and effective enforcement, and education and community engagement to drive long-term behaviour change, including at key hotspots. BirdLife also provides support for the development and implementation of National Action Plans and national multistakeholder committees called for under the Convention on Migratory Species and the Bern Convention.

Benefits to migratory birds: insights from research

Research increasingly shows that coordinated, science-based approaches to reducing overexploitation can deliver rapid benefits for migratory bird populations. Across the African-Eurasian Flyway, the European Commission's Task Force on the Recovery of Birds uses Adaptive Harvest Management to assess whether current hunting pressure is compatible with population recovery. By combining population monitoring, demographic modelling and data on numbers of birds killed, this approach helps inform sustainable management measures for declining migratory birds that are hunted.

European Turtle-dove *Streptopelia turtur* (VU↘), classified as Vulnerable on the IUCN Red List because of habitat loss and unsustainable hunting, was the first major test case for this approach. In response to severe population declines, coordinated measures were put in place, including a four-year hunting moratorium in France, Spain and Portugal. The population in Western Europe has since shown a rapid recovery, increasing by c.47% between 2021 and 2025. While the ban on hunting may not be the sole explanation, and trends remain negative in other countries along the flyway, it suggests that coordinated, well-informed conservation action can support the recovery of threatened migratory birds[2]. Building on this work, recommendations have since been developed for other declining species, including Common Pochard *Aythya ferina* (VU↘) and Common Quail *Coturnix coturnix* (LC↘).



Estimates of European Turtle-dove breeding population size along the European part of the western flyway (blue) and central-eastern flyway (orange). Error bars indicate 95% confidence intervals. Data: Arroyo *et al.* (2026)

Red-footed Falcon *Falco vespertinus*
Photo © Vladimir Kogan Michael, Shutterstock

CASE STUDY: Addressing mass mortality caused by indiscriminate mist-net use in the East Asian–Australasian Flyway

In the East Asian–Australasian Flyway, BirdLife International has identified at least 211 migratory bird species, including 45 globally threatened species, negatively impacted by the use of mist-nets[3]. Mostly used for hunting or as protection of agricultural land or fisheries, such nets indiscriminately kill hundreds of thousands of migratory birds each year. In response, China introduced stronger legislation, supported community engagement and education campaigns, and worked with e-commerce platforms to curb online sales of mist nets. In Vietnam, enforcement effort by government agencies against the use of mist nets for hunting has also increased, alongside the release of new policy guidance on hunting of migratory species. Together, these coordinated actions are driving dramatic reductions in the use of nets and associated bird mortality.

CASE STUDY: Tackling illegal hunting at the world's largest raptor non-breeding site

At a roosting site in Angola dubbed "Falcopolis", up to one million Red-footed Falcon *Falco vespertinus* (VU↘) gather each March. Following reports of large-scale illegal hunting at the site, conservation organisations Orbis Angola and our Partner in Hungary, MME, worked with national authorities to introduce patrols, awareness campaigns and long-term monitoring through ringing and tagging. A research camp, sponsored by the Falcopolis Fund, has now been established, and habitat improvements are ongoing. These efforts have helped reduce illegal hunting—in 2026 only a small number of illegal activities were detected, highlighting the value of sustained community engagement and conservation investment[4].

References 1. UNEP-WCMC (2024), 2. Carboneras *et al.* (2025), 3. Angkaew *et al.* (2026), 4. Palatitz & Agostinho (2026)

Implement nature-safe land use planning

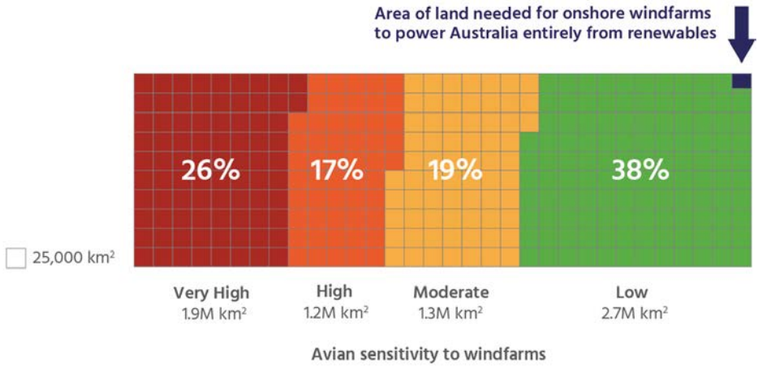
Integrating biodiversity data into the early stages of development planning is key to minimising negative impacts on migratory birds. Information on species' distributions, susceptibility to threats, and locations of important sites for biodiversity can be used to map the risk posed by development. High-risk areas where development should be avoided may include migratory bottlenecks, key stopover sites and sensitive breeding and non-breeding habitats. BirdLife is championing efforts to implement nature-safe land-use planning by businesses and governments, especially within the energy sector, through the development of best-practice legislation and guidance, including for investors, and by pioneering sensitivity mapping tools.

Benefits to migratory birds: insights from research

The mitigation hierarchy is a framework designed to limit the negative impacts of development on biodiversity. It consists of four key actions, ordered from most effective to least effective: avoid, minimise, restore and offset. The first action requires developers to "anticipate and prevent adverse impacts on biodiversity before actions or decisions are taken that could lead to such impacts"[1]. While mitigation measures may reduce negative impacts, avoidance is widely recognised as the most effective way to deliver a no-net-loss outcome.

Effective avoidance depends on access to robust biodiversity data and the willingness of businesses to act on such information. The Taskforce on Nature-related Financial Disclosures (TNFD) framework is accelerating this shift, with growing numbers of businesses now using it to identify, assess, and disclose their nature-related risks and dependencies. This is driving greater demand for, and use of, the best available biodiversity data in corporate decision-making, including decisions about where and how infrastructure is sited.

The sensitivity of biodiversity to development varies between different places, so negative impacts can be avoided by siting infrastructure in low-risk areas. For example, a recent assessment of avian sensitivity to energy infrastructure in Australia indicates that over 2.6 million km² of land has both suitable wind speeds for commercial wind generation and low avian sensitivity to wind farms[2]. This is 142 times more land than is needed to power the country entirely from renewables. While much of this area will not be suitable for other reasons, it clearly shows that there is a lot of potential to advance onshore wind energy development in the country without needing to exploit areas with high risk of harmful effects on birds.



Area of land in Australia with different levels of avian sensitivity to windfarms, as a percentage of the total land area with suitable wind speeds for commercial wind generation.

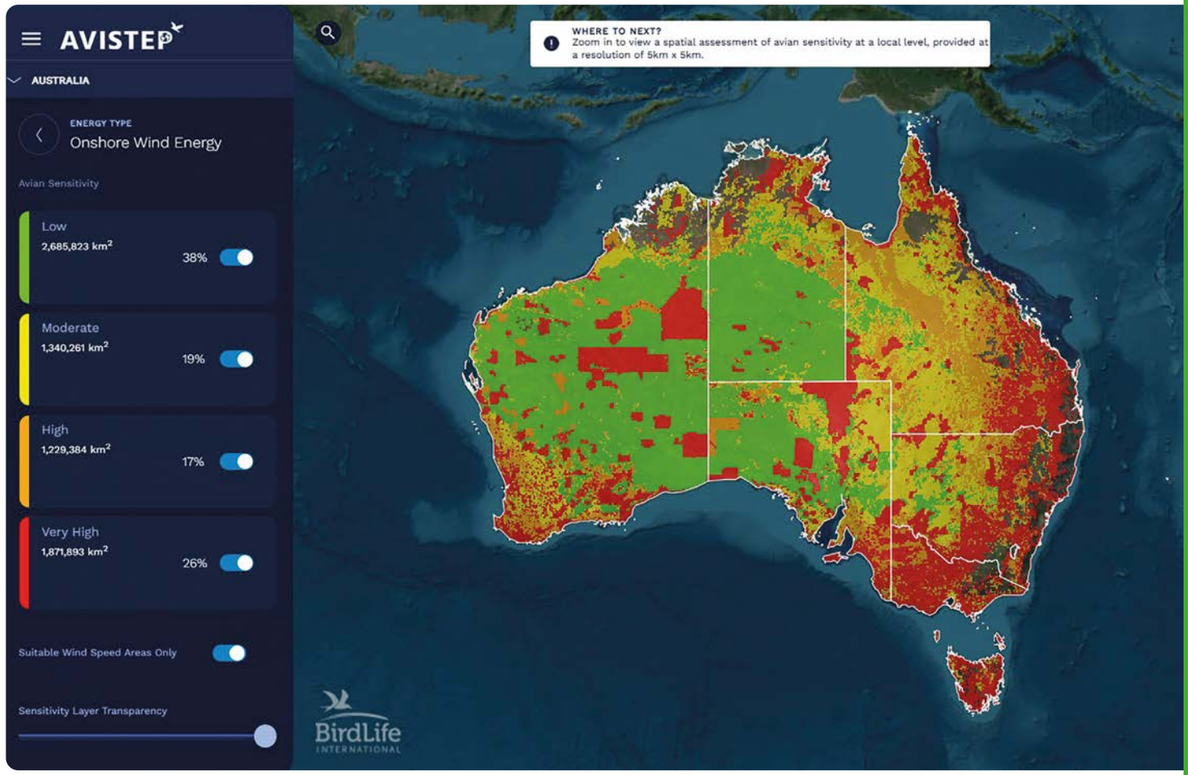
CASE STUDY: Mapping avian sensitivity to energy infrastructure with AVISTEP

