BirdLife INTERNATIONAL

100 It's Time.

State of the World's Birds 2022

Insights and solutions for the biodiversity crisis

Contents

Executive summary

This fifth edition of *State of the World's Birds* summarises what birds tell us about the state of nature, the pressures upon it, and the solutions in place and needed. It focuses on birds because they are an excellent barometer for planetary health. Being widely distributed, relatively easy to survey, and responsive to environmental change, birds are useful biodiversity indicators, revealing wider trends in natural ecosystems. Owing to the cultural significance and enduring popularity of birds, there is an army of birdwatchers collecting data on them. BirdLife began documenting the status of birds and the threats to them exactly 100 years ago. Birds are therefore better known than any comparable group of organisms.

This wealth of information paints a deeply concerning picture. One in eight bird species is threatened with extinction, and the status of the world's birds continues to deteriorate: species are moving ever faster towards extinction. For those not yet considered threatened, the majority are in decline and have much-depleted populations. For example, 2.9 billion individual birds are estimated to have been lost in North America since 1970, and 600 million have been lost in the EU (an area five times smaller) since 1980. Furthermore, many key sites supporting bird populations – Important Bird and Biodiversity Areas (IBAs) – are in an unfavourable condition.

The pressures causing these losses of our natural heritage are well understood, and the vast majority are driven by human actions. The principal threats include: agricultural expansion and intensification, unsustainable logging, invasive alien species, overexploitation and climate change. Additional threats include bycatch from fisheries, expanding residential and commercial development, the increasing frequency and intensity of wildfires, and poorly planned energy production. Most species are impacted by combinations of these threats, and some threats exacerbate others.

Fortunately, we know what actions are needed to reverse these losses and to help nature to recover. Most urgent is the conservation and effective management of the global network of IBAs, particularly through protected areas, or where appropriate through other effective area-based conservation measures. Conservation by Indigenous Peoples or local communities, either within or outside protected areas, is important for many sites. Beyond IBAs, it is essential to retain remaining intact habitats and restore degraded ecosystems, including to enhance connectivity.

1 in 8

bird species is threatened with extinction

Key threats to the world's birds require mitigation, including preventing overexploitation and illegal killing of birds, managing invasive alien species, tackling fisheries bycatch, and minimising the negative impacts of energy infrastructure. Many threatened species also require targeted recovery actions such as captive breeding and release, translocation, supplementary feeding and other species-specific interventions.

Underpinning these responses are the need to mainstream biodiversity across all sectors of society, including accounting for the full value of nature in terms of the benefits that it provides to people, raising awareness and supporting education, and promoting effective policies and legislation that are comprehensively implemented. Adequate monitoring systems are essential to allow us to track progress.

Birds provide reasons for hope and show us that conservation action works. There are many examples of species being saved from extinction, populations recovering, threats being effectively managed and ecosystems being restored. However, time is running out. The next decade is critical if we are to stop unravelling the fabric of life and destroying our global safety net. Governments must adopt a Global Biodiversity Framework with ambitious commitments to ensure transformative change and urgent implementation of action. The future of the world's birds and ultimately our own species depends upon it.

Foreword

by Patricia Zurita, CEO of BirdLife International

2022 is a landmark year for BirdLife and conservation. One hundred years ago, in 1922, a group of visionary conservationists concerned about the plight of the world's birds and wider biodiversity came together to found one of the world's first international conservation organisations – the International Committee for Bird Protection (ICBP). This network has steadily grown over the last century, evolving into BirdLife International – a global Partnership of 119 national conservation organisations.

Through its 100-year history, BirdLife has been at the forefront of conservation science and action. Our world-leading conservation science has helped to identify the bird species at greatest risk of extinction, the most important sites for their conservation, the most urgent threats to address and the actions required to tackle them. This science informs successful conservation action on the ground and underpins our policy and advocacy, which has influenced global, regional and national conservation agendas. Birds, as the canary in the coalmine, have helped us ensure this conservation action not only benefits birds, but thousands of other species and ecosystems that enable life to thrive.

However, despite these successes, this fifth edition of BirdLife's flagship *State of the World's Birds* report conveys all too clearly that the pressures facing birds and wider biodiversity today are greater and more diverse than ever. Nature is in decline across the world, with unsustainable development degrading natural habitats and driving species to extinction. Threats

"Through its 100-year history, BirdLife has been at the forefront of conservation science and action."

such as agricultural expansion and intensification, logging, invasive alien species and overexploitation continue to drive this trend, while climate change is not only a threat in itself, but also exacerbates many existing pressures.

Despite this sobering assessment and outlook, the report also demonstrates that effective solutions to these problems exist, and that success is attainable. All that is needed is the political will and financial commitment to implement the solutions at scale and pace. The Post-2020 Global Biodiversity Framework currently being negotiated is the world's best and perhaps last chance to halt the loss of nature and put us on a nature-positive path to conserving and restoring the planet, upon which our own future also depends. This time, governments must succeed where they have previously failed by translating their promises into substantive action.

As a key implementor of many of the actions required, the BirdLife Partnership is ideally placed to make a vital contribution to ending the global biodiversity crisis. This report shows how harnessing local expertise within a global framework of best practice based on sound science can be incredibly effective and impactful. We look forward to deploying our century of experience and working together with others to help turn the tide in the critical decade ahead. The birds and the rest of nature are depending on us. And we are depending on them.

Foreword

by Mette Skov, Aage V. Jensen Charity Foundation

In 2003, the Aage V. Jensen Charity Foundation (AVJCF) made the bold decision to support BirdLife in developing a report drawing on information amassed through its global community of conservation practitioners. Launched the following year in March 2004 at BirdLife's World Conference in Durban, South Africa, the *State of the World's Birds* report constituted the first comprehensive overview of the state of the planet's birds, the pressures they face, and the work being done to save them. Combining high-quality data and a clear and concise style, the report was immediately acclaimed as a landmark publication, with one reviewer describing it as 'an exciting testimony to BirdLife's intent and capacity to influence policy at the highest levels', which 'should be in every school, academic and local library'. The report helped to cement BirdLife's reputation as a world leader in conservation science and communication.

"We have been delighted to see State of the World's Birds become BirdLife's flagship publication and one of the leading and best-respected conservation reports of its kind."

Since that first report, AVJCF have been delighted to see *State of the World's Birds* become BirdLife's flagship publication and one of the leading and best-respected conservation reports of its kind. Each new iteration of the report – in 2008, 2013 and 2018 – has been hotly anticipated and provided BirdLife with an important opportunity to draw global attention to the current state of birds and biodiversity more generally.

AVJCF's support extends much further than this series of reports. It has been instrumental in shaping BirdLife's science strategy and has helped support the mammoth task of generating and managing the conservation data that underpin BirdLife's science. It has also helped create and maintain the web platforms serving this science to an audience of millions, and has enabled the development of over 40 science and advocacy publications, including 17 national 'State of the Birds' reports.

After nearly 20 years of ongoing support, we are extremely proud to see that the fifth edition of the report continues this approach, presenting a huge amount of data in an accessible and visually engaging style. We fully expect that it will have the same success as its predecessors in influencing decision-makers and strengthening conservation outcomes for nature worldwide.

Hyacinth Macaw *Anodorhynchus hyacinthinus*.
Photo © Dominik Lange-Lej

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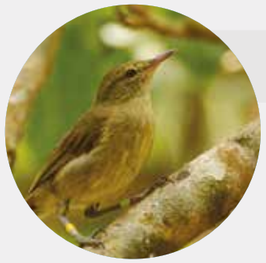
Section 1
Introduction

100 years of avian science and conservation

In 1922, a group of visionary conservationists from the USA, UK, France and the Netherlands decided that the only way to tackle the increasingly complex conservation issues facing the world's birds was through international cooperation. They founded the International Committee for Bird Protection (ICBP, later the International Council for Bird Preservation), rapidly establishing 'national sections' in multiple countries. Over the last 100 years, this network has continued to grow, evolving into BirdLife International – a global Partnership of 119 national conservation organisations united by a common vision and strategy. Throughout its history, BirdLife has been at the forefront of avian science and conservation – from producing the first comprehensive list of threatened bird species to developing a global standard for identifying important sites for the conservation of birds and other wildlife. Our science has influenced global policy and informed conservation action on the ground, bringing about numerous conservation successes.

T. GILBERT PEARSON, ICBP PRESIDENT, 1922 – 1938



SEYCHELLES WARBLER, COUSIN ISLAND ©REMI JOUAN

SAMANTHA MATJILA, ALBATROSS TASK FORCE

UN CONVENTION ON BIOLOGICAL DIVERSITY © CBD

1922 – On 20 June, a group of visionaries from four countries meets in London to form the International Committee for Bird Protection (ICBP). At the inaugural meeting, the following resolution is adopted: 'ICBP calls upon the nations of the world to study carefully the status of all their bird life and to take the necessary steps to maintain at all times an adequate supply of native birds'. Issues given high priority include: curbing exploitation of tinamous in Argentina; campaigning to regulate the live bird trade in Australia; and raising awareness of the loss of egrets, crowned-pigeons and birds-of-paradise for use of their feathers in hats and other clothing.

1925 – ICBP is asked to assist in the revision of the Paris Treaty for Bird Protection of 1902 – the first international legislation for nature conservation.

1954 – One of ICBP's first campaigns proves successful – lobbying against oil pollution culminates in the International Convention on Prevention of Pollution of the Sea by Oil.

1960 – ICBP is involved in establishing an 'Operations Intelligence Centre' at IUCN headquarters in Switzerland to compile lists of threatened species. Colonel Jack Vincent is recruited to work on compiling a list of threatened bird species. Six years later, the first Red Data Book of birds is published, detailing 190 bird species at risk of extinction.

1968 – ICBP purchases Cousin Island to save Seychelles Warbler from extinction. This project catalyses the formation of the country's first conservation organisation – Nature Seychelles, now a BirdLife Partner. Thanks to restoration of the island's woodland and translocations to other islands, the species is no longer at risk of extinction.

1979 – ICBP launches the concept of Important Bird Areas (IBAs), later renamed as Important Bird and Biodiversity Areas to emphasise their importance for other taxa as well as birds. The first complete inventory of IBAs in Europe is published in 1989, followed by the Middle East (1994), Africa (2001), Asia (2004) and the Americas (2009). Over 13,600 IBAs have now been identified in over 200 countries and territories worldwide.

1979 – ICBP European members are instrumental in getting the European Union's first piece of environmental legislation approved – the EU Birds Directive. Thirteen years later, ICBP also plays a key role in getting the EU Habitats Directive in place.

1980 – Having operated on a voluntary basis for 58 years, ICBP establishes a professional secretariat in Cambridge, UK, with a director and secretary.

1988 – ICBP produces the first comprehensive IUCN Red List, having assessed the extinction risk of every known bird species.

1989 – ICBP initiates a project to map important areas for the conservation of global biodiversity using restricted-range bird species as indicators. This 10-year project culminates in the publication of a directory of Endemic Bird Areas in 1998.

1993 – ICBP is relaunched as BirdLife International: a global Partnership of national nature conservation organisations.

2000 – BirdLife launches the Save the Albatross Campaign – the precursor to the Albatross Task Force, which has played a pivotal role in trialling and introducing mitigation measures worldwide to reduce seabird bycatch.

2003 – BirdLife commences development of a Red List Index (RLI) to show trends in extinction risk of groups of species over time. The RLI has since been widely adopted in various policy contexts, for example to measure progress towards biodiversity targets.

2004 – The first *State of the World's Birds* report is published, bringing together the latest scientific research on what birds tell us about the state of the planet, the pressures on nature and the conservation actions needed to influence global and national policy and conservation action. Updates follow in 2008, 2013, 2018 and 2022.

2010 – The UN Millennium Development Goals report profiles one of BirdLife's key indicators for the first time – the degree of protection of IBAs.

2013 – BirdLife publishes a list of the most threatened IBAs around the world – 'IBAs in Danger'.

2016 – Campaigning by BirdLife and others successfully saves the EU Birds and Habitats Directives from being undermined.

2021 – Four internationally important mudflats along the Korean Yellow Sea coast are inscribed as World Heritage Sites following lobbying by the BirdLife Partnership.

2022 – BirdLife celebrates its 100th anniversary. With 119 Partners and over 13 million individual members, BirdLife is the world's largest and oldest international nature conservation partnership. Through our unique local-to-global approach, we deliver high impact and long-term conservation for the benefit of nature and people.

A critical decade to act

The natural world is in trouble. Human actions are driving species rapidly towards extinction, undermining ecosystem functions and services vital to our own survival. Meanwhile, the climate crisis continues to escalate, threatening biodiversity and human wellbeing across the globe. In recent years, many parts of the world have experienced extreme wildfires, droughts, heatwaves and floods, as human-transformed ecosystems struggle to adapt to climate change. Continuation of these trends will lead to widespread species extinctions, as well as negatively impacting water availability, food security and human health.

Tackling these closely interlinked biodiversity and climate crises requires a global effort to bring about transformative change. The coming years have been identified as a 'critical decade' to act. We must urgently identify and significantly scale up nature-based solutions to safeguard the natural world, for the benefit of biodiversity and human society.

The challenges to conservation are escalating

As the biodiversity and climate crises escalate, so do the challenges to tackling them. The COVID-19 pandemic had a devastating impact on human health, the economy and livelihoods worldwide. It also had widespread, mostly negative, impacts on conservation efforts. Travel restrictions, social distancing measures and wage cuts disrupted activities such as species monitoring, invasive species eradication and wildlife law enforcement, while governments largely turned attention and funding away from environmental issues. The pandemic, alongside rapidly rising food, energy and housing prices, has caused a global cost of living crisis that threatens to further distract from the environmental agenda. As poverty escalates and natural resources run out, there is also an increasing risk of political unrest and armed conflict, hindering international cooperation to tackle environmental issues.

Governments have made new commitments to tackle the biodiversity and climate crises

In recognition of the escalating threats to the natural world, governments around the world are committing to halt biodiversity loss and combat climate change through Multilateral Environmental Agreements (MEAs). The United Nations Framework Convention on Climate Change (UNFCCC), an international legal instrument to combat climate change, has been ratified by 197 countries; while 192 have joined the Paris Agreement, a 2015 treaty with the goal of limiting global warming to well below 2°C, preferably 1.5°C, compared to pre-industrial levels. In 2021, following the UN Climate Change Conference (COP26) in Glasgow, UK, nations adopted the Glasgow Climate Pact, which includes resolutions to phasedown fossil fuels, halt deforestation, and deliver on climate finance. The Convention on Biological Diversity (CBD) is the international legal instrument for conserving nature and has been ratified by 196 countries. Following delays caused by the COVID-19 pandemic, a Post-2020 Global Biodiversity Framework is being negotiated under the CBD, with targets for 2030 to put us on a nature-positive path to recovery, leading the way to 'living in harmony with nature' by 2050. The framework is expected to be adopted at the next Conference of the Parties (COP15), scheduled to take place in December 2022. However, simply signing these agreements is not sufficient. In order to save nature, it is imperative that governments translate these commitments into concrete action, ensuring effective implementation measures are in place to bring about substantive change.

Goals and targets of the draft Post-2020 Global Biodiversity Framework, as of September 2022

Goal A
Maintain/enhance area, integrity & connectivity of natural ecosystems. Halt extinctions, reduce extinction risk, increase abundance, safeguard genetic diversity.

Goal B
Value, maintain and enhance ecosystem services.

Goal C
Share benefits from sustainable use of biodiversity, including genetic resources.

Goal D
Mobilise resources, build capacity, and transfer technology.

- **Target 1** Spatial planning
- **Target 2** Restoration
- **Target 3** Protected and conserved areas
- **Target 4** Recovery actions
- **Target 5** Sustainable use
- **Target 6** Invasive alien species
- **Target 7** Pollution
- **Target 8** Climate change
- **Target 9** Benefits
- **Target 10** Sustainable production
- **Target 11** Ecosystem services
- **Target 12** Green/blue spaces
- **Target 13** Genetic resources
- **Target 14** Mainstreaming
- **Target 15** Business impacts
- **Target 16** Citizen actions
- **Target 17** Biotechnology
- **Target 18** Incentives
- **Target 19** Finance
- **Target 20** Information
- **Target 21** Indigenous Peoples
- **Target 22** Inclusion

The astounding diversity of birds

Birds are ubiquitous, being found in every country in the world, and nearly every habitat. Ranging from hummingbirds to ostriches, from penguins to eagles, birds exhibit astounding diversity. Some species have evolved to survive in extreme climates, from the coldest polar regions to the hottest deserts, while others exploit their ability to fly long distances to migrate between climatically suitable areas in different seasons. Some gather in huge flocks, while others exist only as a handful of individuals. Species such as peafowl, birds-of-paradise and parrots have brightly coloured plumage to attract mates, while others such as potoos and ptarmigan exhibit exceptional camouflage. The diversity of birds has fascinated humans for centuries, uniting people from all parts of the world.

1 Bar-tailed Godwit *Limosa lapponica* flies more than 12,000 km without stopping on migration from Alaska to New Zealand – the longest recorded non-stop flight of any bird.

2 Arctic Tern *Sterna paradisaea* undergoes one of the longest migrations of any animal, travelling up to 90,000 km every year from the Arctic to the Antarctic.

3 Ringed Storm-petrel *Hydrobates hornbyi* breeds up to 75 km from the shoreline in the 'absolute desert' region of the Atacama Desert, an area that harbours virtually no other life.

4 Emperor Penguin *Aptenodytes forsteri* has been recorded diving to depths of up to 564 m and for periods of over 30 minutes.

5 Great Snipe *Gallinago media* has been recorded flying at 8,700 m (almost the height of Mount Everest) while migrating from Sweden to Africa's Sahel region.

6 Wisdom, a Laysan Albatross *Phoebastria immutabilis* banded in 1956, turned at least 70 years old in 2021, making her the oldest-known bird in history. She has mothered up to 36 chicks in her lifetime.

7 The now-extinct elephant birds of Madagascar were the largest birds in the world. The biggest species, *Vorombe titan*, weighed up to 800 kg and stood up to 3 m tall.

8 Cuba's Bee Hummingbird *Mellisuga helenae* is the smallest bird in the world, weighing around 2 g – the same as a small coin. Hummingbirds are the only vertebrates that can continuously hover in still air, flapping their wings at up to 80 beats per second.

9 Peregrine Falcon *Falco peregrinus* is the fastest animal on earth, capable of diving at speeds of over 200 mph.

10 Red-billed Quelea *Quelea quelea* is considered one of the most abundant wild bird species in the world, with an estimated population of 1.5 billion individuals in Africa. Millions of individuals gather in huge flocks to feed.

11 Marsh Warbler *Acrocephalus palustris* is a master of mimicry, learning the songs of other birds and incorporating them into its own song. It has been recorded imitating at least 99 European species and 113 African species, as well as mechanical sounds.

12 The birds-of-paradise native to New Guinea and north-eastern Australia have elaborate courtship displays. Sporting spectacular plumage, males perform extravagant 'dances' from a perch or a cleared space on the forest floor to attract a female.

13 Sociable Weaver *Philetairus socius* builds some of the largest nests on earth. Measuring up to 4 m high and 7.2 m long, and weighing as much as a tonne, these nests can contain several hundred birds within separate nest chambers.

14 Fatu Hiva Monarch *Pomarea whitneyi* is one of the rarest birds in the world. Found only on the small island of Fatu Hiva in French Polynesia, the total population is estimated to number fewer than 20 individuals.

15 Red Junglefowl *Gallus gallus*, native to South-East Asia, is the wild ancestor of the domestic chicken. Domesticated around 3,500 years ago, chickens are now the most abundant bird in the world, with an estimated 50 billion raised for food every year.

16 Kiwis have features more characteristic of mammals than birds. Filling the niche of small mammals such as hedgehogs, they have evolved a well-developed sense of smell and hearing, a whiskered face, hair-like plumage and heavy bones filled with marrow.

17 Harpy Eagle *Harpia harpyja* is one of the largest birds of prey in the world. Over 1 m tall with a 2 m wingspan and the largest talons of any living eagle, it predates monkeys and sloths weighing up to its own bodyweight.

18 Snow Bunting *Plectrophenax nivalis* is the most northerly breeding songbird, arriving in the Arctic during early spring when temperatures may drop to -30°C. A range of adaptations, including feathered ankles and layers of insulating fat, allow it to survive in these extreme conditions.

Sources: Barros *et al.* 2018, Dowsett-Lemaire 1979, Egevang *et al.* 2010, Goetz *et al.* 2018, Hansford & Turvey 2018, Lindstrom *et al.* 2021, Peters *et al.* 2022, Wienecke *et al.* 2007.

Birds are a barometer for planetary health

Comprehensively assessing all biodiversity on earth would be prohibitively expensive and time-consuming, so it is necessary to identify taxa that can act as indicators for the overall health of the natural world. Although there is no perfect indicator taxon, birds are widespread, extremely well studied, have population trends that often mirror those of other taxa, and are responsive to environmental change, making them good candidates. By collating and analysing bird data, we not only understand their condition, but also gain an unparalleled insight into the health of the natural world as a whole. In effect, birds act as barometers for planetary health, allowing us to 'take the pulse of the planet'.

Sources: Develey 2021, Gregory & van Strien 2010, Larsen *et al.* 2012, Moussy *et al.* 2021, PECBMS 2021, USFWS 2019, Van Swaay *et al.* 2019.

Bird taxonomy is well known and relatively stable

The majority of bird species were described in the eighteenth and nineteenth centuries. In recent years, the number of recognised bird species has grown by around 0.5% per year on average, while the number of mammal and amphibian species has grown c.3-5 times faster, meaning that analyses and priorities rapidly become out of date.

Birds are widespread, occurring almost everywhere around the globe

Birds are found in every country in the world, and nearly every habitat. For example, Snow Petrel *Pagodroma nivea* can be found breeding up to 440 km inland from the Antarctic Coast, while Iranian Ground-jay *Podoces pleskei* lives in one of the hottest places on earth – the Lut Desert, Iran – where ground temperatures reach up to 70°C.

Bird distribution, behaviour and ecology are much better known than for other comparable taxa

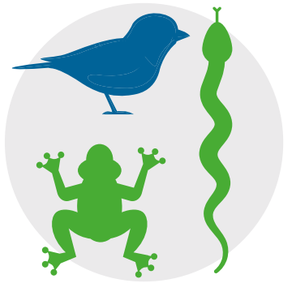
The scientific literature on birds is extensive. On average, 1,217 papers were published on bird conservation every year during 2010-2021, compared to 892, 609 and 341 for mammal, insect and amphibian conservation respectively.

Bird population trends often mirror those of other species

As birds generally occupy high trophic levels in food webs and are sensitive to environmental change, their population trends often reflect those of other taxa. For example, the European Grassland Butterfly Indicator and Farmland Bird Index show congruent declines in both groups of species, primarily as a result of agricultural intensification.

Birds are mobile and responsive to environmental change

Birds are often highly sensitive to changes in their environment, and can therefore act as early warning systems of threats to nature. For example, many bird species are already responding to climate change by shifting their distribution or the timing of key events such as migration.



Bird distribution generally reflects that of many other wildlife groups

Areas that support a high diversity of birds are often also important for other groups of species. For example, one study found that networks of sites identified for maximum representation of bird species in sub-Saharan Africa, Denmark and Ugandan forests also represented over 80% of snake, frog and mammal species, including around half of the rare species in these groups.

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

Birds are conspicuous, largely active during the day, and generally occur in numbers that can be counted with relative ease. As a result, they are by far the most widely monitored taxonomic group, accounting for around half of all species monitoring programmes worldwide.

There are enough bird species to show meaningful patterns, but not so many as to make field identification a significant challenge

There are currently just over 11,000 recognised living bird species, the vast majority of which can be identified in the field with relative ease through observation alone. Many other taxa have an overwhelming number of species that require specialist equipment and/or knowledge to identify. For example, there are over 1 million described insect species, some of which can be identified only through dissection.

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

Birds are popular and engaging, and consequently there is an army of dedicated birdwatchers, as well as professional ornithologists and conservationists, collecting data on birds across the world. Almost 3 million adults go birdwatching every year in the UK, while there are an estimated 45 million birdwatchers in the USA and up to 40,000 in Brazil.

The importance of birds to ecosystems and human culture

Birds play many important roles in the world's ecosystems – they are predators, pollinators, seed dispersers, scavengers and ecosystem engineers. Their highly mobile nature means that they can act as a link between distant ecosystems, cycling nutrients and facilitating the dispersal of other organisms. Birds are also important to human culture – they have featured in art, poetry, music and religion across cultures for millennia, while birdwatching is an increasingly popular hobby that unites people around the world for conservation and has increasing economic significance.

Sources: Chanthorn *et al.* 2019, Graham *et al.* 2018, Grilli *et al.* 2019, Johnson *et al.* 2010, Maisey *et al.* 2021, Naniwadekar *et al.* 2021, Nyffeler *et al.* 2018, Ratto *et al.* 2018, USFWS 2019.

Birds are important pollinators for some plants

Excluding birds from plants that are pollinated by both birds and invertebrates results in an average 46% reduction in fruit/seed production, according to one study, indicating a strong dependence on birds as pollinators.

Insectivorous birds control agricultural pests

Insectivorous birds worldwide consume an estimated 400-500 million tonnes of prey every year, suppressing insect pest populations. Avian control of the Coffee Berry Borer *Hypothenemus hampei* on coffee farms in Jamaica has been estimated to be worth $310 per hectare.

'Avitourism' provides economic benefits

In the US, birders spend an estimated $39 billion every year on bird-related trips and equipment, generating c.$96 billion in total industry output, and creating 782,000 jobs.

Hornbills are important dispersers of large seeds in tropical forests

In areas where hornbills are abundant, they can disperse up to 12,700 large seeds per day per km^2, which is critical for ecosystem function. The loss of large-bodied frugivores such as hornbills would significantly reduce carbon storage in tropical forests.

Some birds act as ecosystem engineers

Every year, Superb Lyrebirds *Menura novaehollandiae* displace an estimated 156 tonnes of leaf litter and soil per hectare when foraging, reducing litter depth and soil compaction at the surface, which plays a key role in ecosystem function.

Scavenging birds dispose of organic waste

Turkey Vultures *Cathartes aura* are estimated to remove 0.12 kg of organic material (e.g. livestock carcasses) per km^2 every day – a service that would cost up to $700 million per year to replace.

Seabirds enhance coral reef productivity and functioning

Seabirds cycle nutrients between the sea and land. On reefs around islands with abundant seabirds, damselfish grow faster and there is a greater biomass of reef-fish overall than on islands where seabird abundance is low.

The health of people and bird populations are linked

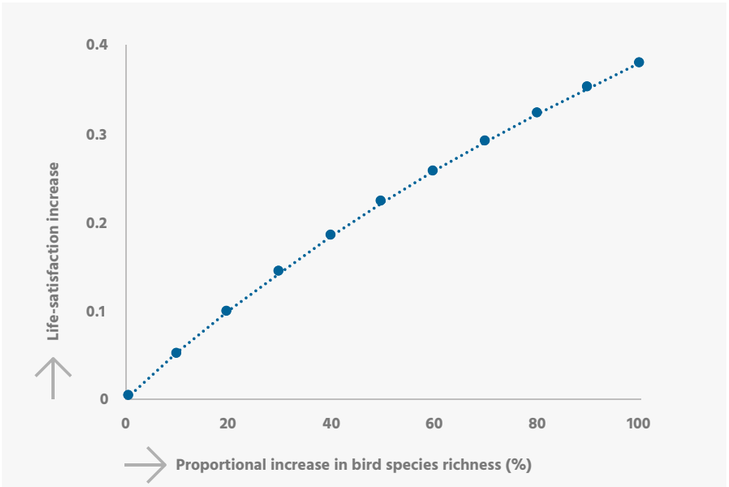
In 2020, the COVID-19 pandemic that swept across the globe highlighted more than ever the link between our health and the natural world. Zoonotic diseases comprise nearly two-thirds of emerging infectious diseases, and over 70% of these originate in wildlife. Overexploitation of wild animals, destruction and degradation of habitats, and expansion of agriculture and infrastructure into increasingly wild places has modified the interface between people and wildlife, increasing the risk of these diseases 'spilling over' from wildlife to humans. During the peak of the pandemic, many people found solace in nature, taking to outdoor hobbies such as birdwatching to boost their mental wellbeing. Maintaining healthy, functioning ecosystems is therefore crucial for both our physical and mental health.

Photo © Barend van Gemerden

Birds are beneficial to our mental health and wellbeing

There is increasing evidence that interacting with wildlife, and birds in particular, can have a positive impact on our mental wellbeing. One study in the UK found that bird abundance was positively associated with a lower prevalence of depression, anxiety and stress in people, while a poll of over 2,000 adults in the UK during the coronavirus pandemic revealed that two-thirds reported improved enjoyment of life due to watching and hearing birds. According to another recent correlative study across 26 European countries, bird species richness is positively associated with life-satisfaction across Europe. This may be due to the direct positive effects of seeing and hearing birds, and/or the indirect effect of experiencing landscapes with features which promote both bird species richness and human wellbeing.

Estimated life-satisfaction increase in relation to number of bird species, based on data from more than 26,000 European citizens



Data from Methorst *et al.* 2021.

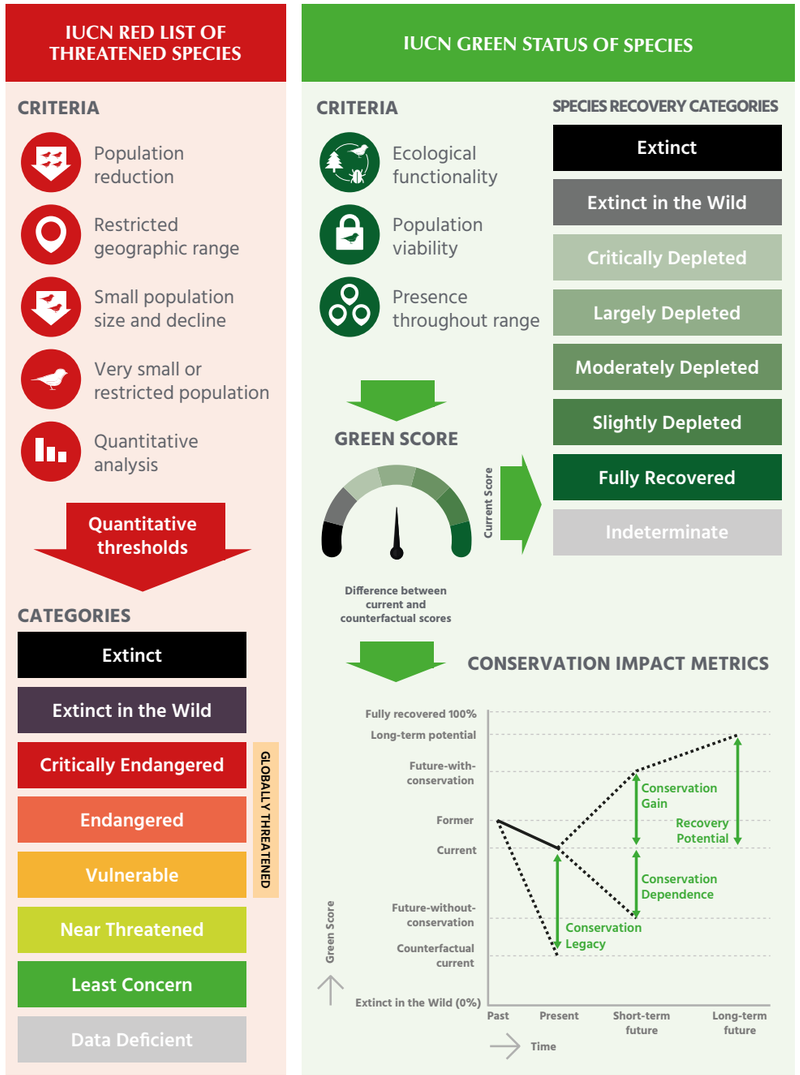
Nature plays a crucial role in modulating human disease

Intact ecosystems play a key role in disease regulation. Disruption of ecosystem function may therefore increase the abundance of human pathogens or disease vectors. For example, scavenging vultures dispose of animal carcasses, limiting the growth of pathogenic bacteria, thus reducing the risk of human infection. The recent collapse in Indian vulture populations owing to ingestion of veterinary diclofenac through cattle carcasses resulted in an increase in rotting carrion, causing deterioration of water quality and subsequently an increase in human mortality by an average of over 3% in districts that were highly suitable for vultures, highlighting the importance of the ecosystem services provided by these species. Some diseases can have severe impacts on both people and birds. Highly pathogenic strains of avian influenza (HPAI) evolved in intensive poultry farms, spread to wild birds though lax biosecurity, and are now driving rapid declines in some bird populations. In 2022, for example, widespread mortality from HPAI affected Great Skua *Catharacta skua* and Northern Gannet *Morus bassanus* in Scotland, UK, which supports over half their global populations. Since late 2021, HPAI has caused the deaths of over 8,000 Common Cranes *Grus grus* in Israel and 40% of the Balkan population of Dalmatian Pelican *Pelecanus crispus*. Although the WHO assesses the risk to the general population from HPAI as low, there is a risk of sporadic infection in humans exposed to infected poultry or contaminated environments. Between 2003 and 2022, 864 cases including 456 deaths of humans from HPAI infection were reported worldwide from 18 countries.

Sources: Cox *et al.* 2017, Frank & Sudarshan 2021, Jones *et al.* 2008, Methorst *et al.* 2021, RSPB 2020, WHO 2022.

Our science: the IUCN Red List

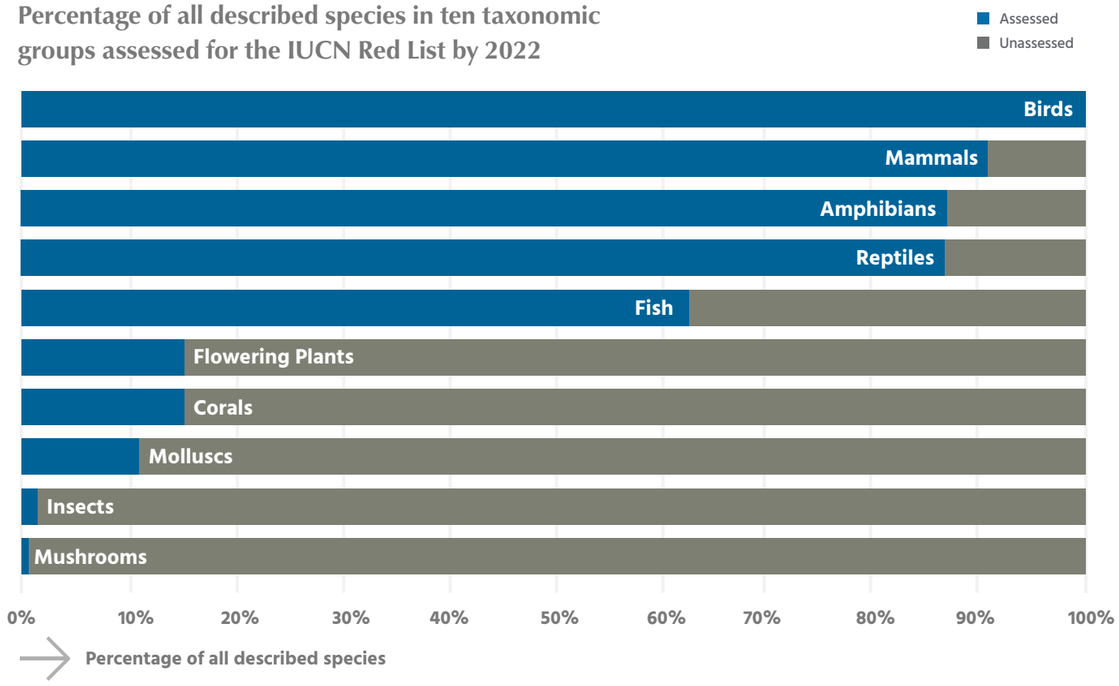
Much of what we know about the current state of the world's birds comes from the IUCN Red List of Threatened Species. As the Red List Authority for birds, BirdLife International is responsible for assessing the extinction risk of all c.11,000 bird species. Data on each species' population size and structure, range size, and trends, are objectively assessed against a set of standardised criteria, resulting in the division of species into eight risk categories. The recently launched IUCN Green Status of Species complements the Red List by providing a framework for assessing the recovery of species populations and measuring conservation success. These assessments allow identification of the species most at risk of extinction, the greatest threats to their survival, and the conservation actions needed to recover their populations.



Red List assessments for birds are more comprehensive than for any comparable taxa

In 1988, birds became the first major group to be comprehensively assessed for the IUCN Red List – i.e. to have every known species assessed against the Red List criteria. Since then, BirdLife has regularly expanded and updated these assessments using the latest data on species' taxonomy, populations, distribution and threats. This involves collaborating with thousands of bird experts worldwide to ensure that the data used are as complete, up to date and accurate as possible. The extinction risk of all known bird species has now been assessed seven times. Few comparable groups of species have been assessed in their entirety, and none as many times as birds. For example, mammals were first comprehensively assessed in 1996, with updates in 2008 and 2022; a global assessment of amphibians was carried out in 2004 with an update currently underway; and reptiles were only comprehensively assessed for the first time in 2022. Birds therefore provide unparalleled insights into the status of biodiversity, with the longest trend data, allowing analysis of the change in extinction risk over time.

Percentage of all described species in ten taxonomic groups assessed for the IUCN Red List by 2022



Data from IUCN 2022.

The Red List Index shows overall trends in extinction risk

For groups of species that have been assessed for the IUCN Red List more than once, it is possible to examine trends over time in the overall extinction risk of species using the Red List Index (RLI). This is based on the number of species in each Red List category and the number of species moving to a higher category of extinction risk between assessments due to a genuine deterioration in their status, or to a lower category of extinction risk due to a genuine improvement in their status. It excludes movement between categories resulting from improved knowledge or revised taxonomy. A RLI value of 1 indicates that all species are Least Concern, while a value of 0 indicates that all species have gone extinct. A declining RLI over time indicates an overall increase in extinction risk, while an increasing RLI indicates a reduction in extinction risk. The RLI has been widely adopted in various policy fora, including by the UN to measure progress towards the Sustainable Development Goals and by the Convention on Biological Diversity and other Multilateral Environmental Agreements.

Source: IUCN 2022.