The climate crisis is triggering a transformation in how energy is generated. Renewables, principally wind and solar, are undergoing unprecedented growth and are set to become the largest source of electricity globally by the end of 2026. This, in turn, will require a massive expansion of the electricity grid, with the total length of powerlines in the world set to double by 2040.

Wind farms, solar facilities and powerlines can have a detrimental impact on birds, so it is vital that this new infrastructure is planned carefully. The characteristics that make some species more susceptible are well known and considerable data exist to map where they occur. BirdLife has now carried out comprehensive assessments of avian sensitivity in relation to wind (on and offshore), solar photovoltaic facilities and powerlines across numerous countries, with the information made available freely through AVISTEP: the Avian Sensitivity Tool for Energy Planning. Using this tool, planners from government, lenders and the energy sector can quickly identify bird-safe areas to develop, ensuring that the energy transition can be truly green.

CASE STUDY: Mainstreaming biodiversity data into the private sector through IBAT

The Integrated Biodiversity Assessment Tool (IBAT), developed by BirdLife International, Conservation International, IUCN and UNEP-WCMC, provides commercial access to the world's most authoritative biodiversity data. Information on protected areas, Key Biodiversity Areas and threatened species can be used by businesses to assess biodiversity risks, align with sustainability frameworks, and meet regulatory and disclosure requirements. Governments can also access these data for free to support land-use planning and legislation development. Over 34,000 users from over 250 private sector organisations have used IBAT to screen more than 750,000 locations and inform their decision-making, helping to minimise the impacts of development on migratory birds and other biodiversity. Funds generated by IBAT are reinvested back into the underlying biodiversity datasets. In 2024, IBAT invested US$2.4 million to support critical data updates and maintenance[3].



The Avian Sensitivity Tool for Energy Planning (AVISTEP)

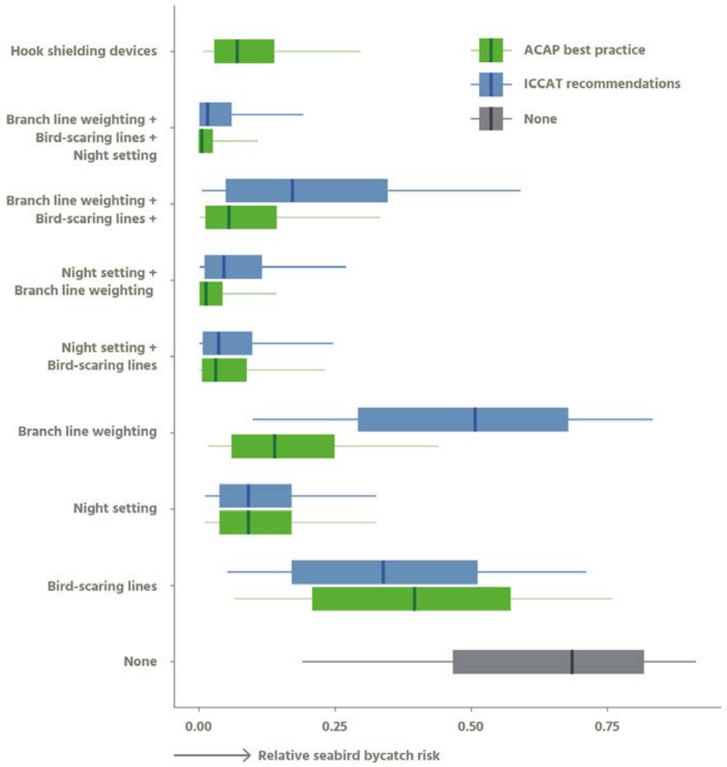
References 1. CSBI (2015), 2. BirdLife International (2026), 3. IBAT (2025)

Mitigate seabird bycatch

The injury or death of non-target species in fisheries, also known as bycatch, is the most important at-sea threat to seabirds globally. It is the main cause of mortality for several migratory species, from seaducks spending the non-breeding season in the coastal waters of the Baltic Sea, to albatrosses soaring across the high seas in the Southern Oceans and North Pacific. Fortunately, effective bycatch mitigation measures exist and, in many cases, have already been adopted in both national and Regional Fisheries Management Organisation regulations. Ensuring effective transparency during fishing operations and compliance with regulations is now essential to effectively tackle this global threat to seabirds throughout their migratory range.

Benefits to migratory birds: insights from research

An evaluation of seabird bycatch mitigation in the South Atlantic pelagic longline fishery highlights the potential for reducing bird mortality by following best practice recommendations[1]. Focusing on five threatened populations of albatrosses and petrels, the analysis compared current management rules established by the International Commission for the Conservation of Atlantic Tunas (ICCAT) against the best practice guidelines recommended by the Agreement on the Conservation of Albatrosses and Petrels (ACAP) under the Convention on Migratory Species. The findings suggest that aligning mitigation measure specifications with best practice guidelines would potentially reduce seabird mortality by 41–86%. Simultaneously implementing three key measures—night setting, branch line weighting, and bird-scaring lines—could reduce seabird mortality by up to 93%. While current regulations often require only two measures, updating specifications to match more rigorous ACAP standards would significantly lower the risk to seabird species breeding in remote Sub-Antarctic islands and migrating across the Southern Ocean.



The relative performance of different combinations of bycatch mitigation measures in the South Atlantic pelagic longline fishery under current ICCAT specifications (blue) and ACAP best practice guidelines (green). Data: Bell *et al.* (2025)

Modified purse-seine net. Photo © Cristian Suazo

CASE STUDY: Tackling bycatch of migratory seaduck in the Baltic Sea

The Baltic Sea is a globally significant non-breeding and passage area for several species of seaduck, but their populations have declined by more than 50% since the early 1990s, with commercial gillnet bycatch identified as a primary driver. Current estimates suggest that nearly 36,000 seaduck are caught as bycatch in the region each year[2]. Recent experimental trials in the Lithuanian coastal gillnet fishery have demonstrated that mitigation measures can significantly reduce mortality. The use of "scaring bird" kites attached to buoys from which gillnets are suspended and nighttime deployment of gillnets both resulted in marked declines in bycatch compared to standard practices[3]. When applied together, these measures proved even more effective, with trial conditions indicating the potential to eliminate seabird bycatch entirely. Tens of thousands of migrating seaduck could be saved each year if these measures were implemented across the region.

CASE STUDY: Promoting safer purse-seine fishing along the Humboldt current

The Humboldt Current System off western South America is among the most productive marine ecosystems on Earth, supporting marine predators alongside major fisheries, including purse-seine fisheries in which large nets are used to encircle and capture entire schools of fish. However, this productivity also brings significant risks for pursuit-diving seabirds such as penguins and shearwaters, which are frequently killed by fisheries during their migration towards lower latitudes in the non-breeding season. Magellanic Penguin *Spheniscus magellanicus* (LC↘) and Humboldt Penguin *S. humboldti* (VU↘) are vulnerable to drowning in purse-seine nets[4], while high bycatch rates have also been recorded for Pink-footed Shearwater *Ardenna creatopus* (VU?)[5]. A modified purse-seine design with structural adjustments including buoy mounting and mesh size, developed through collaboration between the fishing industry and BirdLife International, has been shown to be a highly effective solution. Trials showed a 98% reduction in bycatch of diving seabirds without reducing target fish catch, while also lowering the cost of net materials[6]. This innovation was recognised by Premios Latinoamérica Verde as one of the best environmental initiatives in Latin America in 2017.