Our science: Important Bird and Biodiversity Areas

Biodiversity is not evenly distributed around the planet: some locations are disproportionately significant. To conserve biodiversity effectively, we must identify these places and target conservation action accordingly. Important Bird and Biodiversity Areas (IBAs) are sites identified as being internationally significant for the conservation of birds and other biodiversity, based on a set of standardised, data-driven criteria. Since the launch of the IBA concept by BirdLife (then ICBP) in 1979, IBAs have been identified in over 200 countries and territories worldwide, and thousands of protected areas have been designated as a direct consequence. BirdLife Partners play a key role in identifying, monitoring and updating the IBA network. The criteria that underpin IBA identification have now been adapted to create a 'Global Standard' for identifying sites that contribute to the persistence of biodiversity – Key Biodiversity Areas.

9% **of Earth's terrestrial area and 2% of its oceans are covered by IBAs**

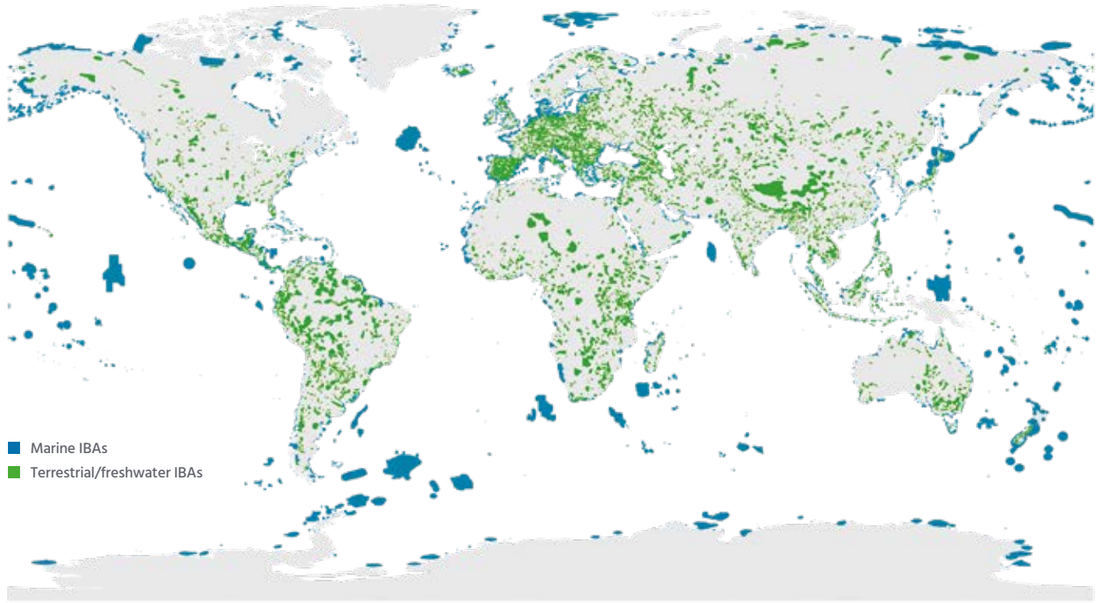
Over 13,600 IBAs have been identified

To date, over 13,600 IBAs have been identified and documented in terrestrial (96%), freshwater (28%) and marine (32%) ecosystems in nearly every country and territory in the world. Many IBAs contain multiple types of ecosystems – for example, those along coastlines contain both terrestrial and marine areas. Advances in satellite tracking technology are improving our understanding of important areas for seabirds beyond exclusive economic zones, and multiple marine IBAs have now been identified in the High Seas (i.e. areas beyond national jurisdiction). IBAs range in size from less than 1 km^2 to more than 600,000 km^2, with the whole IBA network covering approximately 9% of Earth's terrestrial area and 2% of the oceans.

The criteria used to identify IBAs have evolved into a global standard

In April 2016, following extensive consultation with BirdLife and other conservation organisations, the International Union for Conservation of Nature (IUCN) published a *Global Standard for the identification of Key Biodiversity Areas* (KBAs). The KBA Standard builds on the criteria and methodology used to identify IBAs, providing a framework for consistent, objective and transparent identification of sites of global significance for biodiversity. The KBA criteria relate to sites of importance for threatened or geographically restricted species or ecosystems, biological processes, ecological integrity, or irreplaceability. BirdLife is a co-founder of the KBA Partnership, tasked with developing and maintaining the list of KBAs (in a database managed by BirdLife) and promoting the conservation of these sites. To date, more than 16,300 KBAs have been identified worldwide. Although the criteria for KBAs are broader than those for IBAs, nearly all IBAs also qualify as KBAs, and as a result the vast majority (84%) of the KBAs documented so far have been identified as important for birds.

Locations of the >13,600 Important Bird and Biodiversity Areas (IBAs) identified to date



Map shows confirmed IBAs. Note that 'marine IBAs' include those that have both marine and terrestrial areas. Data from BirdLife International 2022.

IBA CRITERIA

GLOBALLY THREATENED SPECIES

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

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).

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.

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.

KBA CRITERIA

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.

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.

ECOLOGICAL INTEGRITY

The site holds wholly intact ecological communities supporting large-scale ecological processes.

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.

IRREPLACEABILITY

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

Inca Tern *Larosterna inca*.
Photo © Rob Potter

2

Section 2

State

Bird populations are in decline around the world

Data from the IUCN Red List show that 49% of bird species worldwide (5,412) have declining populations, while 38% (4,234) are stable, just 6% (659) are increasing and 6% (693) have unknown trends. Declines are not restricted to rare and threatened species – even common and widespread species are declining rapidly in some cases. Although decline rates in these common species may not be great enough to classify them as globally threatened, the substantial reduction in the number of individuals is likely to impact ecosystem function and the provision of ecosystem services.

More than 3 billion birds have been lost across North America and the EU in the last half-century

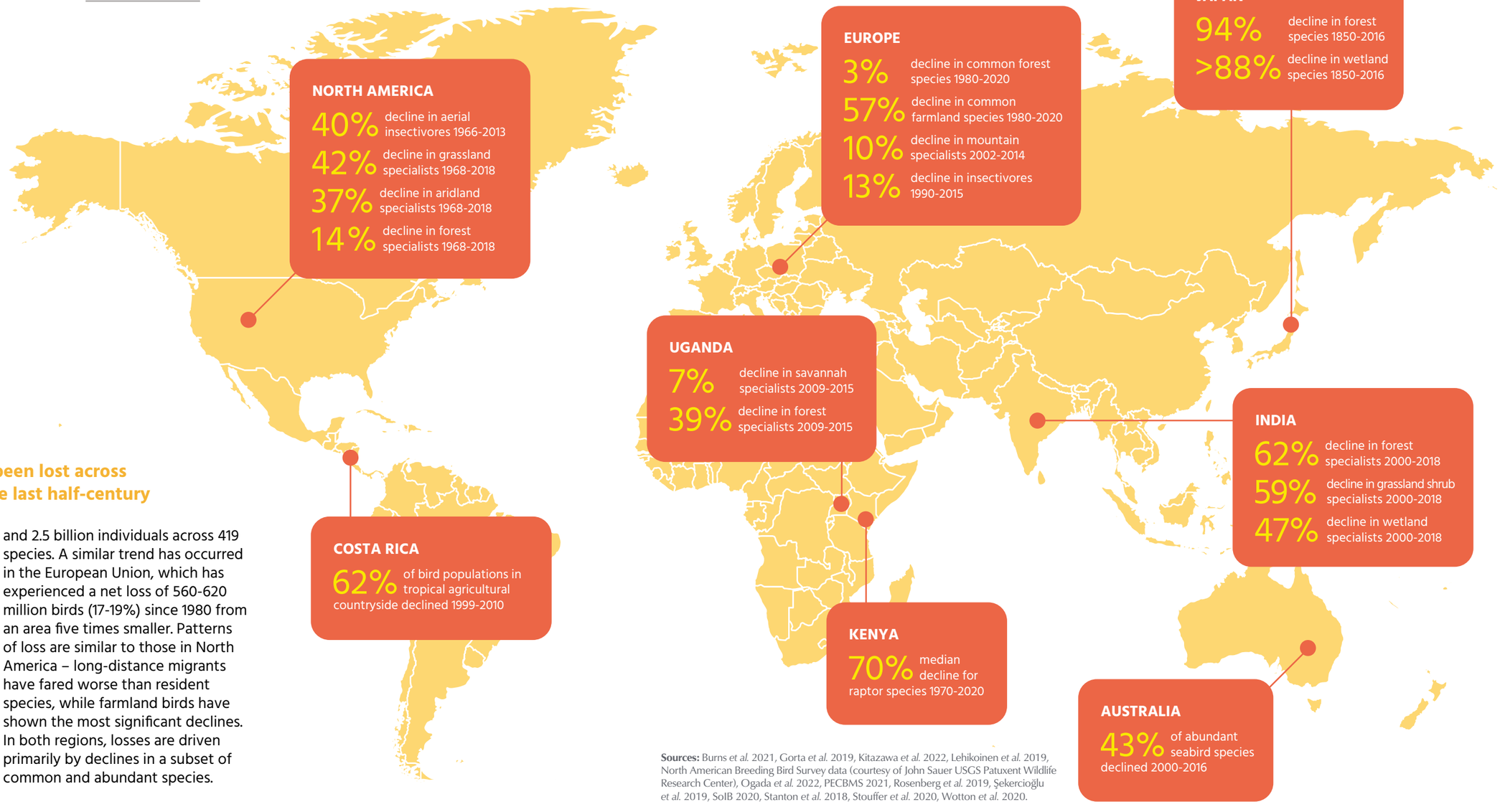
The most comprehensive long-term monitoring data for birds come from Europe and North America, where surveys started almost 50 years ago. Analysis of these survey data reveals the scale of loss of total bird abundance. There has been a net loss of 2.9 billion birds (29%) in North America since 1970. These losses have been most severe in species associated with grassland and those that migrate, with respective net losses of 700 million individuals across 31 species and 2.5 billion individuals across 419 species. A similar trend has occurred in the European Union, which has experienced a net loss of 560-620 million birds (17-19%) since 1980 from an area five times smaller. Patterns of loss are similar to those in North America – long-distance migrants have fared worse than resident species, while farmland birds have shown the most significant declines. In both regions, losses are driven primarily by declines in a subset of common and abundant species.

Declines are widespread across the globe

Data on long-term trends in bird abundance are much scarcer in other parts of the world, however there is increasing evidence that population declines are occurring around the globe. Recent reports have highlighted declines in near-ground and terrestrial insectivores in Brazil's undisturbed Amazon rainforest, and resident, insectivorous and specialised species in the agricultural countryside of Costa Rica. In Kenya, 19 of 22 raptor species have declined since the 1970s, while Uganda's forest and savannah specialist species have also suffered declines. Citizen science is helping to fill data gaps in some countries, revealing declines in grassland/shrub and wetland specialists in India and seabirds off south-eastern Australia.

49%

of bird species worldwide have declining populations



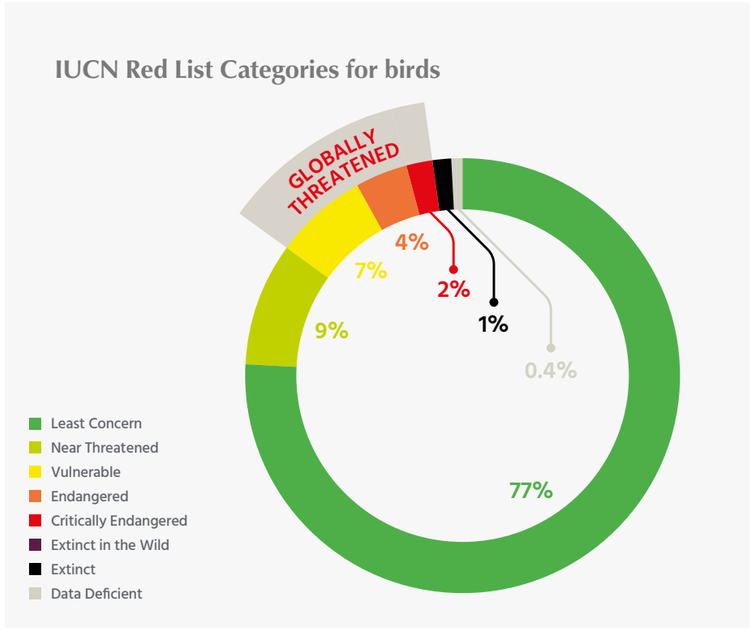
Sources: Burns *et al.* 2021, Gorta *et al.* 2019, Kitazawa *et al.* 2022, Lehikoinen *et al.* 2019, North American Breeding Bird Survey data (courtesy of John Sauer USGS Patuxent Wildlife Research Center), Ogada *et al.* 2022, PECBMS 2021, Rosenberg *et al.* 2019, Şekercioğlu *et al.* 2019, SoIB 2020, Stanton *et al.* 2018, Stouffer *et al.* 2020, Wotton *et al.* 2020.

Many species are at risk of extinction

The latest global Red List assessments for birds show that 1,409 species are considered threatened: 755 are listed as Vulnerable, 423 as Endangered and 231 as Critically Endangered. This equates to 12.8% of all extant bird species, or just over one in eight. A further 1,002 species are categorised as Near Threatened, meaning that they approach the threshold for qualifying as globally threatened. Over one-fifth of the world's birds (21.9%) can therefore be considered as being of significant conservation concern. Only 47 species are lacking sufficient data to assess extinction risk, so are classified as Data Deficient.

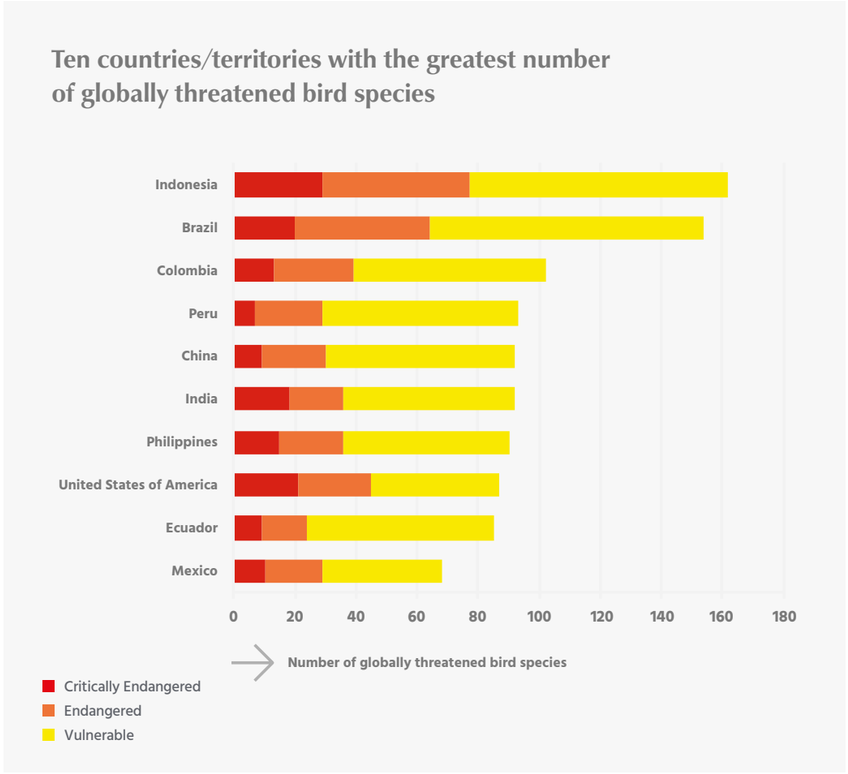
231

species are listed as Critically Endangered



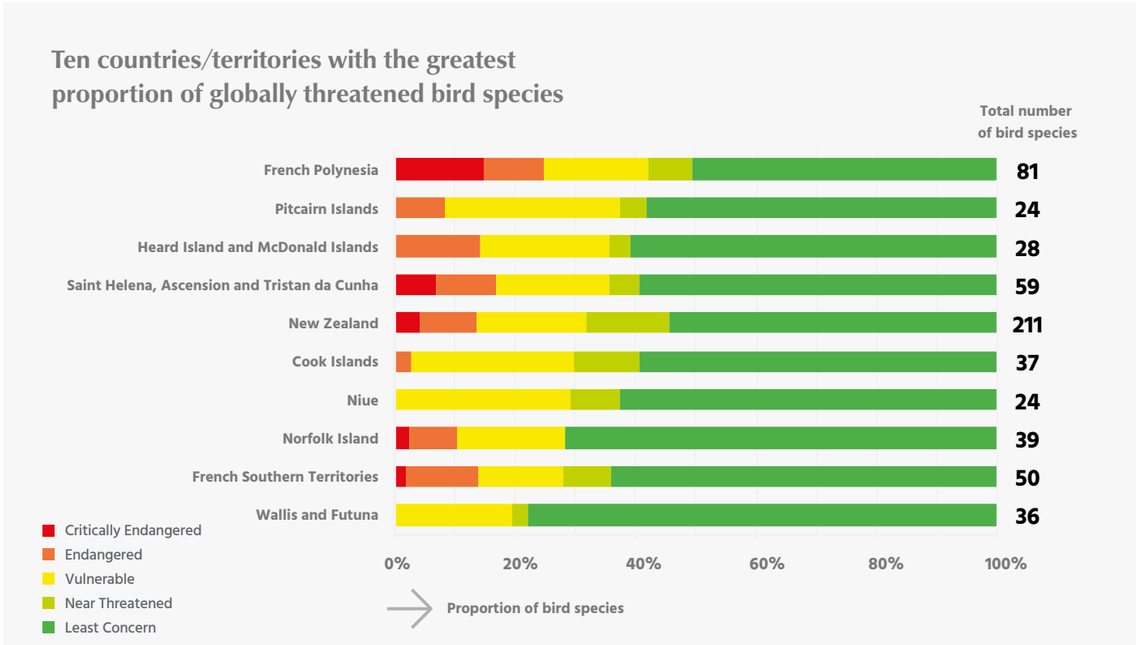
Regional Red List assessments reveal worrying statistics

While global Red List assessments provide an indication of species' extinction risk worldwide, it is also helpful to assess extinction risk at regional and national scales, for example to aid regional or national reporting of progress towards biodiversity targets. The latest European Red List of Birds, published in 2021, revealed that 13% of Europe's 544 bird species are threatened, including a quarter of species that are endemic or near-endemic to the region. Among the most threatened (i.e. regionally Critically Endangered) European species are Sociable Lapwing *Vanellus gregarius* and Steppe Eagle *Aquila nipalensis*. The Action Plan for Australian Birds 2020 revealed that one in six native bird species or subspecies are nationally threatened, while three birds previously considered Critically Endangered are now classified nationally as Extinct – Mount Lofty Ranges Spotted Quail-thrush *Cinclosoma punctatum anachoreta*, Southern Star Finch *Neochmia ruficauda ruficauda* and White-chested White-eye *Zosterops albogularis*.



Some countries are home to a particularly large proportion of threatened birds

The distribution of globally threatened bird species around the world is not random – more threatened species are found in tropical than temperate latitudes. Nine countries have over 80 globally threatened species, with Indonesia (162 species), Brazil (154 species) and Colombia (102 species) topping the list. The ten countries with the highest proportion of globally threatened species among their avifauna are all islands, reflecting the devastating effect of invasive alien species on island bird populations. French Polynesia holds the greatest proportion, with 42% of its 81 species being globally threatened.



Sources: BirdLife International 2021, Garnett & Baker 2021.

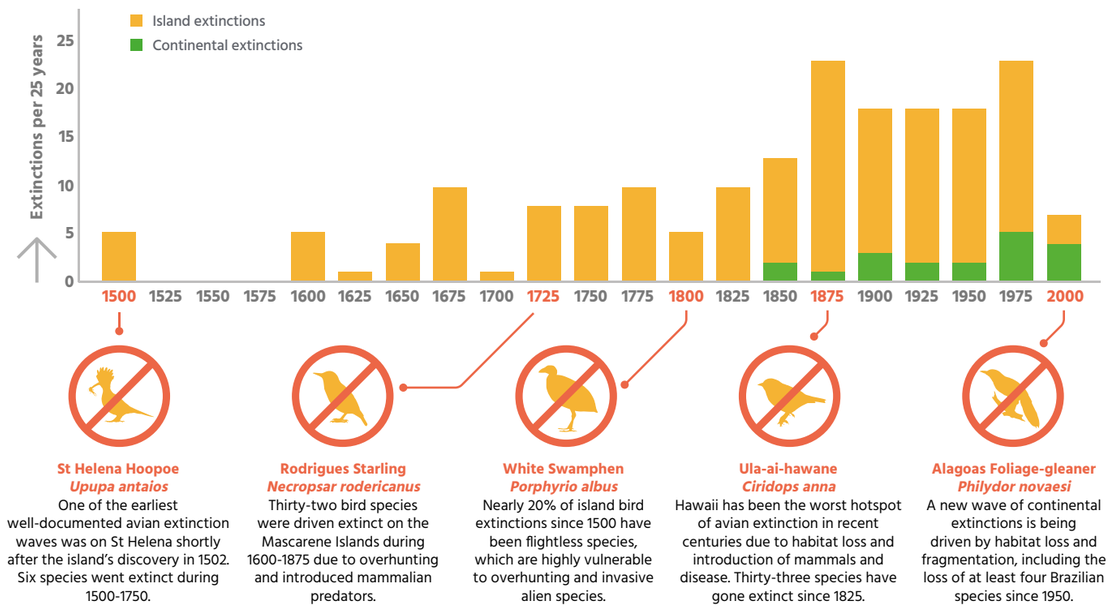
Extinction risk is escalating

We are in the midst of an extinction crisis. It is widely acknowledged that the planet is facing its sixth mass extinction event, with the current extinction rate tens to hundreds of times faster than the average over the last 10 million years. Up to a million plant and animal species are now estimated to be threatened with extinction, many of which may disappear within decades. The extinction risk of birds has been repeatedly assessed by BirdLife International for the IUCN Red List since 1988, providing the longest trend data for any group of species.

Many bird species have already gone extinct

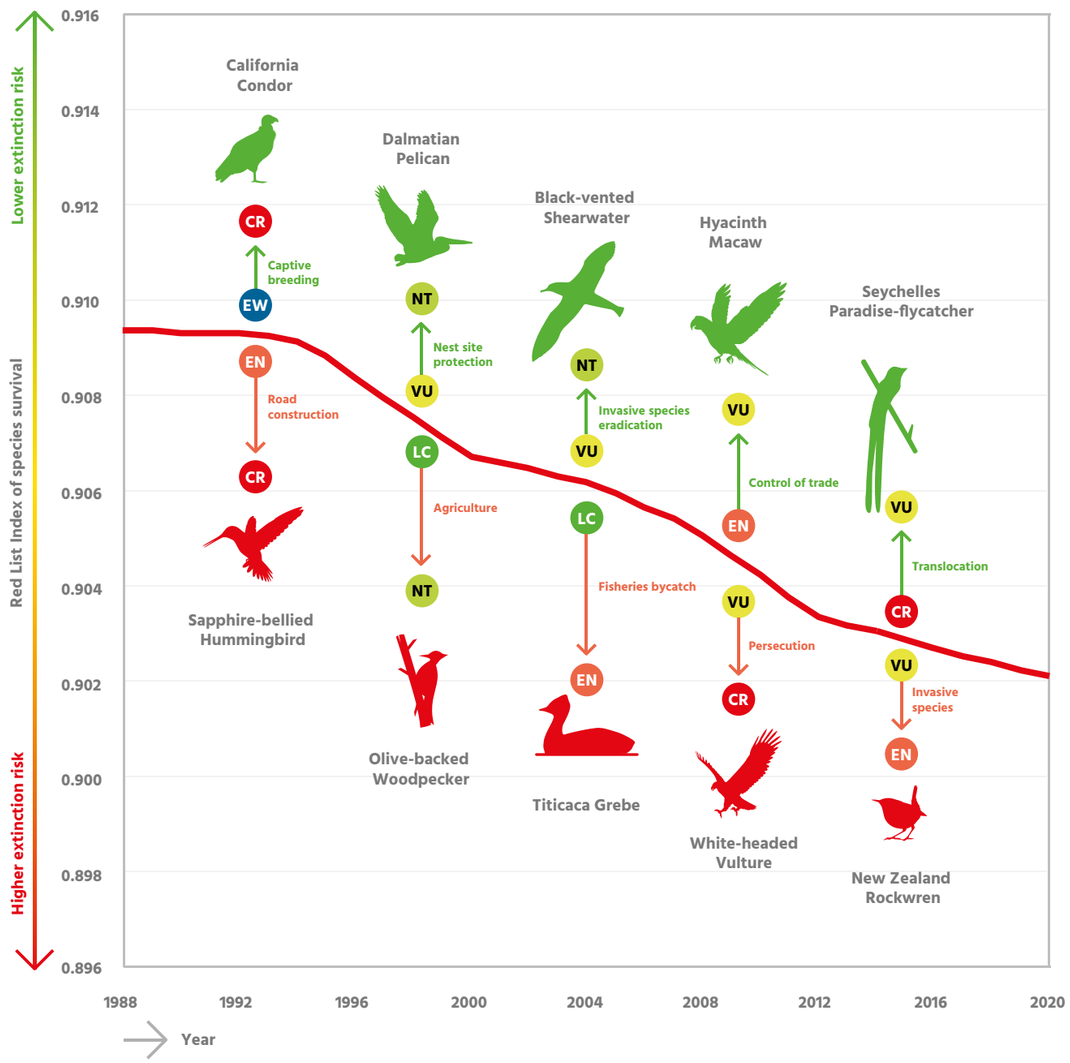
At least 187 bird species are confirmed or suspected to have gone extinct since 1500. The majority of these extinctions have been endemic island species, including 33 from Hawaii, 32 from the Mascarene Islands, 20 from New Zealand, and 16 from French Polynesia, most of which were killed off by introduced mammals. However, more recently there has been an upsurge in continental bird extinctions, particularly in highly fragmented tropical regions. Brazil has lost two bird species endemic to its Atlantic forest in the last two decades – Cryptic Treehunter *Cichlocolaptes mazarbarnetti* and Alagoas Foliage-gleaner *Philydor novaesi* – while a third, Pernambuco Pygmy-owl *Glaucidium mooreorum*, has not been recorded since 2001 and is therefore also suspected to be extinct.

Bird extinctions per quarter-century since 1500



Data from Butchart *et al.* 2018.

Red List Index of species survival for birds



436

species have moved to a higher category of threat because of a genuine deterioration in their status since 1988

The Red List Index shows a continuing decline

The Red List Index (RLI) measures trends in extinction risk over time (illustrating its inverse: survival probability). The RLI for birds has shown a steady decline over the last three decades, indicating an overall increase in extinction risk. Since 1988, 93 species have been downlisted to a lower Red List category due to a genuine improvement in status, but this is outweighed by the 436 species that moved to a higher category of threat because of a genuine deterioration in their status. Estimates based on these trends predict an overall effective extinction rate (the average probability of extinction per species per year) of 2.17 x 10^{-4}/species/year – six times higher than the rate of outright extinction since 1500.

Sources: Butchart *et al.* 2018, IPBES 2019, Monroe *et al.* 2019.

Many important sites for birds are in an unfavourable condition

Healthy, functioning ecosystems within key sites are vital for supporting species and providing ecosystem services. However, as the human population grows, our towns, cities and agricultural lands are increasingly encroaching on important sites for nature, and the habitats within them are becoming degraded by threats such as logging, pollution and invasive species. Although up-to-date monitoring information is not available for all Important Bird and Biodiversity Areas (IBAs), the available data suggest that c.45% are in an unfavourable condition. Of these, 277 currently qualify as 'IBAs in Danger' – sites of international significance for the conservation of birds and other biodiversity that are in an extremely poor state and in urgent need of conservation action.

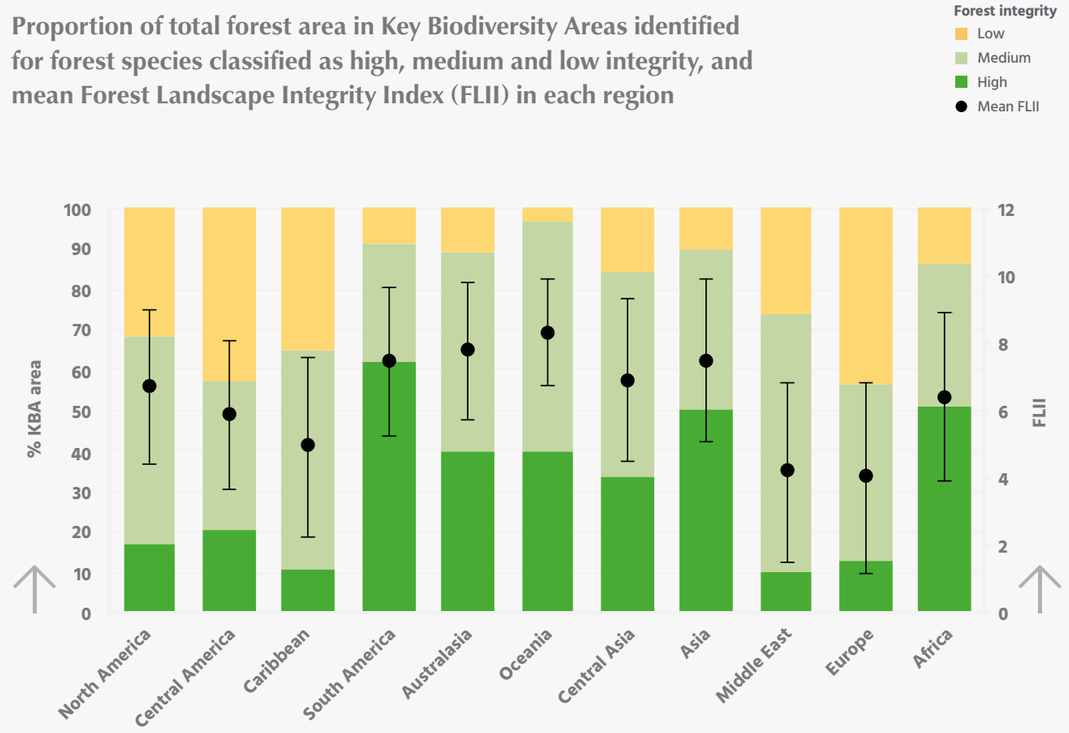
Over half of forest within Key Biodiversity Areas identified for forest species no longer has high integrity

Forests are home to nearly two-thirds of all bird species, including 996 (71%) globally threatened species. However, forests in Key Biodiversity Areas (KBAs, most of which have been identified for birds) across the world are being lost, fragmented and degraded by timber harvesting, development and expanding agriculture. The Forest Landscape Integrity Index (FLII) describes the ecological integrity of the world's forests using data on forest extent, threats and changes in connectivity. Analysis of the FLII in KBAs that contain forest and have been identified for forest species reveals that only 44% (1.7 million km^2) of the forest extent within these KBAs is classified as high integrity, while 39% is medium integrity and 18% is low integrity. KBAs in South America, Africa and Asia have the greatest amount of high integrity forest, both in terms of total area and proportion, while KBAs in Central America, the Caribbean and Europe have the highest proportion of low integrity forest. Loss of forest integrity in these sites reduces their capacity to conserve the species for which they have been identified as internationally significant.

277

IBAs currently qualify as 'IBAs in Danger' and are in urgent need of conservation action

Proportion of total forest area in Key Biodiversity Areas identified for forest species classified as high, medium and low integrity, and mean Forest Landscape Integrity Index (FLII) in each region



Data from Crowe *et al.* in prep.

Wetlands in the East Asian-Australasian Flyway are being heavily degraded

Wetland ecosystems encompass a wide diversity of habitats, including rivers, marshes, lakes and peatlands. They support large numbers of waterbird species, which can act as indicators of wetland health. Over 50 million waterbirds of more than 200 species travel along the East Asian-Australasian Flyway every year, using key wetland sites along their route to rest and refuel. Around half of East Asia's migratory waterbird species are suffering population declines, driven at least in part by the loss and degradation of their wetland habitats due to urban expansion. For example, mudflats in IBAs along the Yellow Sea coast provide vital stopover sites for migratory species such as the Critically Endangered Spoon-billed Sandpiper *Calidris pygmaea* and Endangered Spotted Greenshank *Tringa guttifer*. Since the 1950s, up to 65% of these wetlands have been lost or degraded due to reclamation, pollution and rising sea levels.

Photo © Markus Spiske

Sources: Crowe *et al.* in prep., Murray *et al.* 2014.

Section 3

Pressure

Human actions threaten the world's birds

A wide range of threats are driving the extinction crisis, almost all of which are ultimately caused by human actions. BirdLife's extinction risk assessments for the IUCN Red List show how the human population's increasingly unsustainable use of natural resources causes global bird declines. In particular, agricultural expansion and intensification, logging, invasive alien species, hunting and climate change are causing habitat conversion and degradation, direct mortality of individuals, and indirect impacts.

Birds face a range of threats

The threats currently impacting the greatest number of globally threatened bird species are agricultural expansion and intensification (1,026 species, 73%), logging (710 species, 50%), invasive and other problematic species (567 species, 40%) and hunting (529 species, 38%), while climate change is already a significant threat (479 species, 34%) and will pose even greater future challenges. These threats drive declines in bird populations through a variety of mechanisms. The most important is habitat conversion and degradation (1,336 species, 95%), while others cause direct mortality of individuals (862 species, 61%) or indirectly affect populations, for example through reduced reproductive success (510 species, 36%) or increased competition (134 species, 10%). Most species (90%) are affected by more than one threat, and many threats are interrelated – for example deforestation and climate change increase the risk of extreme wildfires.

Threats to globally threatened bird species

33%

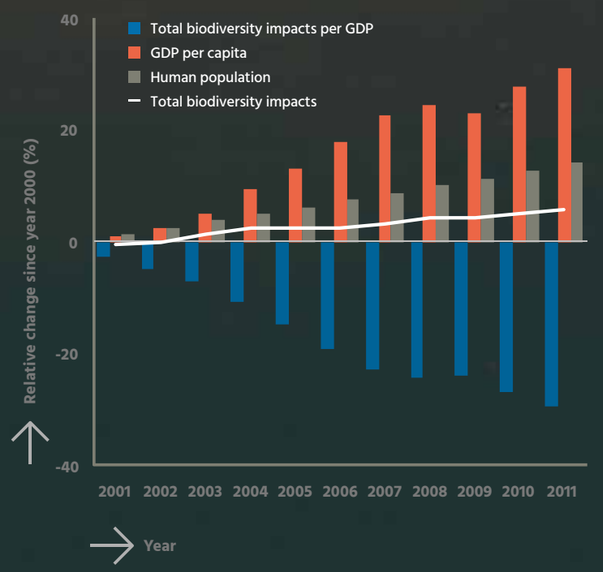
of Central and South America's and 26% of Africa's biodiversity impacts are driven by consumption in other parts of the world

Impacts are driven by unsustainable consumption and economic growth

Unsustainable consumption and economic development are the underlying drivers of almost all threats to the natural world. For example, the growing demand for food and timber drives expansion of agriculture, fisheries and forestry; urbanisation drives development of residential and commercial areas and related infrastructure; international trade and travel increases the risk of introducing alien species; and a combination of these actions contributes towards climate change. During 2001-2011, economic and population growth increased the biodiversity impacts of agriculture and forestry (measured in terms of the number of potential impending bird extinctions), despite a decline in the impact per GDP. International trade results in geographical separation of production and consumption, decoupling biodiversity impacts from economic growth. In 2011, 33% of Central and South America's and 26% of Africa's biodiversity impacts were driven by consumption in other parts of the world.

Source: Marques *et al.* 2019.

Global trends in human population, GDP per capita, and biodiversity impacts of agriculture and forestry (estimated in terms of number of impending bird extinctions) during 2001-2011



Data from Marques *et al.* 2019.

Photo © Marek Piwnicki

Agricultural expansion and intensification drive habitat loss and degradation

Agriculture affects more globally threatened bird species than any other threat. A total of 1,026 globally threatened birds (73%) are impacted by crop or livestock farming, wood and pulp plantations or aquaculture. Almost 40% of earth's terrestrial area has been converted to agriculture, and this continues to expand in order to provide food, fuel and fibre for the growing human population. Agricultural intensification is also increasing – since 1960, pesticide use globally has doubled, fertiliser use has tripled, and cattle density has increased by 20%. While some bird species thrive in low-intensity farmland, agricultural intensification reduces the suitability of these habitats for birds and other wildlife.

In high-income countries, agricultural intensification makes farmland habitats less suitable for birds

In most high-income countries, there is little space left for agricultural expansion. Increased production is therefore achieved through intensification of farming methods on existing agricultural land, such as increased mechanisation and agrochemical input, and conversion of grassland to cropland. This reduces bird survival and reproduction through a variety of mechanisms, including via pesticide toxicity, reduced food supply, and habitat loss. In Europe, there has been a 57% decline in common farmland birds since 1980. The European Union's Common Agricultural Policy (CAP) subsidises intensive farming practices, driving increases in crop yields but significant declines in farmland bird populations. For example, in Spain the CAP has led to a reduction of fallow land, which is strongly associated with the decline of farmland birds such as Little Bustard *Tetrax tetrax*. Farmland birds in North America have suffered similarly severe declines in recent decades – 74% of farmland-associated species declined during 1966-2013, with many of these declines coinciding with a period of rapid intensification of farming practices.