Scaring-bird kite. Photo © Colin Trundle/CIFCA

References 1. Bell *et al.* (2025), 2. Ramírez *et al.* (2024), 3. Morkūnas *et al.* (in prep), 4. Suazo *et al.* (2014), 5. Carle *et al.* (2019), 6. Suazo *et al.* (2024)

Target species recovery actions

Protecting, conserving and effectively managing key sites, restoring degraded habitats and mitigating threats will benefit most migratory species, and are much more cost effective than the long-term investments needed to save individual species once they have become highly threatened. For some species, however, targeted recovery actions are essential to avoid extinction and reverse declines. Such measures include captive breeding, reintroduction into the wild, movement of individuals between locations, predator control, disease management, provision of nest sites, supplementary feeding and other species-specific interventions. When adequately resourced and correctly implemented, these actions can effectively save migratory species from extinction.

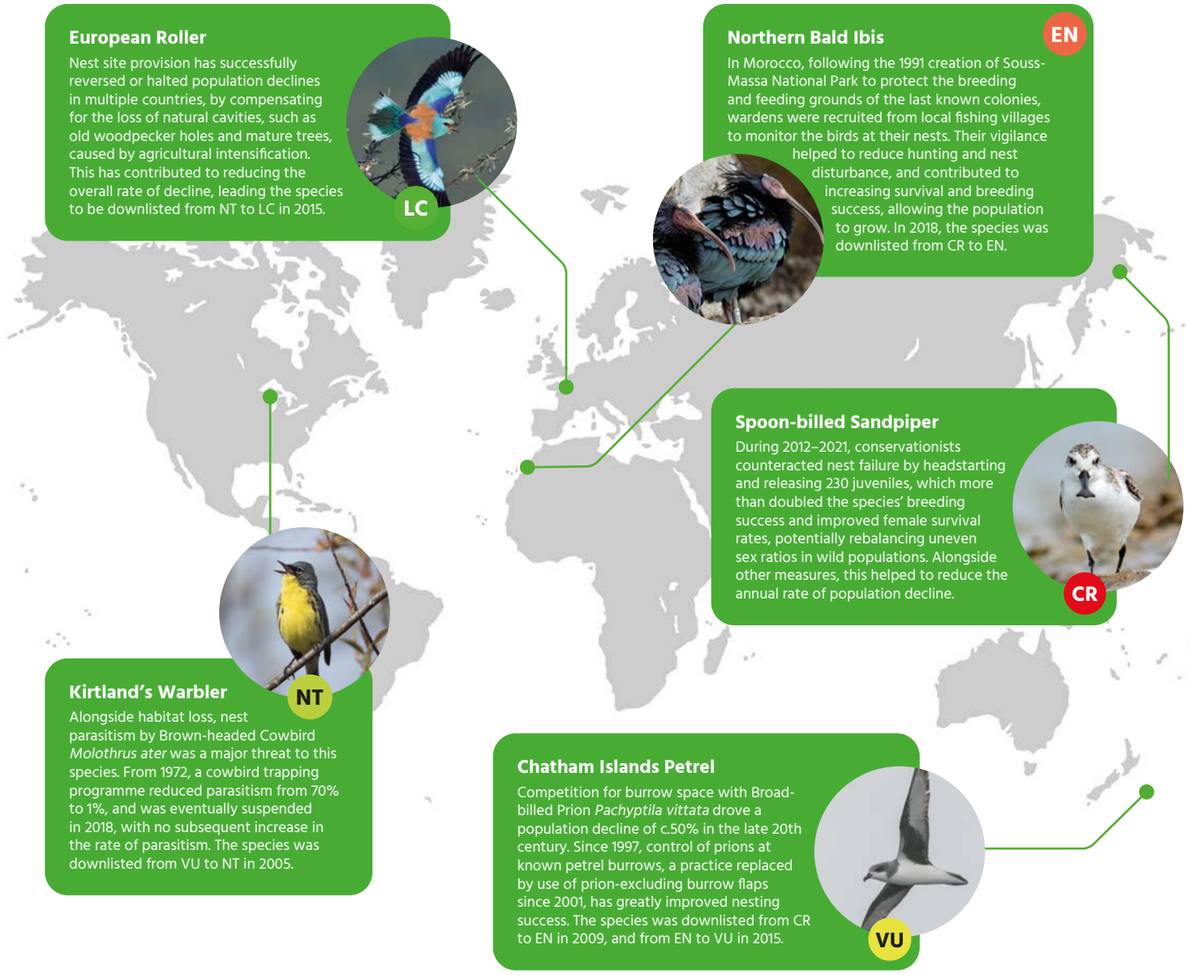
Case study: Captive breeding and reintroduction drive Whooping Crane recovery

Standing at 1.5 m, the Whooping Crane *Grus americana* (EN↗) is the tallest bird in North America. Formerly widespread, its population had dwindled to just 21 birds by 1941 due to overhunting, habitat conversion and human disturbance. Landmark collaborative conservation actions, such as the 1916 Migratory Bird Treaty Act between Canada and the USA, and the establishment of the Wood Buffalo National Park (breeding grounds in Northwest Territories, Canada) and Aransas National Wildlife Refuge (non-breeding grounds in coastal Texas, USA), provided the legal and physical framework for the species' survival[1].

However, the population barely grew until the 1960s, when passive protection evolved into active intervention[2]. Over several decades, hundreds of eggs were collected to establish captive breeding flocks, without impacting the wild population. These supported experimental reintroductions, including cross-fostering by Sandhill Cranes *Grus canadensis* (LC↗), costume-rearing and the use of ultralight aircraft to teach juveniles migratory routes. To ensure the species' resilience, efforts were made by many partners from state and federal agencies and non-profit organisations to establish distinct migratory populations in the Rocky Mountains and the Eastern United States, and non-migratory populations in Florida and Louisiana. Thirteen states implemented a cooperative protection programme to rehabilitate sick and injured birds and mitigate hazards encountered on migration[3].

In 2025, the annual survey of the wild population recorded a record count of 557 birds, including 41 juveniles[4]. The population continues to increase at around 4% per year, reflecting sustained habitat protection and coordinated conservation efforts by state and non-state actors in both the USA and Canada. The Whooping Crane remains one of the rarest birds in North America[5], but if it continues to recover, it will eventually qualify for a lower threat category on the IUCN Red List.

Annual Whooping Crane abundance estimates for the wild population. Data: Stehn & Haralson-Strobel (2014) and Butler *et al.* (2025)



Examples of targeted conservation measures for migratory birds.

Case study: Giving shorebirds a headstart

"Headstarting" is a technique involving the hatching or rearing of wild eggs or young in captivity, and releasing these individuals into the wild at or before independence. Over recent decades, it has been trialled as a conservation intervention for threatened shorebirds to improve the trend of target populations by increasing survival during the vulnerable early-life stages. It has been particularly useful for threatened migratory species like Spoon-billed Sandpiper *Calidris pygmaea* (CR↘).

Population models show that headstarting can result in order-of-magnitude increases in per capita productivity of shorebirds, which could lead to substantial increases in population productivity and improved population trends[6].

Three scenarios in which headstarting can be an appropriate intervention include: (a) to buy time while conservation measures are identified and take effect; (b) to accelerate the recovery of very small populations; and (c) to assist the colonisation of new or improved habitat. Headstarting does not directly address the drivers of shorebird declines and can be challenging and expensive, but it is a valuable conservation tool when used within recovery plans that deliver more sustainable solutions for shorebirds.