57%

decline in common farmland birds in Europe since 1980

Photo © Ivan Bandura

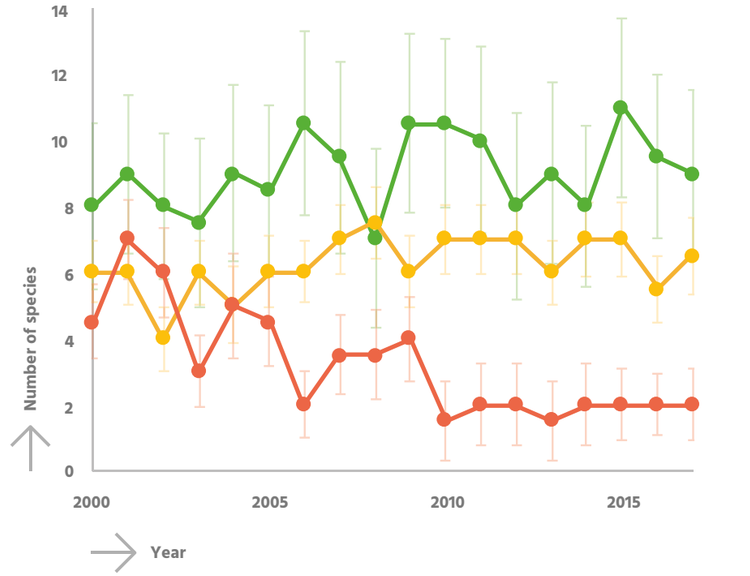
73%

of globally threatened birds are impacted by crop or livestock farming, wood and pulp plantations or aquaculture

In low- and middle-income countries, agricultural expansion drives habitat loss, while intensification is a growing threat

The majority of agricultural expansion today occurs in low- and middle-income countries in tropical regions. In Africa, expansion is driven primarily by subsistence farming for crops such as sorghum, maize and millet. For example, conversion of grassland to cropland and changes to grazing regimes at the Liben Plain, southern Ethiopia, have been the major drivers of declines in the endemic Liben Lark *Heteromirafra archeri* population of over 80% between 2007 and 2019. In South America, most expansion comes from cattle pastures, sugarcane and soybeans, often at the expense of tropical forest. Habitat loss due to agriculture was the main threat to all four recent suspected or confirmed bird extinctions in Brazil's Atlantic Forest, including Alagoas Curassow *Mitu mitu* and Glaucous Macaw *Anodorhynchus glaucus*. Agricultural intensification is also increasing in low- and middle-income countries, further threatening bird populations. During an 18-year study in Costa Rica, the number of endemic, range-restricted and globally threatened or Near Threatened bird species declined in intensively farmed areas, but did not significantly change in diversified-agriculture or natural forest.

Number of endemic, range-restricted and globally threatened or Near Threatened bird species observed in forest and farmland habitats in Costa Rica



Plot shows medians ± standard error from 44 transects. Data from Hendershot *et al.* 2020.

Sources: Develey & Phalan 2021, Hendershot *et al.* 2020, IPBES 2019, Mahamued *et al.* 2021, Stanton *et al.* 2018, Traba & Morales 2019.

Logging threatens forest specialists

7 million

hectares of forest are lost as a result of harvesting for forest products every year

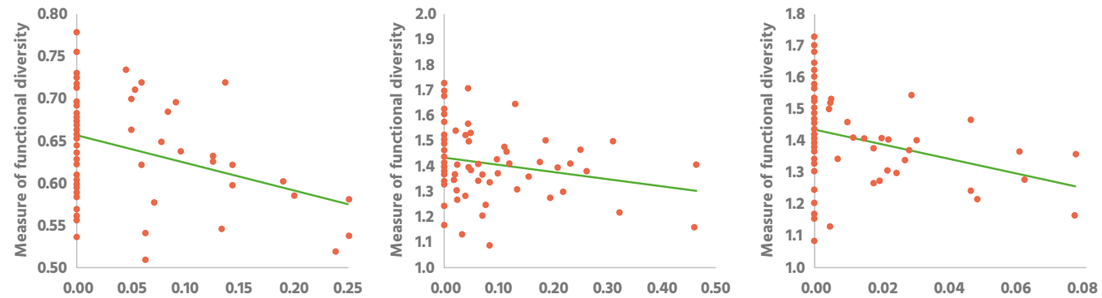
Nearly two-thirds of bird species are found in forests, and many of these are forest specialists that can be found in no other habitat. Yet every year, around 7 million hectares of forest are lost as a result of harvesting for forest products. Clear-felling of trees causes devastating habitat loss, while selective logging, although substantially less damaging, causes disturbance and habitat degradation which often alters the composition of bird communities. Logging may also exacerbate the risk of other threats such as hunting and forest fires.

Photo © Mika Korhonen

Harvesting of forest products negatively affects bird functional diversity in South Africa

Following logging activity, forest specialist bird species tend to be replaced by habitat generalists, resulting in little change in species richness but potentially significant changes in community structure. Functional diversity – a measure of the range, abundance and distribution of species' functions within a community or ecosystem – can be used as an indicator of these ecosystem-level effects of logging. In the Eastern Cape, South Africa, unregulated harvesting of timber, poles and bark had no effect on species richness, but negatively affected two measures of functional diversity – functional evenness and dispersion. Birds with different feeding ecologies were differentially affected by harvesting – for example frugivores and granivores were negatively affected by pole and bark harvesting, while omnivores were positively affected. This suggests that unregulated harvesting of forest products changes the composition of bird communities, with potential knock-on effects for forest productivity and ecosystem functioning.

Response of bird functional diversity to timber, pole and bark harvesting in the Eastern Cape, South Africa



Data from Leaver *et al.* 2019.

Selective logging reduces nest tree availability for Harpy Eagle

Selective logging is significantly less damaging to forest habitats than clear-felling, but it can still pose a significant threat to bird species dependent on old-growth trees. The world's largest eagle, the Harpy Eagle *Harpia harpyja*, is categorised by BirdLife International as Vulnerable on the IUCN Red List because of its rapid population declines caused by forest loss and degradation, combined with hunting. The species has been extirpated throughout much of its former range, with its last stronghold in the relatively intact forests of the lowland Amazon. Harpy Eagles typically nest in the main fork of one of 28 emergent tree species, over 90% of which are also targeted by the ever-growing selective logging industry. Assessing the scale of selective logging in the Amazon is challenging, as the removal of individual trees is almost invisible to satellites. However, advancements in remote sensing technology are making it easier to do so. Using an algorithm trained to detect logged pixels, a recent study found that selective logging affected over 11,500 km^2 (11%) of forest in the Brazilian state of Rondônia, in the south-west of the Amazon basin, during 2000-2019. If similar rates of logging are occurring elsewhere, large tracts of Amazonian forest may no longer provide suitable nesting habitat for this globally threatened species.

Photo © R. Winkelmann

Sources: Hethcoat *et al.* 2020, Leaver *et al.* 2019, Miranda *et al.* 2020.

Invasive alien species can cause catastrophic population declines

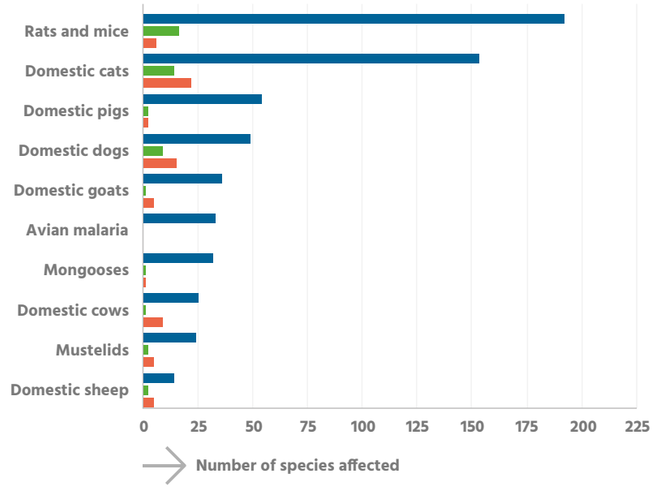
Photo © Ngā Manu Nature Images

Invasive alien species (IAS) are species that establish in an area outside of their natural geographic range and have negative impacts on native species. Humans have been transporting animals around the world for thousands of years, both intentionally for use as livestock or pets, and unintentionally, for example as stowaways on boats. Many of these introduced species have become invasive. Over the last 500 years, IAS have been partially or wholly responsible for at least 86 bird extinctions (46% of all known bird extinctions) – more than any other threat. Invasive and other problematic species remain a significant threat today, affecting 567 globally threatened bird species, including 131 Critically Endangered species.

46%

of all known bird extinctions were associated with invasive alien species

Number of globally threatened bird species affected by invasive alien species on oceanic islands, continental islands and continental areas



Oceanic islands are separated from other land masses by >200 m sea depth and are often volcanic. Continental islands include all other islands, which were generally once part of a continent and lie on the continental shelf. Categories are non-exclusive, as many bird species occur on both continents and islands.

Invasive alien species pose a major threat to birds on oceanic islands

Islands form less than 5% of the world's land area, but are home to 41% of all globally threatened bird species. Birds living on remote oceanic islands are particularly vulnerable to IAS as they have evolved in the absence of predators and competitors, meaning that they often lack the necessary adaptations to survive alongside introduced species. Over 69% of globally threatened bird species that occur on oceanic islands are threatened by invasive species, compared with just 18% of species that are entirely continental. Of the 1,551 islands worldwide that support globally threatened bird species, 69% also have at least one IAS present. Mammalian predators pose by far the greatest threat, with rats and domestic cats affecting 192 and 153 globally threatened oceanic island species respectively. Introduced diseases may also present a significant threat. For example, Avian Malaria *Plasmodium relictum* has already been implicated in the extinction of several Hawaiian bird species, and is predicted to threaten more species in the future as warming temperatures allow mosquitoes to spread to higher altitudes.

Sources: Blancher 2013, Butchart *et al.* 2018, Fortini *et al.* 2015, Krauze-Gryz *et al.* 2018, Li *et al.* 2021, Loss *et al.* 2013, Stobo-Wilson *et al.* 2022, Threatened Island Biodiversity Database Partners 2018, Woinarski *et al.* 2017.

Invasive species may also cause significant mortality to continental birds

While invasive alien species pose less of an extinction risk to continental bird species than island species, they may still have significant negative impacts. There have been relatively few large-scale studies to quantify the extent of this mortality, but initial estimates are alarming. For example, it has been estimated that every year, cats kill 2.69-5.52 billion individual birds in China, 1.3-4.0 billion birds in the United States, 100-350 million birds in Canada, 377 million birds in Australia, and 136 million birds in Polish farmsteads. In Australia, introduced Red Foxes *Vulpes vulpes* are estimated to kill a further 111 million individual birds annually, of which 93% are native.

2.7 -5.5 billion

individual birds are estimated to be killed by cats in China each year

Overexploitation is the most geographically widespread threat to birds

45%

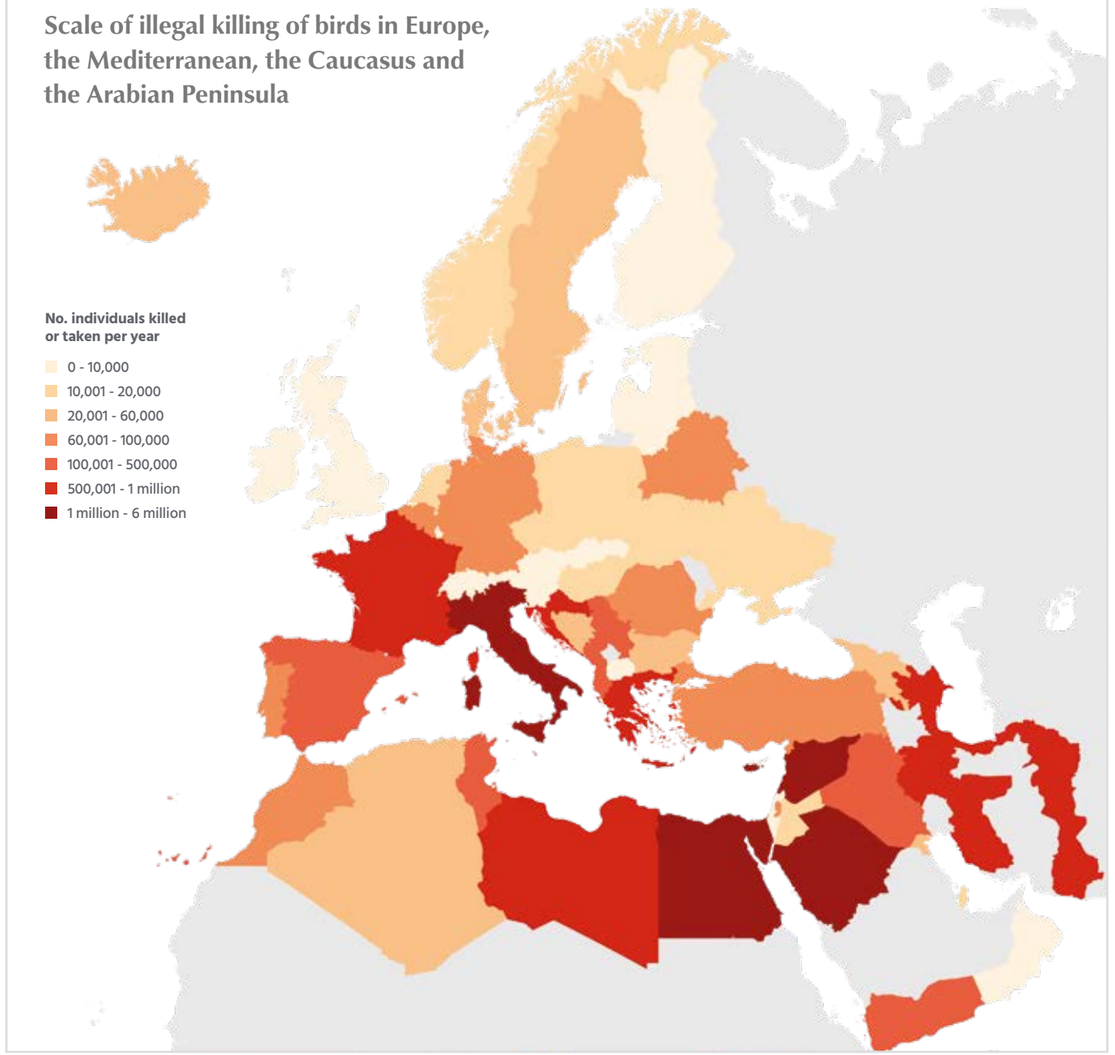
of extant bird species are exploited by humans

Mapping of threats using data from the IUCN Red List reveals that hunting and trapping constitute the most geographically widespread threat to the world's birds. At least 45% of extant bird species are exploited by humans, principally for pets (40%) and food (15%), but also for sport, ornamentation and traditional medicine. Around a third of these species are traded across international borders, but domestic trade is also significant for many species. Unfortunately, much of this use is unsustainable. Hunting has already been a factor in the extinction of at least 50 bird species in the last 500 years, and currently threatens at least 529 (37%) globally threatened species. Although many countries have legislation in place to prevent overexploitation of birds, illegal hunting and trapping often remain rife due to a lack of enforcement, culturally embedded practices, continuing demand and sometimes a lack of alternative livelihoods.

Millions of birds are killed or taken from the wild every year

Overexploitation of birds occurs worldwide, with significant differences between regions in scale, methods and motives. Recent studies in and around Europe have revealed that an estimated 11-36 million birds are illegally killed or taken every year in the Mediterranean region, while a further 0.4-2.1 million are killed in the rest of Europe and the Caucasus, and 1.7-4.6 million in the Arabian Peninsula, Iraq and Iran. Other parts of the world are lacking detailed survey information on the scope and scale of exploitation, but research is underway to fill these knowledge gaps. The scale of the wild bird trade in parts of insular South-East Asia, mainly for pets and singing competitions, is increasingly well documented. For example, recent estimates suggest there are more songbirds in captivity (66-84 million) on Java, Indonesia, than in the wild. Bird trade has been less well studied in mainland South-East Asia, but surveys of food markets in four countries during 2019-2020 revealed trade of at least 99 bird species, with some species being traded in high volumes, including over 1 million Barn Swallows *Hirundo rustica* a year. Preliminary results of a literature review in sub-Saharan Africa suggest that species from at least 43 bird families are regularly illegally killed, with incidents reported most frequently among raptors.

Scale of illegal killing of birds in Europe, the Mediterranean, the Caucasus and the Arabian Peninsula



Data from Brochet *et al.* 2016, 2017, 2019.

Belief-based use drives vulture declines in West Africa

In 2020, more than 2,000 Critically Endangered Hooded Vultures *Necrosyrtes monachus* were found dead across Guinea Bissau. Investigations revealed that the vultures had been poisoned to collect their heads for belief-based use. African vulture species have experienced catastrophic population declines of up to 97% over the last 50 years, resulting in seven of the continent's 11 species being listed as globally threatened on the IUCN Red List. Belief-based use is one of the leading causes of these declines, particularly in West Africa. Vulture body parts are traded for use in rituals, as good luck charms and for traditional medicine, purportedly (but without any known scientific basis) to treat physical or mental illnesses. Financial incentives are strong, with vulture parts selling for up to $127 in Ghana, while a live vulture sells for as much as $210 in Nigeria. There are currently few disincentives to trade – some countries lack specific laws to protect vultures, alternatives to vulture body parts (such as plant-based traditional medicines) are often not available or suggested, and perpetrators are rarely penalised.

Sources: Brochet *et al.* 2016, 2017, 2019, Deikumah 2020, Harfoot *et al.* 2021, Henriques *et al.* 2020, Marshall *et al.* 2020, Ogada *et al.* 2016, UNEP-WCMC 2021, Yong *et al.* 2022.

Bycatch from fisheries threatens seabirds

Seabirds are one of the world's most threatened groups of birds, with 30% of species considered globally threatened (19 Critically Endangered, 34 Endangered and 58 Vulnerable), a further 11% listed as Near Threatened, and 57% of species known to be in decline. Bycatch from fisheries is one of the greatest threats to seabirds, affecting 100 species and having the greatest impact of all threats. Bycatch occurs when seabirds scavenge fishing bait or discarded fish and become hooked or entangled in fishing gear or collide with trawler cables, often resulting in drowning. Hundreds of thousands of seabirds are killed in this way every year. While mitigation measures can be effective, lack of compliance with regulations requiring their application, particularly in the High Seas, means that many birds are still under threat.

Fishing vessels pose a high risk to South Georgia's Wandering Albatrosses

Albatross populations at South Georgia in the southern Atlantic Ocean have been in decline since the 1970s, with an estimated 40-60% decrease across three species in the last 35 years. Bycatch has been identified as the primary threat, with Wandering Albatrosses *Diomedea exulans* particularly at risk because their large foraging ranges expose them to multiple fisheries across national and international waters. In a project funded by the Darwin Plus scheme, data from loggers that record GPS positions of birds and detect radar transmissions from nearby fishing vessels were integrated with the locations of individual vessels derived from their Automatic Identification System to identify areas, gear types and flag states (fishing nations) representing the greatest bycatch risk. For Wandering Albatrosses, this shows that they are at the highest risk of interacting with fishing vessels during their incubation and chick-rearing periods when birds travel to the Patagonian Shelf Break. Out of 251 birds, 43% showed close attendance at fishing vessels. The greatest overlap was with demersal longline vessels, particularly from South Korea but also from the United Kingdom and Chile, and to a lesser extent, trawlers flagged to Argentina and Uruguay, and pelagic longline vessels flagged to Brazil, Portugal and Taiwan (Province of China).

Photo © Nahuel Chavez

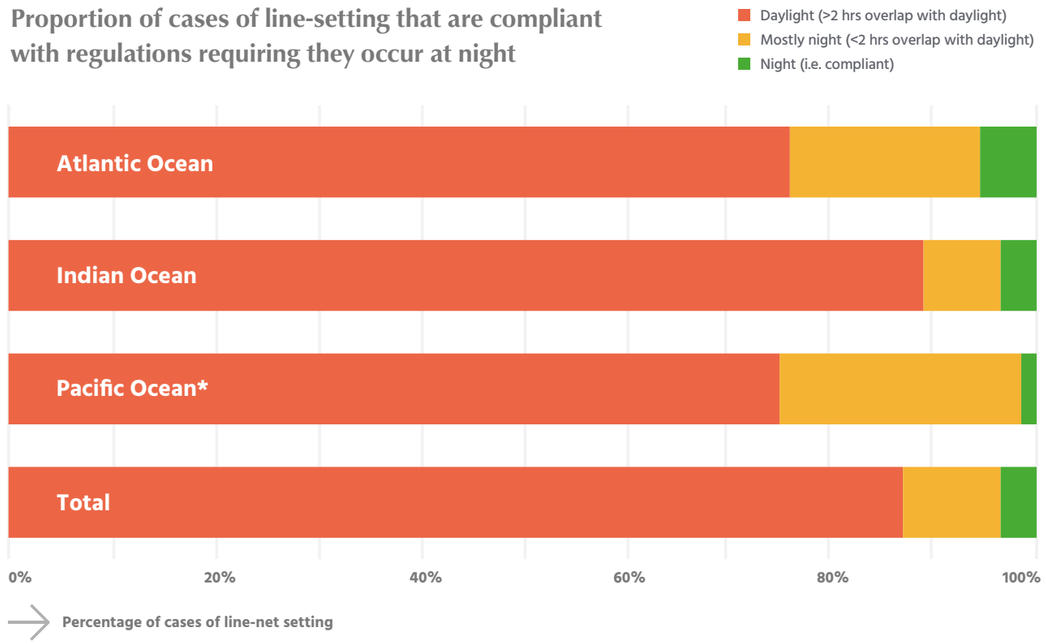
A lack of compliance with mitigation measures increases the risk of bycatch

Longline fishing vessels operating in High Seas areas overlapping with areas of high seabird abundance must use at least two of three specified mitigation measures against seabird bycatch when setting their lines. One of these three options is night setting. As most seabirds tend to only feed during the day, setting the lines at night is a highly effective method of preventing bycatch. However, monitoring compliance with these mitigation measures is challenging owing to low coverage of vessels by official observers (typically 5% or less). To address this, a novel approach is to analyse vessel positioning data (from their Automatic Identification System) using machine learning to determine the time at which lines were set and hauled. Worryingly, the results show that correct use of night setting is very low – 85% of cases overlapped more than two hours with daylight, while only 15% of vessels set their lines mostly or completely at night. Furthermore, most line-setting that overlapped with daylight hours occurred at dawn rather than dusk, when seabird feeding activity is particularly high. This level of compliance is very low compared with that which is self-reported by the countries whose fleets are required to use these measures, which ranges from 29-85%, indicating that the problem is worse than official data previously suggested.

30%

of seabird species are considered globally threatened

Proportion of cases of line-setting that are compliant with regulations requiring they occur at night



*Pacific Ocean refers to the Western & Central Pacific Fisheries Commission (WCPFC) only. Data from Winnard *et al.* 2018.

Sources: Carneiro *et al.* in prep., Clay *et al.* 2019, Dias *et al.* 2019, Pardo *et al.* 2017, Winnard *et al.* 2018.

Climate change is already an important threat and poses even greater future challenges

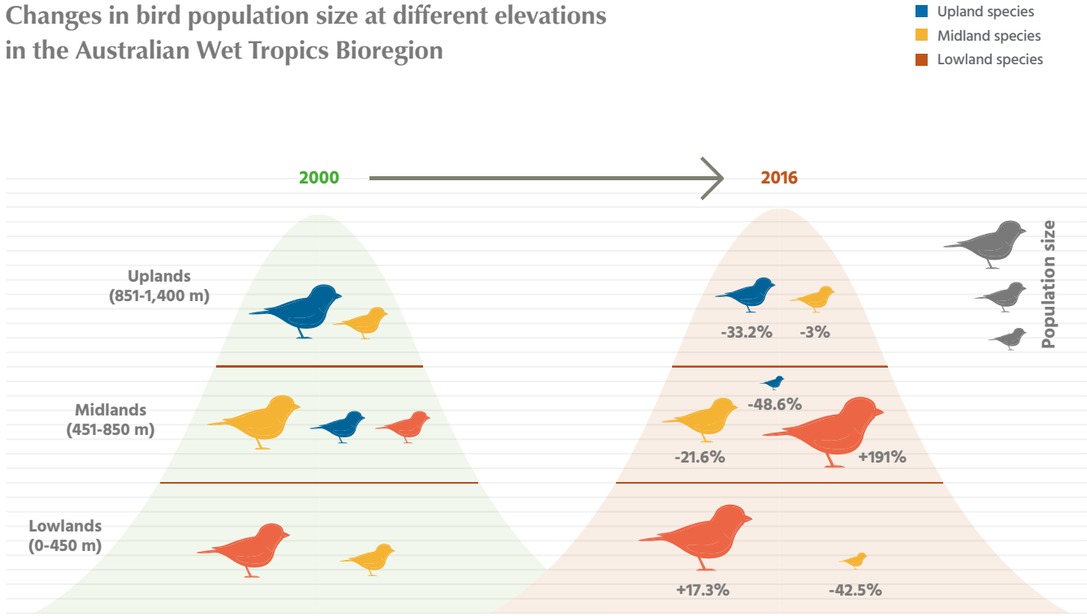
Climate change is rapidly becoming one of the most significant threats to global biodiversity. Human activities are estimated to have caused global warming of 1.1°C above pre-industrial levels, and this is predicted to rise to 1.5°C between 2030 and 2052, and to 3°C by 2100. Faced with such rapid warming, birds have few options for survival. They can seek cooler climates at higher latitudes or altitudes if suitable habitat is available, or they can change the timing of events such as migration or breeding to coincide with more favourable climatic conditions. However, there is a limit to how far distributions can shift, and changes in migratory and breeding cycles lead to disrupted relationships between predators, prey and competitors, often resulting in reduced survival. Analysis of terrestrial bird population trends from the Living Planet database shows that declines are greatest in areas that have experienced rapid warming, while one recent study estimated that almost one in four threatened bird species may have already been negatively impacted by climate change in at least part of their range.

Some impacts of climate change are already evident

Many bird populations are already responding to climate change. Recent studies highlight shifts in distribution and timing of key events, as well as significant population declines. For example, mountain species in the Peruvian Andes and Australia's Wet Tropics have shifted to higher elevations to track their optimal climate, resulting in significant declines (and in some cases extirpation) of mountain-top species. Analysis of the breeding ranges of 32 bird species native to eastern North America revealed an overall northward shift in mean breeding latitude since the 1970s. Some colonise higher latitudes while persisting at the southern edge of their range. In contrast, Neotropical migrants have shown a contraction in the southern margin of their range but no measurable shift in the northern margin, resulting in a reduction in latitudinal distribution. Earlier springs in the Arctic are causing migratory geese to advance their arrival date, but a mismatch between gosling hatching and peak food availability is resulting in reduced survival. Finally, in the Mojave Desert, south-western USA, surveyed sites have lost on average 43% of their bird species since the early 1900s, with a decline in precipitation being the most important driver.

Photo © Marek Piwnicki

Changes in bird population size at different elevations in the Australian Wet Tropics Bioregion



Data from Williams & de la Fuente 2021.

Climate change is likely to pose even greater challenges in the future

As global warming continues, negative impacts will multiply and intensify. In the USA, 97% of bird species could be affected by two or more climate-related threats by 2100 if global temperatures rise by 3°C. Based on species distribution models predicting the future impacts of climate change for 197 African-Eurasian migratory waterbirds, a recent study found that dispersive species in the Afrotropical realm are predicted to suffer the greatest net losses in range extent by 2050. Of the 60 dispersive species modelled, 14 (18%) are predicted to experience a net range loss of over 30%, including Slender-billed Gull *Larus genei* and White-winged Flufftail *Sarothrura ayresi*. Even for those species not predicted to suffer net losses in distribution, range shifts will pose a challenge for conservation as species composition at key sites changes.

97%

of bird species in the USA could be affected by two or more climate-related threats by 2100 if global temperatures rise by 3°C

Sources: Bateman *et al.* 2020, Freeman *et al.* 2018, Iknayan & Beissinger 2018, IPCC 2018, Lameris *et al.* 2018, Nagy *et al.* 2021, Pacifici *et al.* 2017, Rushing *et al.* 2020, Spooner *et al.* 2018, Williams & de la Fuente 2021.

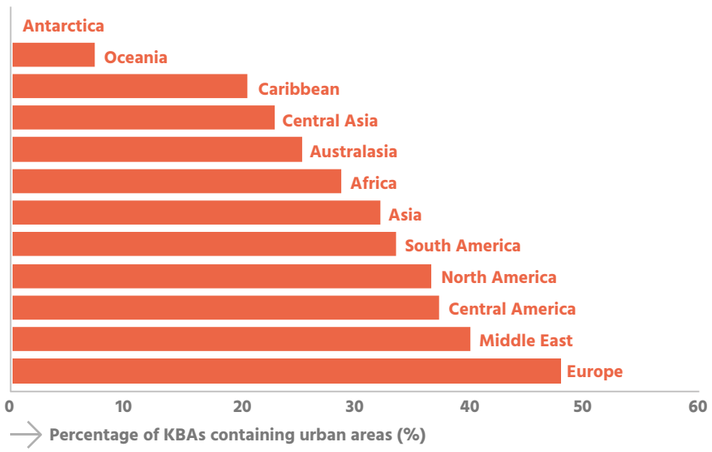
Residential and commercial development threatens species and sites

The development of residential and commercial areas is a major threat to global biodiversity, affecting 374 (27%) globally threatened bird species. Impacts to birds occur mainly through habitat loss and fragmentation, but also through pollution, disturbance and collisions with structures. Expansion of residential and commercial areas is almost always associated with development of related infrastructure, such as roads, railways and energy infrastructure, including powerlines, compounding the threats to nature. Urban areas are expanding rapidly. One recent study estimated that the total global urban extent will increase up to five-fold during 2000-2100, with the fastest rates of expansion in Africa and Asia. If poorly planned, this development could have extensive negative impacts on biodiversity.

Infrastructure development is a threat to the most important areas for biodiversity

The majority of Key Biodiversity Areas (KBAs) contain infrastructure. Currently, at least 36.9% of KBAs identified for birds contain urban areas, including almost half of those in Europe, 40% in the Middle East and 38% in Central America. Most KBAs identified for birds (at least 75.7%) also contain roads, resulting in increased accessibility which facilitates further urban development, illegal hunting, logging, and spread of invasive species. Urban areas are also associated with high levels of light pollution, which can negatively impact migratory species in particular. More than four-fifths of all KBAs are at least partly covered by light-polluted night skies, while more than two-thirds lie entirely under artificially bright skies. Mirroring the pattern of urban areas, the regions with the greatest proportion of KBAs lying completely under polluted skies are Europe (94%) and the Middle East (88%).

Percentage of Key Biodiversity Areas identified for birds that overlap with urban areas in each region



Data from Simkins *et al.* in review.

76%

of KBAs identified for birds contain roads, increasing accessibility and facilitating a range of threats

Collisions with buildings cause substantial direct mortality of birds

Collisions with buildings, particularly windows, are a significant cause of avian mortality. Birds are disorientated by reflections of open sky or vegetation during the day, and by artificial lighting at night. In the USA, 365-988 million individual birds are estimated to be killed by colliding with buildings every year, while estimates in Canada range from 16 to 42 million. A wide range of species are susceptible to collisions, but research suggests that some are more at risk than others. According to one recent study on avian collisions with buildings in the USA, Canada and Mexico, collision risk is greatest for migratory, insectivorous and woodland species, while another study in Minnesota found collision risk to be greater for species that migrate during the night compared with those that migrate during the day. Species in this region identified as being disproportionately vulnerable to collisions include Black-throated Blue Warbler *Setophaga caerulescens*, Ruby-throated Hummingbird *Archilochus colubris* and Yellow-bellied Sapsucker *Sphyrapicus varius.*

Sources: Elmore *et al.* 2020, Gao & O'Neill 2020, Garrett *et al.* 2019, Loss *et al.* 2014, Machtans *et al.* 2013, Nichols *et al.* 2018, Simkins *et al.* in review.

Photo © Adam Hiles

Wildfires are increasing in intensity and frequency

Landscape-scale fires are a natural seasonal phenomenon in many parts of the world, and an integral feature of some ecosystems. However, when these fires burn out of control they may become wildfires, which can have significant negative effects on wildlife. The frequency of wildfires is predicted to rise by 50% by 2100 due to a combination of climate change and changes in land use and management. Increasing wildfire frequency is already evident across the globe, with record-breaking fires in 2020 in the Arctic, western North America and the Brazilian Pantanal. A total of 191 globally threatened bird species are currently under threat from an increase in fire frequency and/or intensity.

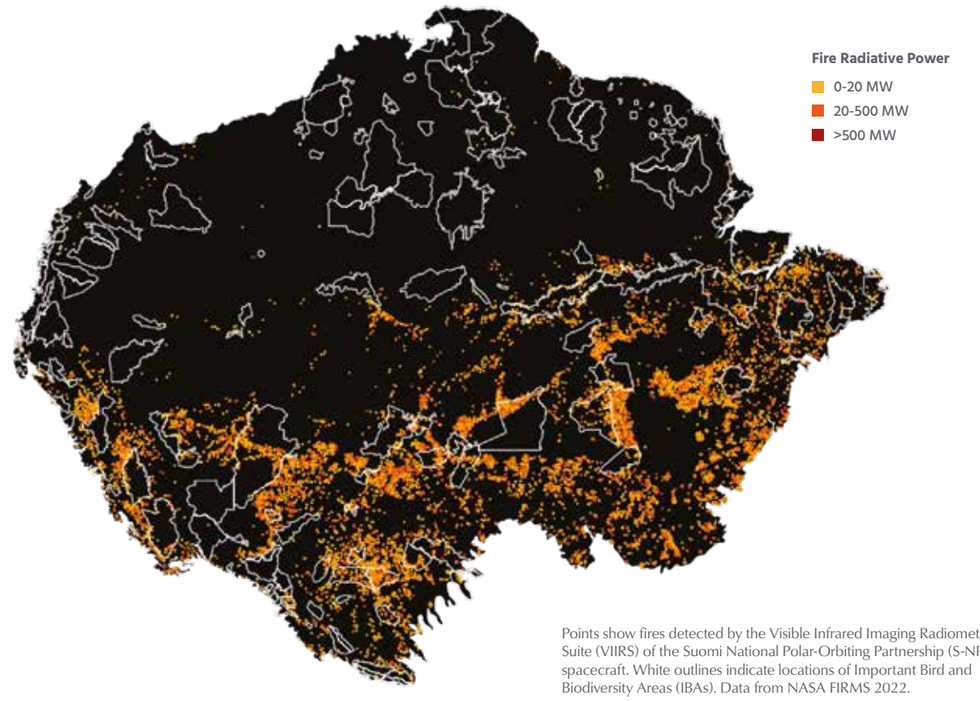
Australia's birds suffered from intense bushfires during 2019-2020

Following record-breaking heat and intense drought, unprecedented bushfires swept across southern Australia during the summer of 2019–2020. Up to 19 million hectares were burnt, often with exceptional intensity, including 20% of the forests in south-eastern Australia. It has been estimated that up to 180 million individual birds may have been impacted by the fires. Many threatened species were brought closer to extinction, while other species not previously considered at risk may now be threatened. For example, on Kangaroo Island, off South Australia, 15 endemic subspecies, including Kangaroo Island Superb Fairy-wren *Malurus cyaneus ashbyi* and Kangaroo Island Western Whipbird *Psophodes nigrogularis lashmari*, are thought to have lost more than 30% of their populations, causing them to meet thresholds for listing as threatened. In 2022, BirdLife raised the global extinction risk of 10 Australian bird species on the IUCN Red List owing to the impacts of these fires.

191 **globally threatened bird species are currently under threat from an increase in fire frequency and/or intensity**

Photo © Cristofer Maximilian

Active fires in the Amazon Biome during July–September 2020



Points show fires detected by the Visible Infrared Imaging Radiometer Suite (VIIRS) of the Suomi National Polar-Orbiting Partnership (S-NPP) spacecraft. White outlines indicate locations of Important Bird and Biodiversity Areas (IBAs). Data from NASA FIRMS 2022.

Fires have affected large areas of the Amazon rainforest

Fires tend to be fairly rare in tropical rainforests because of their high humidity. However, hotter, drier weather caused by climate change and deforestation is creating conditions more conducive to wildfires. Since 2001, it is estimated that 103,000-190,000 km^2 (2.2-4.1%) of Amazon rainforest has been affected by fire. In 2020 alone, over 2,500 major fires were documented across the Amazon, the vast majority (88%) of which were in Brazil, where they burnt c.5.4 million hectares of forest. Since 2001, at least 83 globally threatened Amazonian bird species such as Golden Parakeet *Guaruba guarouba* have experienced the impacts of fire within their ranges. As rainforest species have largely evolved in the absence of wildfire, they lack adaptations to cope and are therefore likely to struggle to recover their populations if fire frequency continues to grow.

Over

2,500

major fires were documented across the Amazon in 2020 alone

Sources: Boer *et al.* 2020, van Eeden *et al.* 2020, Feng *et al.* 2021, Filkov *et al.* 2020, Finer *et al.* 2020, Garcia *et al.* 2021, Garnett & Baker 2021, Higuera *et al.* 2020, McCarty *et al.* 2020, UNEP 2022.

Energy production poses a significant risk to some species

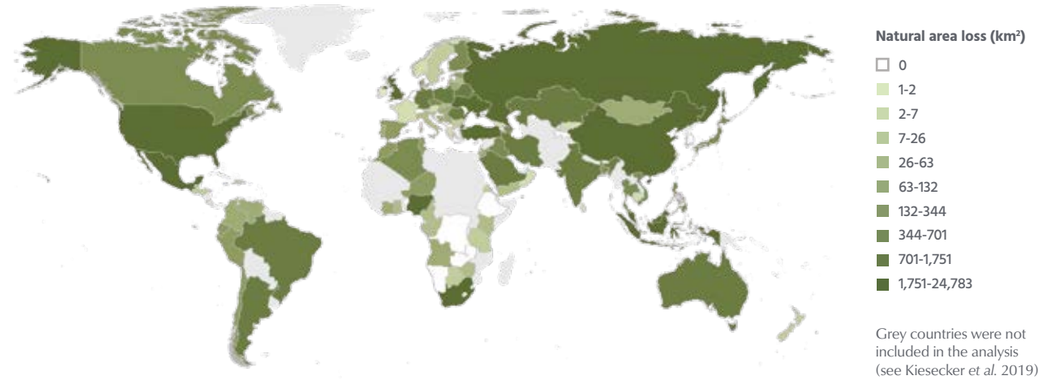
The Industrial Revolution precipitated a rapid growth in fossil fuel consumption. Today, fossil fuels account for 80% of all energy production and impact biodiversity in numerous ways, including via climate change. In addition, mining activities destroy and degrade habitats, while access roads expose landscapes to further encroachment and disturbance. Bird collision is a significant issue at offshore oil and gas platforms, while oil spills from tankers and pipelines cause periodic mass mortality events. In response to the climate emergency, an essential transition to renewable sources of energy is now in progress. However, renewable technologies can also have harmful consequences for nature if poorly planned and designed. Hydropower can destroy riverine ecosystems. Biofuels can replace wildlife-rich habitats with monocultures of grass, eucalyptus and palm oil. Even wind and solar facilities can have major impacts on nature if poorly sited. The transition to renewable energy will also require a significant growth in the powerline network, increasing the risk of bird collision and electrocution.