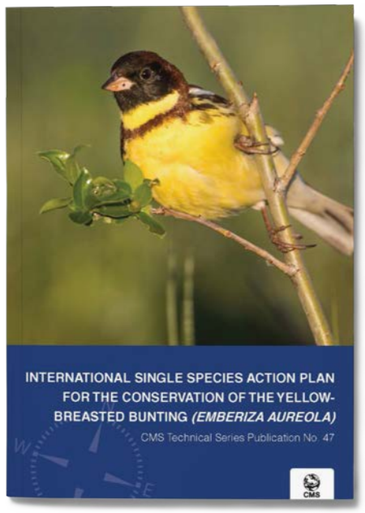
Photos © aaltair/Shutterstock, Lars Petersson, Butterfly Hunter/Shutterstock, Chris Tuffley, Cory Gregory

References 1. Allen (1952), 2. Stehn & Haralson-Strobel (2014), 3. Urbanek & Lewis (2020), 4. Butler *et al.* (2025), 5. USFWS (2025), 6. Donaldson *et al.* (2025)

Coordinate action for species along flyways

Aquatic Warbler *Acrocephalus paludicola*. Photo © Karin Jaehne, Shutterstock

Threatened and declining migratory bird species require coordinated interventions across flyways to ensure their recovery and long-term survival. Multiple tools have been developed to support governments and other stakeholders to identify and implement the actions needed for restoring populations of migratory species to favourable conservation status.



International Species Action Plans for migratory birds

Action planning is a widely applied conservation tool for agreeing the key issues to be addressed and identifying and coordinating implementation of interventions by relevant stakeholders. More than 100 International Species Action Plans have been developed for migratory birds across the various flyway frameworks, but some are outdated and not all are being implemented.

Single Species Action Plans make up the majority with an increasing number of Multispecies Plans developed since the mid-2010s, marking a shift from a species-by-species approach to covering multiple species facing common threats across shared habitats. In addition, there are some species management plans designed to regulate harvest. Action plans are most prevalent for threatened migratory waterbirds, with the majority adopted for species in the African-Eurasian Flyway. Most action plans for migratory birds have been developed under multilateral environment processes such as the Convention on Migratory Species (CMS), the African-Eurasian Migratory Waterbird Agreement (AEWA), the East Asian–Australasian Flyway Partnership (EAAFP) and the European Union.

The BirdLife Partnership has engaged in developing and implementing many of these plans, providing data and conservation expertise in the action-planning phase, supporting coordination of implementation as well as delivering conservation interventions and monitoring on the ground. Current priorities include Single Species Action Plans for the Spoon-billed Sandpiper *Calidris pygmaea* (CR↘) (through EAAFP), Far Eastern Curlew *Numenius madagascariensis* (EN↘) (CMS), Dalmatian Pelican *Pelecanus crispus* (NT↘) (CMS), Yellow-breasted Bunting *Emberiza aureola* (CR↘) (CMS), Sociable Lapwing *Vanellus gregarius* (CR↘) (AEWA/CMS) and Steppe Eagle *Aquila nipalensis* (EN↘) (CMS), as well as Multispecies Action Plans for African-Eurasian Vultures (CMS), Bustards (CMS), Grassland Waders (EU) and Benguela Current Seabirds (AEWA). The African-Eurasian Migratory Landbirds Action Plan (CMS) sets out an even higher level of ambition, providing a coordinated framework for the conservation of hundreds of migratory landbird species across the African-Eurasian Flyway.

Additional mechanisms for coordinating conservation efforts along flyways

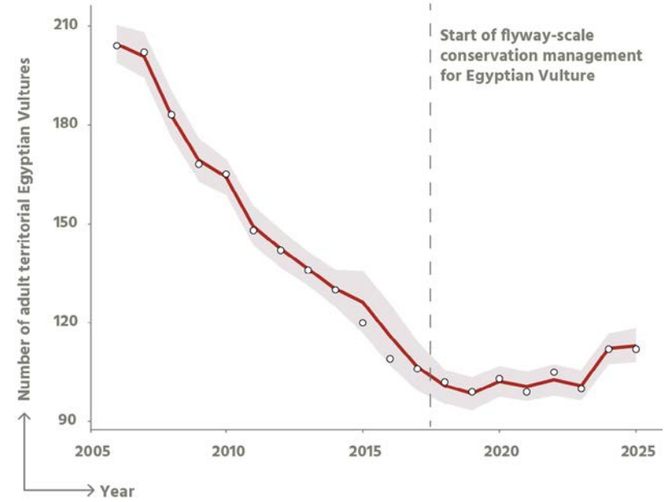
Effective and comprehensive action-planning is a resource-intensive process and is usually only carried out for priority species or groups of species. CMS also offers the opportunity for governments to adopt time-bound concerted actions for species listed under the Convention, which require less coordination across range states. Given the large number of threatened migratory waterbirds in the African-Eurasian Flyway for which coordinated action is needed, AEWA also produces shorter conservation briefs to provide flyway-level guidance to governments and stakeholders on where to focus implementation for particular species.

At a broader scale, dedicated Memoranda of Understanding have been developed under CMS for the Conservation of Migratory Birds of Prey in Africa and Eurasia and the Conservation of Southern South American Migratory Grassland Bird Species and their Habitats as well as for individual species such as Aquatic Warbler *Acrocephalus paludicola* (VU↘) and Siberian Crane *Leucogeranus leucogeranus* (CR↘). Most of these have dedicated coordination units, action plans and governance processes to advance conservation of target species in their respective flyways.

Governance and resourcing matter more than planning

Species Action Plans and other similar coordination mechanisms can be real drivers of change and deliver conservation success stories for migratory species, as demonstrated in the case of Egyptian Vulture *Neophron percnopterus* (EN↘) in the Balkan region of Europe[1].

Successful implementation depends on a combination of critical elements, many of which are often lacking, particularly as the process moves from planning to implementation. These include transparent and inclusive involvement of all key stakeholders, close international coordination across range states, a dedicated international network of conservation practitioners, political prioritisation at the national level, translation of foreseen activities into national level planning, monitoring and reporting on activities, and sufficient financial resources. Ensuring funding, as well as champion countries and organisations from the outset for both action-planning and implementation, is key for these coordination tools to deliver effectively for migratory birds.



Population trend of Egyptian Vulture in four Balkan Peninsula countries during 2006–2025. Data: Oppel *et al.* (2024), updated to 2026 using data kindly provided by S. Oppel, V. Arkumarev & V. Saravia

References 1. Oppel *et al.* (2024)

Empower Indigenous Peoples and local communities

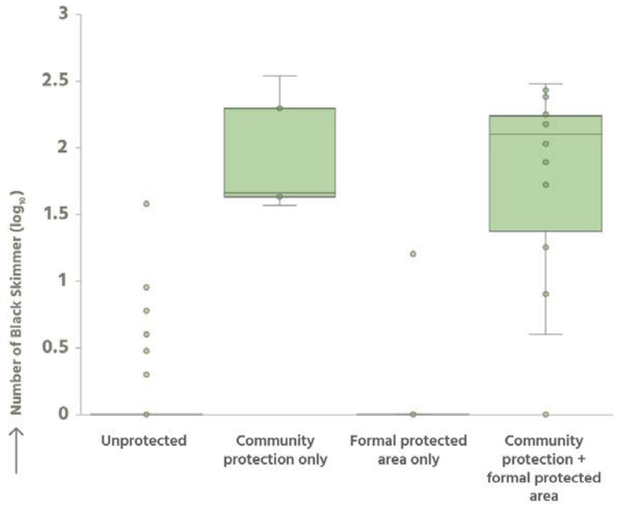
Indigenous Peoples and local communities (IPLCs) play a vital role in conserving the habitats upon which migratory birds depend. Indigenous Peoples manage or have tenure rights over more than a quarter of the world's land, much of it overlapping with intact ecosystems and protected areas[1]. Many communities rely on nature for their livelihoods and wellbeing, while also holding deep knowledge of local species, ecosystems, and sustainable land management practices developed over generations. Indigenous knowledge systems and stewardship have helped maintain biodiversity and ecological integrity across many landscapes and seascapes used by migratory birds. Acknowledgement of these contributions and involvement of IPLCs in shaping decisions that affect their lives is therefore crucial for effective and equitable conservation. Where communities have governance over the management of important sites for biodiversity, conservation outcomes are often strengthened through long-term stewardship, customary management practices and local knowledge.