Poorly sited wind and solar energy developments can cause significant bird mortality

Wind and solar power requires significantly more land for producing energy compared with fossil fuels and nuclear. The coming decades will see millions of square kilometres across the globe set aside for windfarms and solar facilities. If poorly sited, this infrastructure could have a considerable impact on wildlife. It is calculated that if renewable energy developments were sited solely to maximise energy production, 11 million hectares of natural habitat could be lost globally, including over 3 million hectares in Key Biodiversity Areas (KBAs). Perversely, this loss of natural habitat would result in the release of almost 415 million tonnes of stored carbon, undermining the climate change benefits associated with a transition to renewable energy. Birds are one of the wildlife groups likely to be most impacted by this expansion, being susceptible not only to habitat destruction but also to collision with energy infrastructure and to displacement from favoured habitats, flight paths and migration routes. It has been estimated that in California, USA, utility-scale solar developments are responsible for the loss of over 500,000 birds per year through a combination of collision mortality and habitat destruction. Renewable energy facilities can even alter the composition of ecosystems by changing predator-prey interactions. In India's Western Ghats, windfarms have been shown to cause an increase in the density of lizards by suppressing the abundance and activity of predatory raptors.

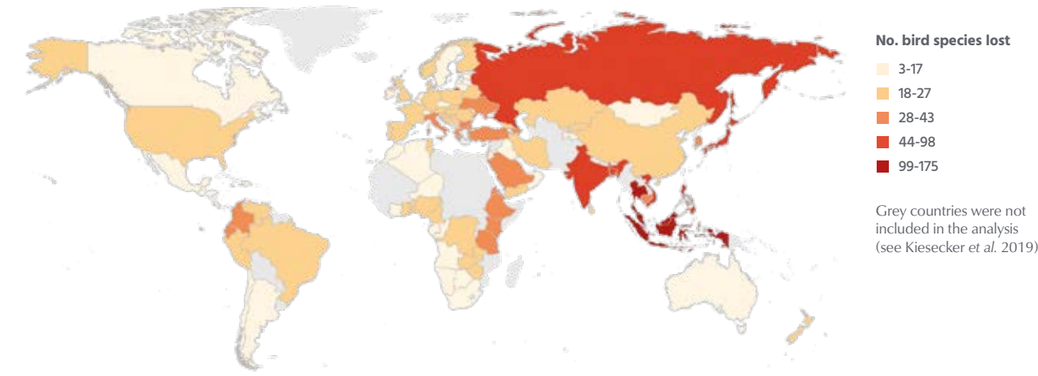
Photo © Vista Wei

Predicted natural area loss per country if wind and solar energy were sited solely to maximise production



Grey countries were not included in the analysis (see Kiesecker *et al.* 2019)

Potential losses of globally threatened bird species per country if wind and solar energy were sited solely to maximise production



Grey countries were not included in the analysis (see Kiesecker *et al.* 2019)

Powerlines are a significant threat to some bird species

It is estimated that there are over 65 million kilometres of high and medium voltage powerlines in the world – enough to stretch to the moon and back 169 times. To accommodate the ongoing transition to renewables, it has been suggested that this network will need to more than double globally. Overhead powerlines pose two main threats to birds – electrocution and collision. Electrocution is primarily associated with poorly designed distribution lines where there is insufficient distance between energised components to prevent a bird from touching them simultaneously. One recent study suggests that the 22,000 km of distribution lines planned across Ethiopia by 2030 could result in more than 3,000 vulture fatalities a year if constructed to the current, inadequate designs. Powerlines may appear almost invisible to birds in certain conditions, posing a significant collision risk, particularly for some species. For example, bustards are heavy, fast-flying birds with low manoeuvrability and limited frontal vision, making them ill-equipped to negotiate landscapes containing powerlines. Even the installation of bird flight diverters, which can be effective at minimising collision in other bird groups, show limited efficacy for bustards. The Critically Endangered Great Indian Bustard *Ardeotis nigriceps* has declined across India for many reasons; however, today, the single greatest cause of mortality is collision with powerlines. A recent study estimates the annual mortality rate from powerline collision is 16%. At such a rate, the extinction of this species is projected within 20 years.

Sources: Kiesecker *et al.* 2019, Oppel *et al.* 2021, Shaw *et al.* 2021, Smallwood 2022, Thaxter *et al.* 2018, Uddin *et al.* 2021.

Section 4

Response

4

Griffon Vulture *Gyps fulvus*.
Photo © Jevgeni Fil

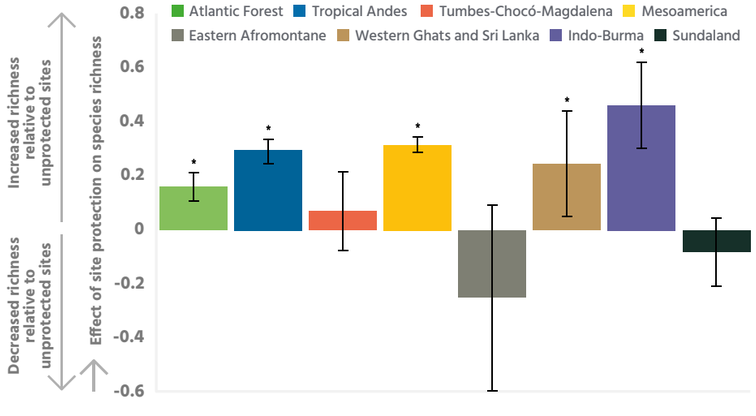
Protecting and effectively managing important sites for birds and other biodiversity

Protected areas are a mainstay of nature conservation. Protecting and effectively managing the most important sites for biodiversity not only conserves species, but also the ecosystems they are part of and the services these provide. There are many different types of protected area – while some have strict rules regarding human access, others permit sustainable use of natural resources. The world's governments have pledged to conserve at least 30% of the planet's land and sea by 2030 through protected and conserved areas. To be effective, protected area expansion must be targeted at sites of global biodiversity importance – Key Biodiversity Areas (KBAs) – and be effectively managed to minimise negative human impacts on the species and ecosystems within their boundaries.

The coverage of KBAs by protected areas has increased, and this is benefiting the species they support

The average coverage by protected areas of each KBA identified for birds steadily increased from 12% in 1980 to 47% in 2021, while the percentage of these KBAs completely covered by protected areas increased from 4% to 21% over the same period. Evidence suggests that these protected areas are successfully conserving the bird species within them. In one recent study, analysis of citizen science data on bird species presence in eight tropical forest biodiversity hotspots showed a positive effect of protection on species richness of globally threatened or Near Threatened, forest-dependent and endemic birds. In another, modelling of trends in abundance of 1,902 populations of birds and mammals from 447 protected areas globally showed that, on average, protected areas are successfully maintaining populations of monitored species, with more positive trends for larger-bodied species and in countries with higher development scores.

Effect of protected areas on species richness of globally threatened or Near Threatened birds in eight tropical forest biodiversity hotspots



Graph shows estimates from a GAM model, with 95% confidence intervals. Asterisks highlight statistically significant results (*P* value < 0.05). Data from Cazalis *et al.* 2020.

"The NACES Marine Protected Area (MPA) is the first MPA on the High Seas to be identified from tracking data."

The first marine protected area on the High Seas identified using seabird tracking data has been designated in the North Atlantic

While breeding colonies of seabirds are often protected, the at-sea foraging areas for these species are often poorly known and unprotected. Tracking data (from satellite-linked devices fitted to individual birds) provide a considerable opportunity for identifying important marine areas that can inform area-based management. In 2016, BirdLife International led an international collaboration to analyse over 2,000 seabird tracks which revealed a major foraging hotspot in the North Atlantic, estimated to be used by up to 5 million birds of 21 species throughout the year. BirdLife presented information on the importance of the site and a proposal to designate it as a marine protected area (MPA) to the commission of the OSPAR Convention – a regional mechanism to protect the marine environment of the North-East Atlantic. Following extensive advocacy efforts, on 1 October 2021, the North Atlantic Current and Evlanov Sea-basin (NACES) MPA was officially designated by the OSPAR Commission, making it the first MPA on the High Seas to be identified from tracking data.

Location of the NACES MPA (turquoise), with lines indicating the Large Marine Ecosystems (LMEs) the birds are travelling from. The thickness of the lines indicates the number of seabird species travelling from each LME. Colonies are shown as circles.

Data from Davies *et al.* 2021.

Sources: Barnes *et al.* 2016, Cazalis *et al.* 2020, Davies *et al.* 2021.

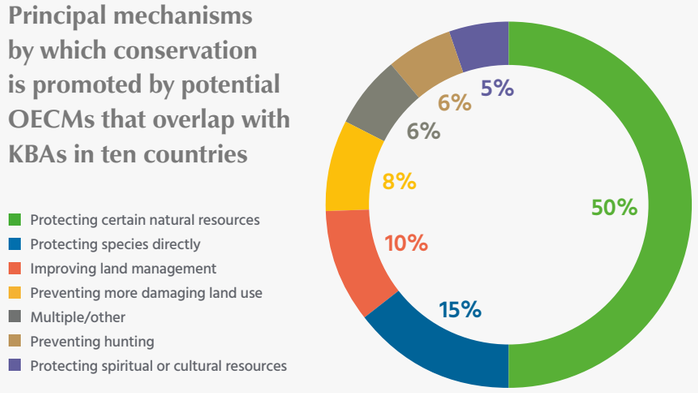
Conserving important sites through community management

Protected areas play a critical role in site-based conservation. However, designation of formal state-governed protected areas is not always appropriate or feasible. In some cases, biodiversity may be better conserved through long-established sustainable management practices by Indigenous Peoples or local communities. Consequently, there has been increasing recognition of the importance of engaging Indigenous Peoples and local communities to ensure equitable and effective management of important sites for biodiversity, both inside and outside protected areas. There is also growing evidence that community reserves and other locally governed areas may contribute significantly to the conservation of sites falling outside the formalised protected area network. Formal recognition of these sites may therefore benefit both people and biodiversity.

OECMs are likely to be important for KBA conservation

In 2010, the world's governments agreed targets for conserving areas of particular importance for biodiversity through a network of protected areas and 'other effective area-based conservation measures' (OECMs). These OECMs were defined in 2018 as 'geographically defined areas other than protected areas which are governed and managed in ways that achieve positive and sustained long-term outcomes for the in situ conservation of biodiversity'. Unlike protected areas, OECMs are not required to have conservation as a core management goal – they just need to deliver sustained conservation benefits. Examples include community-managed areas, sacred sites, and some military areas that are not designated as protected areas but provide long-term biodiversity benefits. Research in ten countries suggests that the majority (76.5%) of Key Biodiversity Areas (KBAs, most of which have been identified for birds) that fall outside the protected area network are at least partly covered by lands that would likely be classed as OECMs, suggesting that OECMS have the potential to contribute significantly to conservation of unprotected KBAs. The conservation of ecosystem services or biodiversity was a stated management aim in 73% of these potential OECMs. Local or central government bodies managed 46% of potential OECMs, while local and indigenous communities and private landowners managed 24% and 14% respectively. This study found no difference in state, conservation response or tree cover loss for KBAs within and outside the potential OECM sites. However, respondents to the study survey suggested that conservation of KBAs currently lacking protected area and OECM status would usually be better achieved through an OECM than a protected area. Further research is needed to determine how many are identified as OECMs or designated as protected areas in due course, and their respective effectiveness.

Principal mechanisms by which conservation is promoted by potential OECMs that overlap with KBAs in ten countries



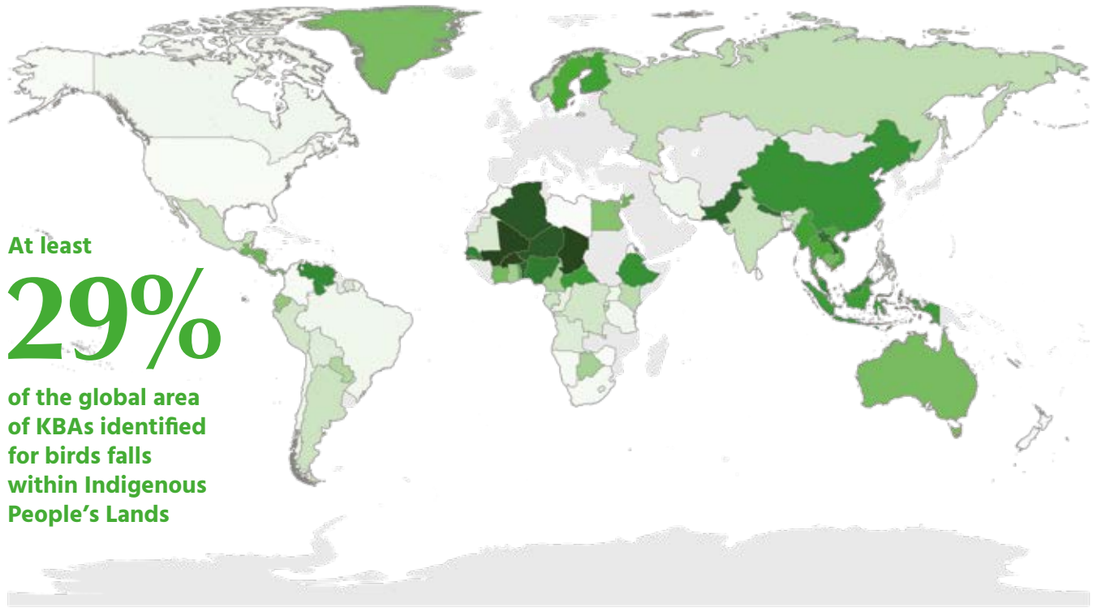
Data from Donald *et al.* 2019.

Many KBAs identified for birds are within Indigenous People's Lands

Indigenous People's Lands (IPL) are terrestrial lands that are managed and/or owned by Indigenous People. Many of these lands may qualify as OECMs if they deliver long-term biodiversity benefits. IPL cover at least 28.5% (3.44 million km²) of the total global area of KBAs identified for birds, of which half falls outside protected areas, so such lands may be significant for conserving many of the most important areas for biodiversity. Analysis of tree cover loss in KBAs identified for forest species reveals that globally, the lowest rates of tree cover loss are found in KBAs in protected areas, regardless of whether they are in IPL or other lands. However, outside protected areas, KBAs in IPL have, on average, lower rates of tree cover loss than those in other areas. This result varies significantly between countries, with half of the countries included in the analysis showing no significant difference. This variation may be explained by differences in how Indigenous People's rights, particularly their land ownership and management rights, are recognised and respected in different countries.

Photo © Dwayne Reilander

Proportion of the Key Biodiversity Area network identified for birds that occurs within Indigenous People's Lands (IPL) in each country



At least

29%

of the global area of KBAs identified for birds falls within Indigenous People's Lands

Grey indicates countries where IPL data were not available (Garnett *et al.* 2018). Data from Simkins *et al.* in prep.

Sources: Donald *et al.* 2019, Garnett *et al.* 2018, Simkins *et al.* in prep.

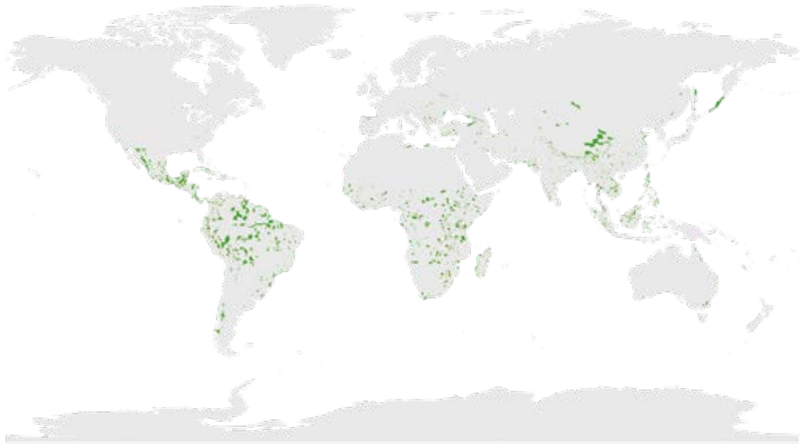
Retaining and restoring habitats

In order to conserve biodiversity, we must conserve and retain remaining habitats, and restore and reconnect those that have been lost or degraded. Ecosystem restoration is also crucial for mitigating climate change, as many natural habitats contain significant amounts of carbon. For example, Important Bird and Biodiversity Areas (IBAs) contain almost 9% of the world's terrestrial carbon stocks. BirdLife Partners around the world are leading projects on the ground to restore the most important habitats for biodiversity within and beyond IBAs, while governments are set to commit to ambitious restoration targets under the Post-2020 Global Biodiversity Framework. The United Nations has declared 2021-2030 the 'UN Decade on Ecosystem Restoration', while the European Commission has recently proposed a pioneering new Nature Restoration Law, with the overarching target of restoring 20% of the EU's land and sea area by 2030.

Important Bird and Biodiversity Areas (IBAs) are disproportionately important for habitat restoration

The benefits and costs of ecosystem restoration vary significantly between sites. Priority areas for restoration across all terrestrial biomes have recently been identified based on a 'multicriteria optimisation approach' accounting for benefits to biodiversity, carbon sequestration and costs. It is estimated that restoring just 15% of croplands or pasturelands back to natural ecosystems in these priority areas could avoid 60% of expected bird, mammal and amphibian extinctions, and result in the storage of 299 gigatonnes of CO_2: around a third of the total increase in CO_2 in the atmosphere since the Industrial Revolution. Despite only covering 9% of the terrestrial area of the planet, IBAs contain almost 12% of identified priority areas for restoration, indicating that they could provide disproportionate opportunities for habitat restoration.

Location of Important Bird and Biodiversity Areas overlapping with priority locations for habitat restoration



Analysis of data from Strassburg *et al.* 2020. Priority locations represent the top 15% of cells identified from a multi-criteria optimisation approach.

60% **of expected bird, mammal and amphibian extinctions could be avoided by restoring 15% of converted lands in priority areas**

BirdLife Partners are leading habitat restoration projects around the world

1 BirdLife Partners in Argentina (Aves Argentinas), Brazil (SAVE Brasil) and Paraguay (Guyra Paraguay) are working to reconnect IBAs in the Atlantic Forest. Historically one of the world's largest forests and home to over 200 endemic bird species, around 85% of the forest has now been lost, with remaining patches heavily fragmented. Under the Trillion Trees initiative, more than 51,000 hectares of remaining forest have been protected, while 60 hectares have been regrown so far.

Photo © SAVE Brasil

Photo © GEPOMAY

2 On the small island of Mayotte off the east coast of Africa, work is underway to restore heavily degraded wet meadows that provide vital feeding and nesting sites for the Endangered Madagascar Pond-heron *Ardeola idae*. Restoration efforts are being carried out under the European LIFE BIODIV'OM project, coordinated by Ligue pour la Protection des Oiseaux (LPO, BirdLife Partner in France) and implemented by The Association for the Study and Protection of Birds in Mayotte (GEPOMAY) with support from Asity Madagascar (BirdLife Partner in Madagascar). Actions include removing invasive plant species, developing partnerships with local farmers to regulate grazing levels, and stepping up enforcement against the illegal creation of embankments.

Photo © SABUKO

3 In Europe, the Endangered Landscapes Programme recently announced a $31 million investment in eight landscape restoration projects, many of which are being led by BirdLife Partners. These include restoration of water sources, grasslands and native forests along the Turkey-Bulgaria border led by the Bulgarian Society for the Protection of Birds; grassland restoration in the Kakheti steppes led by Georgian BirdLife Partner SABUKO; and reconnecting upland habitats in north-west England led by UK Partner RSPB.