IPLC knowledge and stewardship typically benefits migratory birds

Research shows that conservation is more successful when Indigenous knowledge, stewardship and governance are recognised and when IPLCs are central to decision-making and management. A recent review of social and ecological outcomes from conservation projects with different types of governance found that positive outcomes were more likely when local stakeholders play a central role[2]. In contrast, interventions led by external organisations and focused on changing local practices tend to produce weaker biodiversity outcomes and negative social impacts. These findings highlight that IPLCs are not simply stakeholders in conservation, but often longstanding custodians of biodiversity whose knowledge and stewardship contribute directly to positive conservation outcomes.

Combinations of social and ecological outcomes reported from conservation projects with external governance approaches (n = 102) and local governance approaches (n = 59). Data: Dawson *et al.* (2021)

Many studies confirm that actions led by IPLCs can directly benefit migratory birds. In the Brazilian Amazon, community-based protection of riverine sandy beaches has led to substantial increases in breeding populations of migratory waterbirds. Among 155 beaches surveyed, the 21 protected by local communities supported more than 80% of all birds recorded[3]. Black Skimmer *Rynchops niger* (LC?) showed the strongest response, with mean population size 135 times higher on community-managed beaches than on unprotected sites.



The log transformed number of Black Skimmer individuals surveyed along the Juruá Rive, Brazil, at beaches under different protection regimes. Vertical lines show the minimum and maximum values (excluding outliers), boxes show the lower 25th and upper 75th percentiles and horizontal lines show the median. Data: Campos-Silva *et al.* (2021)

Photo © BirdLife International

CASE STUDY: Community safeguarding of important sites for migratory birds in the East Atlantic Flyway

Since 2020, BirdLife's East Atlantic Flyway Initiative Small Grants Programme has supported grassroots conservation efforts to protect vital habitats for migratory birds while strengthening local community capacity and livelihoods. In Senegal's Tocc Tocc Community Nature Reserve, a Ramsar site critical for migratory birds, grants have enabled local communities to construct ecotourism infrastructure, purchase a boat for monitoring birds on the lagoon, and strengthen their advocacy for habitat preservation. Communities have also benefitted from initiatives to enhance food security, diversify income sources and promote sustainable agriculture. Ongoing monitoring is expected to show that these outcomes are benefiting migratory species using this site.

CASE STUDY: Supporting Indigenous communities to protect ancestral lands in Canada

Canada's boreal forests provide breeding habitat for up to three billion migratory birds[4]. These vast ecosystems are also the ancestral lands of many Indigenous Peoples. Our Partners in Canada and the USA are supporting Indigenous governments and organisations across northern Canada to help protect these globally important ecosystems through Indigenous Protected and Conserved Areas (IPCAs). Through their 'Science in the North' initiative, Birds Canada works with local communities, including the NunatuKavut Community Council in southern Labrador, to provide training in monitoring techniques and strengthen local capacity for conservation planning and data collection[5]. These efforts enable communities to generate and use scientific evidence alongside Indigenous knowledge to guide land stewardship decisions. Since 2021, Audubon has been collaborating with the Seal River Watershed Alliance to support their 12-million-acre proposed IPCA, including through support of their Indigenous Guardians program and the deployment of acoustic monitoring devices to conduct bird surveys across the Seal River watershed[6]. These surveys are helping to address knowledge gaps and strengthen the evidence base for permanent protection as part of a larger strategic effort to advance conservation in the watershed.

References 1. Garnett *et al.* (2018), 2. Dawson *et al.* (2021), 3. Campos-Silva *et al.* (2021), 4. Wells & Blancher (2011), 5. Birds Canada (2026), 6. Thorassie *et al.* (2024)

Strengthen capacity and raise awareness

Strengthening capacity and raising awareness are central to effective biodiversity conservation. To address threats to migratory birds, policies and conservation actions must be informed and supported by the knowledge, skills, engagement and support of communities, institutions and decision-makers across entire flyways. Strengthening these foundations underpins long-term conservation through improved governance, local stewardship, better monitoring, behavioural change, and sustained public and political support. Building a broader understanding of, and connection to, the natural world is essential, as lasting transformational change depends on societies valuing biodiversity and supporting the policies and actions needed to conserve it.

Strengthening capacity for conservation along flyways

Evidence shows that stronger management capacity is directly linked to better conservation outcomes. Protected areas with greater management capacity and resourcing tend to support higher vertebrate abundance, demonstrating that effective conservation depends on adequate skills and investment[1,2]. Capacity building is also essential for strengthening the engagement of Indigenous Peoples and local communities in conservation. Provision of training, resources and opportunities to exchange experience with other practitioners helps to strengthen skills, confidence, and long-term participation in biodiversity monitoring and management[3].

Capacity strengthening is a cornerstone of BirdLife's local-to-global approach. Through our network of 125 Partners across 120 countries, we facilitate the exchange of knowledge, tools and best practices across borders. The BirdLife Global Team supports national Partners through technical assistance, training, providing data and tools, and enabling Partners to share lessons and experience with each other. Partners in turn strengthen capacity among local communities and institutions.

Across the African-Eurasian Flyway, our Partners are applying this approach to strengthen site-based conservation for migratory birds. In Senegal, our Partner Nature Communautés Développement has trained over 100 local stakeholders in bird monitoring, site management, and ecosystem service assessment using the Toolkit for Site-based Ecosystem Service Assessment (developed by BirdLife and collaborators). Our Partners BirdWatch Zambia and BirdLife Zimbabwe are strengthening civil society capacity to apply science and monitoring tools to inform national policy, contributing to the protection of important wetland habitats.

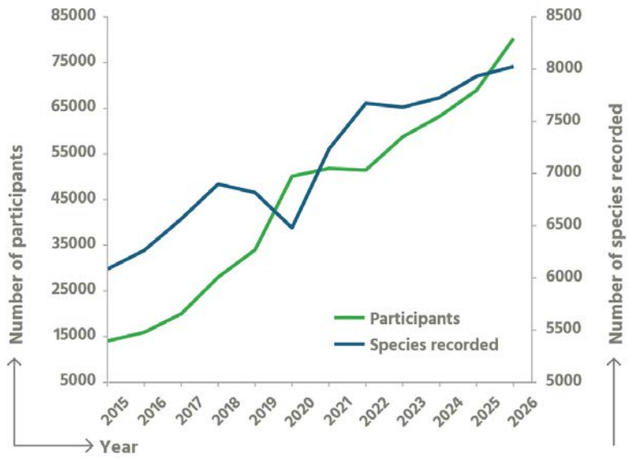
Capacity building is also central to the work of the Key Biodiversity Area (KBA) Partnership, which supports countries in identifying, monitoring and conserving sites of significance for biodiversity. BirdLife recently led a project to map KBAs across seven countries in the Tropical Andes and Congo Basin—two regions that provide critical non-breeding habitat for migratory birds, but that previously lacked comprehensive site inventories. The project established KBA National Coordination Groups and trained experts from 129 organisations in the application of KBA criteria. These experts then identified 722 KBAs, of which 258 were entirely new. This work is now expanding to Brazil, French Guiana, Guyana and Suriname, while efforts are underway to protect the KBAs identified in the Andes and Congo.

Photo © Kristina Govorukha

Raising awareness and advocating for migratory birds

Raising awareness increases understanding of conservation challenges and helps mobilise public and political action. Well-designed campaigns can rapidly influence decisions and protect important habitats from emerging threats. For example, the Tejo Estuary in Portugal is one of the most important wetlands for migratory shorebirds in the East Atlantic Flyway. In 2020, plans for a new airport within the site threatened key shorebird foraging areas[4]. Our Partner in Portugal, SPEA, together with other NGOs, launched legal action and a public campaign highlighting the ecological risks. This generated widespread national and international attention, with over 40,000 people throughout the flyway signing a petition opposing the construction. In 2024, the Portuguese government officially ruled out plans to build the airport[5].

Global campaigns also play a key role in sustaining awareness and engagement. World Migratory Bird Day is a global awareness-raising campaign coordinated by the Convention on Migratory Species (CMS), the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA), the East Asian–Australasian Flyway Partnership (EAAFP) and Environment for the Americas (EFTA). It is celebrated biannually in more than 100 countries, bringing people together to highlight the shared responsibility of conserving migratory birds. eBird's Global Big Day, held each May, mobilises birders worldwide to record as many species as possible on World Migratory Bird Day. In May 2026, more than 80,000 participants from 203 countries recorded 8,023 bird species (72% of the world's birds), demonstrating the scale of global public engagement in celebrating and conserving migratory birds[6].



World Migratory Bird Day 2025, Senegal. Photo © BirdLife International

Trends in number of participants and number of species recorded on eBird's Global Big Day. Data: eBird.

References 1. Geldmann *et al.* (2018), 2. Gill *et al.* (2017), 3. Ivande *et al.* (2026), 4. Catry *et al.* (2022), 5. BirdLife International (2024), 6. eBird (2026)

Influence policy and legislation

Migratory species epitomise the need for multilateralism. Effective policies and legislation at global, regional, national and local levels are key to ensuring the delivery of coordinated conservation outcomes at the flyway scale. The focus of BirdLife's local to global flyway advocacy is to ensure we have a comprehensive network of robust, inclusive and ambitious multilateral frameworks and tools facilitating government collaboration and tackling key threats to migratory birds across all flyways.

BirdLife at CMS COP15. Photo © Barend van Gemerden/BirdLife International

Key flyway policy instruments

There is a long history of international cooperation for migratory bird conservation, reflecting recognition that species crossing national borders can only be effectively protected through coordinated action. Early examples include the Migratory Bird Treaty between the USA and Canada, dating to 1916. Bilateral agreements continue to play an important role today, particularly in Asia, alongside regional and global multilateral frameworks that coordinate conservation efforts across entire flyways.

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) provides the overarching legally binding global framework for the conservation of migratory species. Two legally binding regional agreements for migratory birds have been developed under the auspices of CMS: the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) and the Agreement on the Conservation of Albatrosses and Petrels (ACAP). The latter protects these seabirds primarily across the Southern Hemisphere.

A range of other instruments and initiatives have been established under CMS with support from BirdLife. These include the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MoU), under which governments have committed, among other actions, to safeguard around 7,500 internationally important sites for migratory raptors. Other examples include the CMS Initiative for the Central Asian Flyway and, most recently, plans to establish a CMS Initiative for the Americas Flyway.

In 2026, governments took a major step in advancing the protection of migratory seabirds under CMS by recognising marine flyways, as identified by BirdLife[1], as the guiding tool for collectively tackling seabird declines at an ocean basin scale[2]. For the first time, seabirds have a dedicated global workstream under a multilateral process.

Another key regional flyway instrument is the East Asian–Australasian Flyway Partnership (EAAFP), a voluntary international partnership for the conservation of migratory waterbirds, including dedicated workstreams such as the newly mandated EAAFP Tidal Flats Initiative.

Other global biodiversity Conventions relevant to migratory birds

Many Wetlands of International Importance under the **Ramsar Convention of Wetlands** are identified and designated under Criterion 6—for wetland sites which regularly support 1% of the individuals in a population of one species or subspecies of waterbird.

World Heritage Convention serial site designations allow for the nomination of multiple, physically separated sites that together hold Outstanding Universal Value, used to advance designations of sites critical for migratory shorebirds in the Yellow Sea.

The **Convention on International Trade in Endangered Species (CITES)** is relevant for species threatened by trade across borders which is the case for migratory species such as vultures, falcons and bustards.

The Kunming-Montreal Global Biodiversity Framework adopted in 2022 under the **Convention on Biological Diversity (CBD)** emphasizes that ecological connectivity is fundamental for ecosystem functionality and maintaining species populations (Goal A).

The Agreement under the UN Convention on the Law of the Sea on the **Conservation and Sustainable Use of Marine Biological Diversity of Areas beyond National Jurisdiction (BBNJ)**, which entered into force in January 2026, provides for the designation of Marine Protected Areas (MPAs) in the High Seas. BirdLife was instrumental in facilitating the designation of one of the world's first MPAs in the High Seas in the North Atlantic Current and Evlanov Sea basin (NACES) under the OSPAR Convention, for seabirds.

Many additional regional multilateral frameworks and instruments are relevant for migratory bird conservation, such as the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and the Arctic Council Working Group on Fauna and Flora (CAFF). The Birds and Habitats Directives remain the most relevant legislative frameworks within the European Union, with other more recent decisions also directly relevant, such as the ban on lead gunshot in wetlands under the EU REACH Regulation and the adoption of the EU Restoration Law.

Bridging the implementation gap

Implementation review processes exist under many of these treaties and provide structured mechanisms for supporting governments to comply with obligations. BirdLife has successfully leveraged these processes, for example as part of our efforts to tackle emergencies when key sites face imminent threats, coupled with national advocacy campaigns by our Partners.

Firefighting to protect individual sites and species continues to be necessary but is not the most effective way to safeguard migratory species. Ensuring that biodiversity is integrated into all relevant policies, investments and development decisions before they cause threats remains a key challenge to tackle.

Most crucially, international commitments must be translated into national policies and legislation to ensure implementation actually happens on the ground. Furthermore, the commitments made for migratory birds should be reflected across broader national biodiversity and climate planning frameworks and integrated into relevant sectoral policies. The continuing declines in many migratory bird populations is partly due to the failure to achieve these critical parts of the process.

CASE STUDY: Conserving migratory birds through the EU Birds and Habitats Directives

The EU Birds and Habitats Directives provide a strong legislative framework for bird conservation across Europe. Together with targeted investment through the EU LIFE fund, they have helped reduce unsustainable hunting and persecution, establish the Natura 2000 network of protected species, and support species recovery programmes. These measures have contributed to the recovery of many migratory bird populations, and have helped bring species such as Spanish Imperial Eagle *Aquila adalberti* (VU↗) back from the brink of extinction. Maintaining ambitious legislation and long-term investment is essential to sustaining and building on these conservation gains.

References 1. Morten *et al.* (2025), 2. Morten *et al.* (2026)

Scale-up investment for impact at flyway scale

Flyway conservation needs a significant step-up in scale of impact if we are to be successful, and this requires investments to match. BirdLife has partnered with Multilateral Development Banks and other key partners to establish 'Regional Flyway Initiatives' as well as a Global Flyway Grant Mechanism as our contribution to closing the global biodiversity and climate funding gaps.

Regional Flyway Initiatives set to unlock billions for flyway conservation

On track to cover all four of the world's major terrestrial flyway systems, the Regional Flyway Initiatives aim to mobilise significant blended finance for conservation action at key flyway sites.

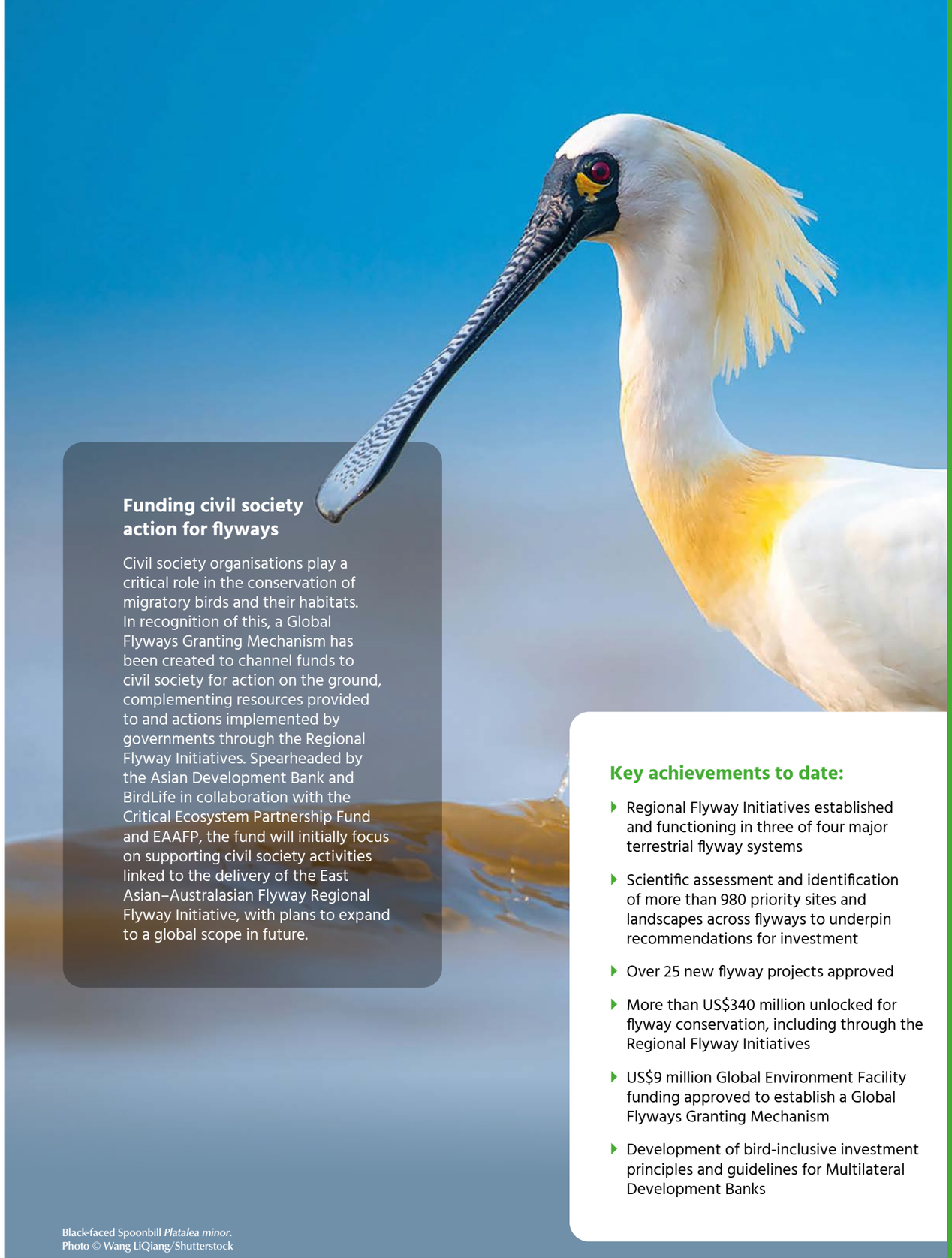
The first Regional Flyway Initiative was established for the East Asian–Australasian Flyway in 2021 by the Asian Development Bank, the East Asian–Australasian Flyway Partnership (EAAFP) and BirdLife. The Americas Flyways Initiative is a collaboration between the Development Bank of Latin America and the Caribbean (CAF), the National Audubon Society and BirdLife. In 2025, the World Bank and BirdLife agreed to develop a Regional Flyway Initiative for the African-Eurasian Flyway. We are also exploring the establishment of a dedicated Regional Flyway Initiative for the Central Asian Flyway.

The overarching goal of these initiatives is to significantly improve management and connectivity of critical flyway sites, benefitting migratory birds as well as wider nature, climate and people. The Regional Flyway Initiatives are long-term programmes that build on and leverage existing conservation efforts across entire flyways, offering an unprecedented opportunity to deliver solutions at the same scale as the challenges migratory birds face. Their focus and activities vary slightly across flyways, reflecting regional differences, but all share a strong emphasis on science-based decision-making, nature-based solutions, ecosystem services and livelihoods. Investments are supporting habitat restoration and protection, sustainable aquaculture and agriculture, pollution prevention and water management, ecotourism, green infrastructure and renewable energy, as well as the exploration of other financial instruments such as flyway bonds.

With funds released and projects underway at the first sites, the initiatives will collectively mobilise billions of US dollars for government implementation. Project funds consist of a combination of loans provided to governments at preferential rates as well as grants from institutional and private sources. The ambition is also to increase private sector funding. This will be aided by the scale of investment opportunities provided by the flyway approach and by reduced investment risk due to institutional investment by the banks. Additional support will come from dedicated initiatives such as the Asian Development Bank Nature Solutions Finance Hub, of which BirdLife is a Technical Partner.

Project pipelines include investment both in the critical flyway sites identified and in existing development bank projects with scope for including actions beneficial for migratory birds. These collaborations also offer the opportunity to integrate the conservation of migratory birds and their habitats into development bank operations more widely.

The Regional Flyway Initiatives directly support government delivery of their international biodiversity and climate commitments under the Convention on Biological Diversity, UN Climate Change Convention, Convention on Wetlands, Convention on Migratory Species, UNESCO World Heritage Convention, East Asian–Australasian Flyway Partnership, and African-Eurasian Migratory Waterbird Agreement.



Funding civil society action for flyways

Civil society organisations play a critical role in the conservation of migratory birds and their habitats. In recognition of this, a Global Flyways Granting Mechanism has been created to channel funds to civil society for action on the ground, complementing resources provided to and actions implemented by governments through the Regional Flyway Initiatives. Spearheaded by the Asian Development Bank and BirdLife in collaboration with the Critical Ecosystem Partnership Fund and EAAFP, the fund will initially focus on supporting civil society activities linked to the delivery of the East Asian–Australasian Flyway Regional Flyway Initiative, with plans to expand to a global scope in future.

Key achievements to date:

- Regional Flyway Initiatives established and functioning in three of four major terrestrial flyway systems
- Scientific assessment and identification of more than 980 priority sites and landscapes across flyways to underpin recommendations for investment
- Over 25 new flyway projects approved
- More than US$340 million unlocked for flyway conservation, including through the Regional Flyway Initiatives
- US$9 million Global Environment Facility funding approved to establish a Global Flyways Granting Mechanism
- Development of bird-inclusive investment principles and guidelines for Multilateral Development Banks

Black-faced Spoonbill *Platalea minor*.
Photo © Wang LiQiang/Shutterstock

The importance of monitoring

Data on long-term trends in the abundance and distribution of migratory birds are crucial for underpinning efforts to track and understand the global biodiversity crisis, target scarce conservation resources to priority species, sites and threats, and quantify the impact of those investments. However, biodiversity monitoring is currently patchy, poorly coordinated, and has various taxonomic, regional and methodological biases. Technological advances and citizen science are helping to fill some of these gaps in monitoring programmes, improving our understanding of bird migration, distribution, abundance and threats.

Coordinated counts in the field

The majority of monitoring across flyways is done through observation by people on the ground. The International Waterbird Census[1] is one of the world's largest, longest-running citizen science biodiversity monitoring programmes, coordinated annually by Wetlands International since 1967. Volunteers have counted a cumulative total of nearly two billion waterbirds at more than 67,000 sites across 189 countries. These observations underpinned the establishment of 956 Ramsar Wetlands of International Importance and the identification of 2,701 Key Biodiversity Areas[2]. Data on the sizes and trends of waterbird populations also contribute to our knowledge of their conservation status, including our assessments of extinction risk for the IUCN Red List.

Other large-scale monitoring initiatives have also generated invaluable insights into migratory bird populations. For example, the Christmas Bird Count[3], coordinated by our Partner Audubon since 1900, provides the longest-running annual bird count at a continental scale. These data have helped reveal long-term changes in the distribution and abundance of migratory species, informing conservation action throughout the Americas Flyway.

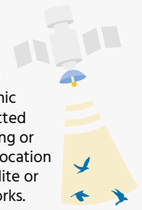
Citizen science

Citizen science is playing an increasingly important role in monitoring bird populations globally, with online platforms such as eBird[4], Observation.org[5], iNaturalist[6] and BirdLasser[7] engaging millions of contributors worldwide. Launched in 2002 by the Cornell Lab of Ornithology, eBird has grown into the world's largest biodiversity citizen-science project. Users enter information on when and where they observed birds and submit checklists of the species they saw and heard. To date, over 1.2 million users have contributed more than 2.1 billion bird observations. Data from citizen science projects such as eBird are used to support the identification of important sites for birds, determine distributions of poorly known species, reveal population trends and seasonal abundance, and track climate-driven shifts in species ranges. For example, the African Bird Atlas Project[8] is using citizen science data to map species' distributions and report biodiversity changes across the region. Many BirdLife Partner organisations lead or otherwise promote bird population monitoring efforts through citizen science platforms within their respective countries.

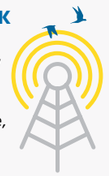
MONITORING MIGRATORY BIRD MOVEMENTS

BIRD RINGING
Birds are caught and fitted with a uniquely numbered ring around their leg. Recaptures or resightings provide information on survival and movements.

SATELLITE TRACKING
Small electronic devices are fitted to birds, storing or transmitting location data via satellite or mobile networks.



MOTUS NETWORK
Networks of receiver stations automatically detect signals from radio tags on birds that pass within range, logging data on time and signal strength.



PASSIVE ACOUSTIC MONITORING
Automated microphones record animal sounds remotely, allowing identification of nearby bird species.

Photo © carlo_p

Advances in automated monitoring

Advances in technology are transforming migratory bird monitoring by enabling continuous data collection across much larger spatial and temporal scales than is possible through field observations alone. In 2014, our Partner Birds Canada launched the Motus Wildlife Tracking System[9]—an international collaborative research network that uses automated radio telemetry to track the movements of small migratory animals. Motus has expanded into a network of over 2,400 receiver stations throughout 34 countries in four continents, tracking more than 63,000 individuals across 480 species (mostly birds). When a tagged animal passes within range of a receiver station, data are automatically logged and uploaded to a central database. Motus data help conservationists to identify key sites for birds, assess threats, and implement conservation actions.

Another recent innovation is Passive Acoustic Monitoring, which uses automated, weatherproof microphones to record animal sounds remotely. The audio data that they capture can be analysed using artificial intelligence to automatically identify specific bird species. This approach is particularly valuable for monitoring migratory species because it captures data continuously, including at night when many species fly and call, and can be deployed in remote areas that would be challenging for people to survey. Using these data, researchers can track the exact timing of migration and investigate how climate change, light pollution and other factors may affect flight pathways. These precise acoustic insights can then be used to safeguard crucial stopover habitats, regulate urban lighting, and inform infrastructure placement.

Seabird tracking

Satellite tracking technology has been instrumental in understanding the at-sea movements of migratory seabirds. Lightweight electronic devices are attached to birds to record their movements, storing or transmitting location data via satellite or mobile networks. In 2004, BirdLife established the Seabird Tracking Database[10]—now the largest collection of seabird tracking data in existence, with over 80 million datapoints for nearly 200 species, most of them migratory. These data have been used to identify important sites for seabirds, support spatial planning, mitigate threats such as fisheries bycatch, and identify six marine flyways. The establishment of marine flyways as a new ocean conservation framework under the Convention on Migratory Species provides novel opportunities to tackle the many threats seabirds are facing across the globe.

Monitoring important sites for migratory birds

A wide range of datasets is now available online to support Key Biodiversity Area (KBA) identification and monitoring. Many of these are derived from increasing numbers of free, high resolution, regularly updated products based on remote sensing that enable tracking of key features in each KBA, such as tree cover, surface water, night lights, infrastructure and urbanisation. Together with direct observations and citizen science data, these can support monitoring of the state of KBAs, the threats impacting them and the responses being implemented.

References 1. Wetlands International (n.d.), 2. Wetlands International (2025), 3. National Audubon Society (n.d.) 4. eBird (n.d.), 5. Observation International (n.d.), 6. iNaturalist (n.d.), 7. BirdLasser (n.d.), 8. African Bird Atlas Project (n.d.), 9. Birds Canada (n.d.), 10. BirdLife International (2026)

Efforts needed to meet the 2030 biodiversity targets for migratory species

This *State of the World's Birds* report synthesises the wealth of information available on migratory birds and their flyways to summarise what it tells us about the state of nature, the pressures upon it, and the conservation responses that are in place and needed. It focuses on birds because they are excellent environmental indicators, yielding insights into the health of the wider environment. The phenomenon of migration allows us to take a bird's eye view to see how pressures on biodiversity disrupt ecological connectivity across continents and to understand the collective impact of these pressures on nature, with consequences for climate and people.

The takeaway message is no surprise: biodiversity remains in decline. Following the adoption of the Kunming-Montreal Global Biodiversity Framework (GBF) in 2022, we are still lagging far behind on delivery against the agreed goals and targets for 2030, despite progress made in some areas. Harmful subsidies have continued to increase, with an estimated US$30 invested in destroying nature for every US$1 invested in restoring it[1]. As outlined in the 2026 IPBES Business and Biodiversity Assessment[2], biodiversity loss and the decline of nature's contributions to people are now considered a critical systemic risk to the global economy and financial stability. Despite this, our economies are directly dependent on nature, and the majority of businesses continue to operate in a way that is not compatible with their own long-term resilience and survival. Biodiversity loss has moved down the priority scale in many parts of the world, reflected in diminished funding and increased attacks on nature and the people trying to protect it.

With the date for achieving the GBF 2030 targets to halt and reverse biodiversity loss approaching, we must rapidly scale up the implementation of actions. We have the science needed and we know the solutions required, so there are no excuses for inaction. Birds are our compass, but they also provide reasons for hope, showing that by implementing these solutions we can prevent extinctions, recover populations and restore ecosystems.

However, governments must significantly accelerate national action: transposing global environment commitments into national policies and legislation across all portfolios, creating the enabling conditions for a transition to more sustainable economies, and ensuring implementation of conservation action on the ground to deliver for both biodiversity and climate.

The whole-of-society approach outlined in the GBF must be better reflected in the implementation and ownership of this collective challenge. This includes ensuring full and effective participation of Indigenous Peoples and local communities, strengthening the capacity of national civil society organisations, and meaningful engagement by the private sector.

All GBF targets are vital for halting and reversing biodiversity loss and must be fully implemented to achieve their aims by 2030. Five clusters of targets require particular collective attention and coordinated, scaled-up efforts to ensure their delivery:

Targets 1 on spatial planning, 2 on restoration and 3 on protecting 30% of terrestrial, freshwater and marine ecosystems:

Prioritise the quality of protected areas and other effective area-based conservation measures (OECMs), not just the quantity. Ensure that the most important sites for migratory species and other biodiversity—Key Biodiversity Areas (KBAs)—are the focus of efforts to expand protected areas and recognise OECMs. Ensure that all KBAs are integrated into national spatial planning, restored and effectively managed including to secure ecological connectivity.

Targets 4 on recovery of threatened species, 5 on sustainable use and 6 on invasive alien species:

Implement urgent species-specific recovery actions, coordinated through action plans where appropriate, for those threatened species requiring such interventions, including migratory species. Eliminate unsustainable hunting and illegal killing and capture of birds, particularly migratory species. Implement effective biosecurity to restrict the further spread of invasive alien species, and eradicate or control these at priority locations, particularly on islands.

Target 8 on mitigating climate change:

Mitigate climate change by urgently phasing out the use of fossil fuels, investing in nature-based solutions, and tripling nature-safe renewable energy.

Target 14 on mainstreaming biodiversity for governments and 15 for businesses:

Mainstream biodiversity across sectors, especially agriculture, forestry, fisheries and the extractive and energy industries, to transition them to sustainable management practices that minimise negative impacts on biodiversity.

Targets 18 on harmful subsidies and 19 on resource mobilisation:

Reduce and redirect harmful subsidies and scale up investment in nature through traditional and innovative finance mechanisms.

Our vision for the world's flyways

In this report, we have summarised the dire state of migratory birds, the pressures driving their declines, and the actions needed to reverse these trends. The challenges are immense, but the evidence also shows that conservation works. To safeguard the future of migratory birds, we have a bold vision for the world's flyways.

A world where migratory bird populations are thriving—connecting ecosystems, countries and people across continents.

A world in which the network of sites, habitats and landscapes that sustain migration has been protected, restored and reconnected, allowing birds to move safely along their flyways.

A world where we have acted for nature, climate and people by mobilising finance, transforming the sectors that drive biodiversity loss, reviving critical habitats, ending unsustainable killing, and ensuring infrastructure is safe for nature.

This vision is within reach. The science is clear, the solutions are known, and examples from around the world demonstrate that conservation works. What is needed now is for governments, businesses and wider society to step up and implement these solutions at the scale and pace required to meet the goals and targets of the Global Biodiversity Framework. This will secure a future in which migratory birds—and the ecosystems upon which we all depend—can thrive.

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Barn Swallow *Hirundo rustica*.
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