Source: Strassburg *et al.* 2020.

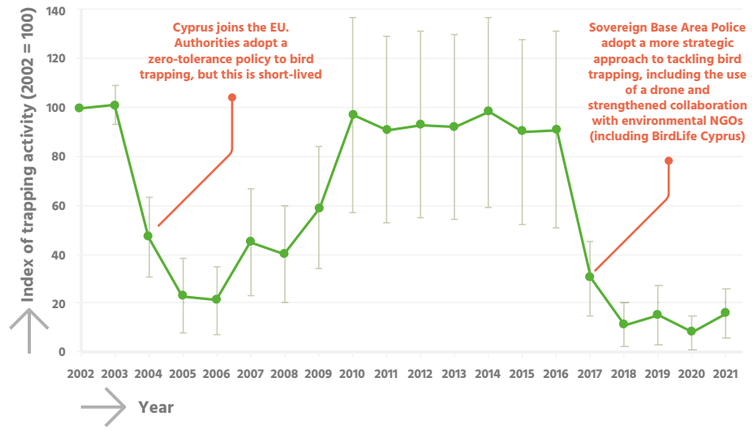
Preventing overexploitation and illegal killing of birds

Strong national and international legislation is key to preventing the overexploitation of birds, backed up by effective enforcement, monitoring and engagement with a wide range of stakeholders. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is the main legal framework for regulating international trade. There are currently 155 bird species listed in CITES Appendix I, prohibiting any commercial trade, and a further 1,279 species in Appendix II which can only be traded internationally under certain circumstances. The Convention on Migratory Species (CMS) also tackles overexploitation through its Intergovernmental Task Force on Illegal Killing, Taking and Trade of Migratory Birds in the Mediterranean (MIKT). CMS recently launched the 'Rome Strategic Plan 2020-2030', with the aim of halving the scale and scope of illegal killing of birds in Europe, North Africa and the Middle East by 2030. The BirdLife Partnership is tackling this threat at all levels, from carrying out active surveillance and supporting enforcement actions to building the capacity of authorities, facilitating the development of National Action Plans and working with communities to develop alternative livelihoods.

Photo © Tim Plowden / www.timplowden.co.uk

84% decline in illegal mist-netting in Cyprus since 2002

Illegal bird trapping activity in Cyprus during 2002-2021



Bars represented standard errors. Data from BirdLife Cyprus 2021.

Increased surveillance and enforcement measures in Cyprus have significantly reduced illegal bird killing

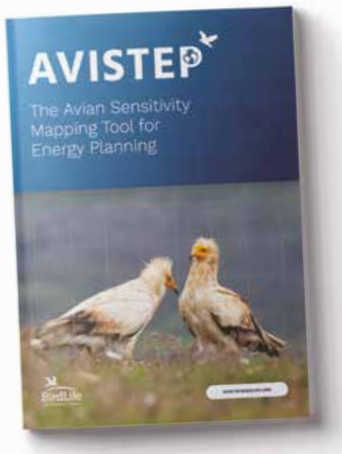
Every year, hundreds of thousands of songbirds are illegally trapped and killed as they pass through Cyprus on migration, to be sold on the black market for the banned local dish of 'ambelopoulia'. BirdLife Cyprus, together with the UK BirdLife Partner, RSPB, have been systematically monitoring illegal bird trapping in the Republic of Cyprus and the Eastern Sovereign Base Areas for the last 20 years. This active covert surveillance has been used to inform on-the-ground action by enforcement officials, resulting in one of the most successful campaigns against illegal poaching globally. Since surveys began in 2002, mist-netting activity within the survey area has decreased by 84%. However, the battle is not yet won. A recent relaxation of deterrent legislation, together with reduced capacity in enforcement teams, resulted in worrying signs of an increase in trapping activity in autumn 2021. Further work is needed to reverse the relaxations to the law, strengthen enforcement and provide training to judicial authorities to ensure that perpetrators are given appropriate court sentences.

Source: BirdLife Cyprus 2021.

Actions are underway to prevent illegal poaching and trade of Helmeted Hornbill

Helmeted Hornbill *Rhinoplax vigil*, restricted to South-East Asia, is hunted throughout its range for its unique solid casque, which is used to make ornamental carvings. International trade of parts, products or specimens of this species has been illegal under CITES since 1975, while national legislation prohibits hunting and trade in most range states. However, high demand continues to drive unsustainable poaching and illegal trade. A surge in trade resulted in the species being re-classified in 2015 as Critically Endangered on the IUCN Red List. In response, BirdLife and others developed a Range-wide Conservation Strategy and Action Plan for conservation of the species. The plan has been widely adopted across the range and many actions are already underway. These include: monitoring of hornbill populations and poaching activity; identification of the most important sites for hornbills; public engagement and awareness raising; disruption of trade routes with seizures at transit points; improved law enforcement at poaching sites; and working with Indigenous Peoples and local communities to appoint them as guardians of their local hornbill populations. BirdLife Partners in Indonesia, Malaysia, Myanmar and Thailand have been successful in securing several high-priority sites across these countries as 'safe havens' where the hornbills breed and are shielded from poaching.

Minimising impacts of energy infrastructure



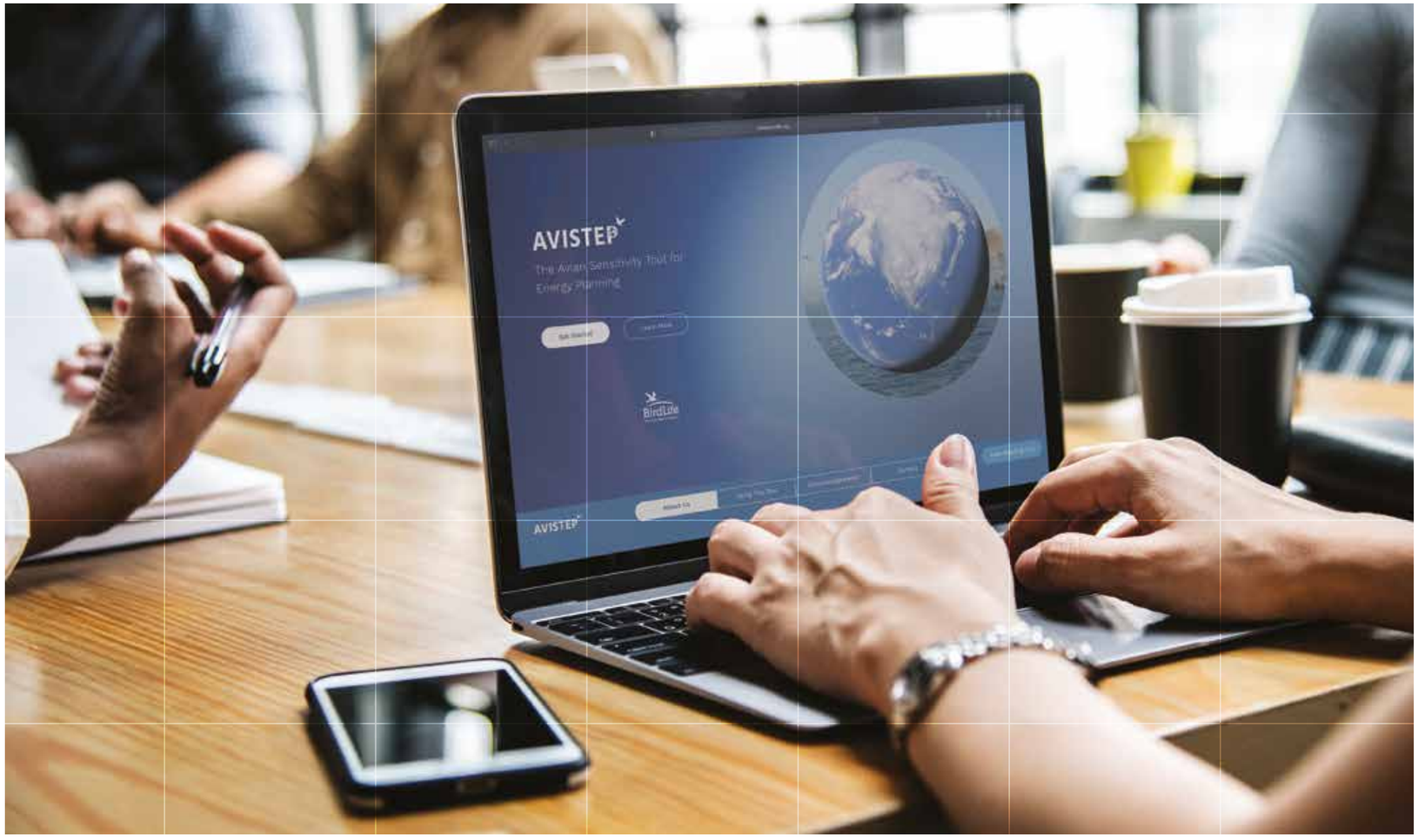
Developing tools to ensure a nature-safe transition to renewable energy

In 2022, BirdLife, with the support of the Asian Development Bank and the e-Asia and Knowledge Partnership Fund, launched AVISTEP: the Avian Sensitivity Tool for Energy Planning. This free-to-access online mapping tool provides a detailed spatial assessment of avian sensitivity in relation to different types of energy infrastructure: windfarms (both on- and offshore), photovoltaic solar facilities, and overhead powerlines. AVISTEP provides assessments at a range of spatial scales. As such, it can be used across the development process, to support national and subnational strategic planning but also for site-level screening and evaluation. AVISTEP provides biodiversity insights early in the planning cycle when development can be steered towards low-risk sites. An early understanding of potential sensitivity is extremely useful for developers. Forewarned of possible issues, they can consider alternative locations or ensure that appropriate mitigation measures are factored into project design from the outset. By ensuring that fewer renewable energy projects encounter conflicts with nature, AVISTEP will help speed up renewable energy growth while ensuring that this expansion is planned strategically and efficiently, optimising available space and minimising wildlife impacts.

BirdLife is championing efforts to ensure that the renewable energy transition is nature-safe and truly green. These efforts include pioneering approaches such as avian sensitivity mapping to help minimise conflict between wildlife and renewable energy expansion. As the coordinator of the Convention on Migratory Species' Energy Task Force and a founding member of the Coalition Linking Energy and Nature for action (CLEANaction), BirdLife is strategically placed to help ensure that the tools and best practice needed for sustainable renewable energy development are mainstreamed across the global energy sector.

Promoting best practice for sustainable, nature-safe, renewable energy development

There is increasing recognition that a comprehensive reshaping of our global energy infrastructure could pose significant threats to biodiversity if not planned responsibly. To this end, governments party to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) established 'a multi-stakeholder Task Force on Reconciling Selected Energy Sector Developments with Migratory Species Conservation'. Known simply as the Energy Task Force, it provides a platform where government ministries, conservation organisations, international financial institutions and the energy sector can collaborate to identify and implement solutions for sustainable, nature-safe, renewable energy development. Under the coordination of BirdLife, the Energy Task Force has grown to include 36 members and 22 observers from around the world. Together this group of key global stakeholders is developing the tools and best-practice guidance necessary to ensure a nature-safe clean energy transition. In 2022, the Task Force launched a Good Practice Handbook on Post Construction Fatality Monitoring, outlining the best methods for consistent and comparable windfarm and powerline monitoring, and an evidence-based powerline mitigation toolkit – 'TransMit' – for use by transmission system operators, energy agencies, regulators and conservation practitioners.



Managing invasive alien species

Photo © Daniil Komov

Managing the threat posed by invasive alien species requires both biosecurity and control or eradication. Improved biosecurity measures (for example, using trained dogs to detect rats and other potential invasive species on boats) are crucial for preventing the initial introduction of invasive species and for preventing reinvasion following eradication. Once invasive species are already established, control or, where possible, eradication is needed to reduce or eliminate impacts on native bird populations. Control methods have improved substantially over the last few decades, resulting in increasingly successful eradication programmes that have saved a number of globally threatened bird species from extinction.

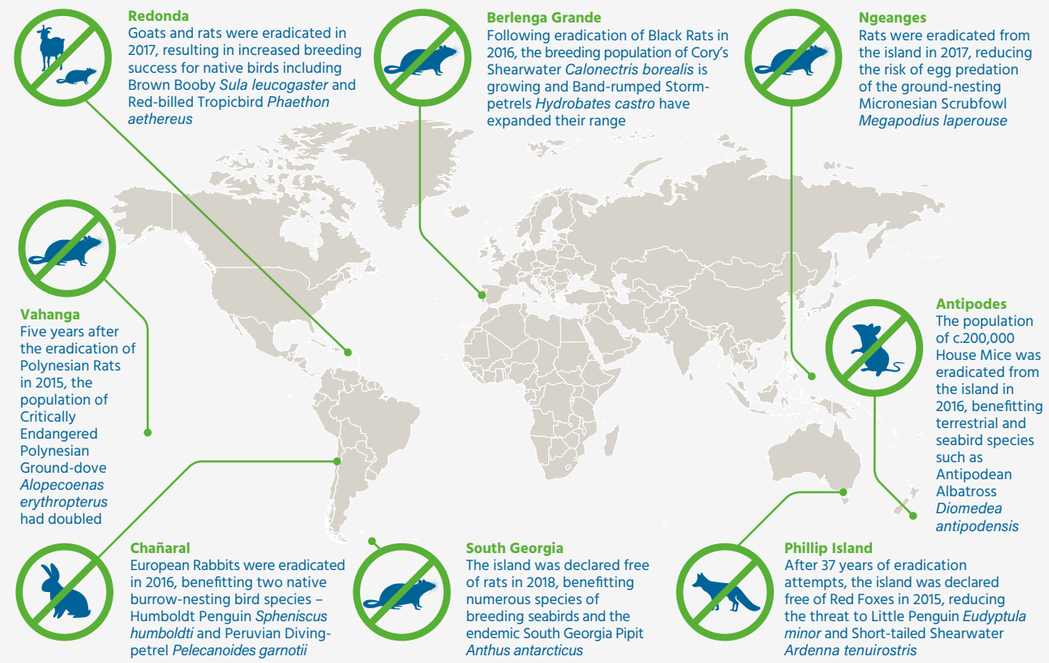
Many successful eradications have been carried out

Of the 32 bird species whose extinctions have likely been prevented by conservation action since 1993, invasive alien species control was the most frequently implemented action (66% of species). At least 1,084 successful eradications of invasive animals have been carried out on 806 islands to date, benefitting at least 80 seabird and 82 terrestrial bird species. For example, the BirdLife International Partnership has successfully removed invasive mammal populations from more than 30 Pacific Islands, including the Acteon Gambier island group – home to the last viable population of the Critically Endangered Polynesian Ground-dove *Alopecoenas erythropterus*. Further eradications of invasive mammals on 107 islands are considered feasible in the near future and would benefit at least 80 highly threatened vertebrate species, most of which are birds.

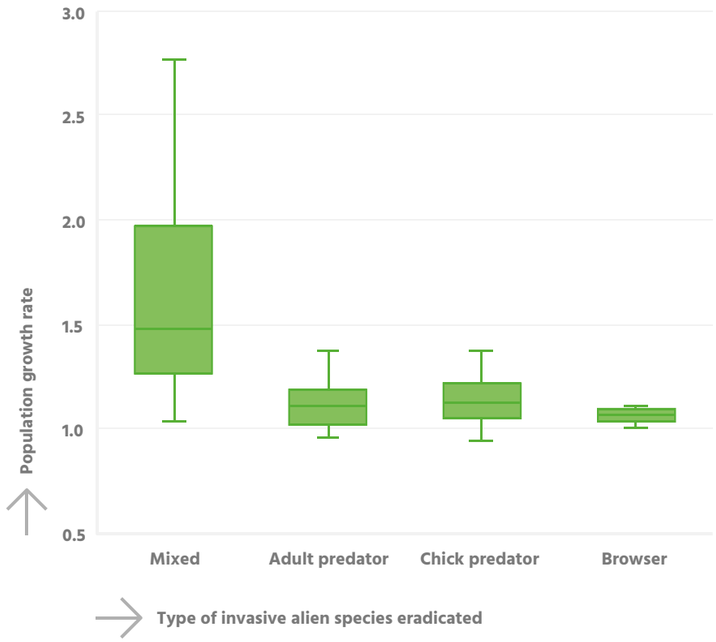
1,084

successful eradications of invasive animals have been carried out on 806 islands to date

Examples of recent successful invasive species eradications and native bird beneficiaries



Seabird population growth rates following eradication of different types of invasive alien mammal species



Data from Brooke *et al.* 2018.

Eradicating invasive species allows bird populations to recover

The eradication of invasive species can bring about significant recovery of bird populations. Analysis of growth rates of 181 seabird populations following successful invasive species control programmes revealed that the vast majority (83%) of populations grew following eradication. Population growth rates were greatest for gulls and terns compared with other seabird groups, and were higher when several invasive mammals were eliminated at the same time. Entire communities can recover in a relatively short period of time following removal of invasive species. Just five years after invasive Norway Rats *Rattus norvegicus* were eradicated from Hawadax Island, Alaska, the populations of apex predators such as Glaucous-winged Gull *Larus glaucescens* and Blackish Oystercatcher *Haematopus ater* had already started to grow, and within 11 years the rocky intertidal community largely resembled that of a rat-free island.

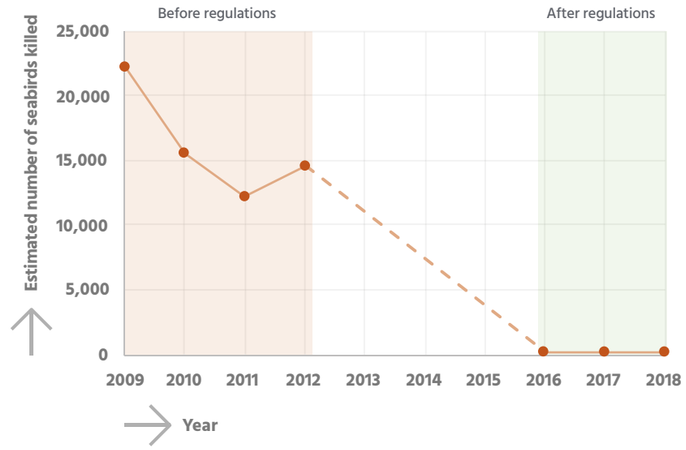
Sources: Bolam *et al.* 2021, Brooke *et al.* 2018, Holmes *et al.* 2019, Jones *et al.* 2016., Kurle *et al.* 2021.

Tackling fisheries bycatch

A wide range of tools and techniques to minimise the threat of seabird bycatch has been developed in recent decades. Studies from around the world have clearly demonstrated the efficacy of these conservation measures. Best practice advice is documented through the Agreement on the Conservation of Albatrosses and Petrels, and technical guidelines for governments have been available for over a decade. As a result, implementation of mitigation measures has led to encouraging signs of improvement in some vulnerable seabird populations, although many are still declining rapidly. Expanding effective implementation requires increased industry collaboration, monitoring and enforcement, alongside greater transparency and accountability in the seafood supply chain.

Photo © Ruben Dellacasa

Annual estimates of the number of seabirds killed as bycatch in the Namibian demersal longline fleet



No data were available for 2013-2015. Data from Da Rocha *et al.* 2021.

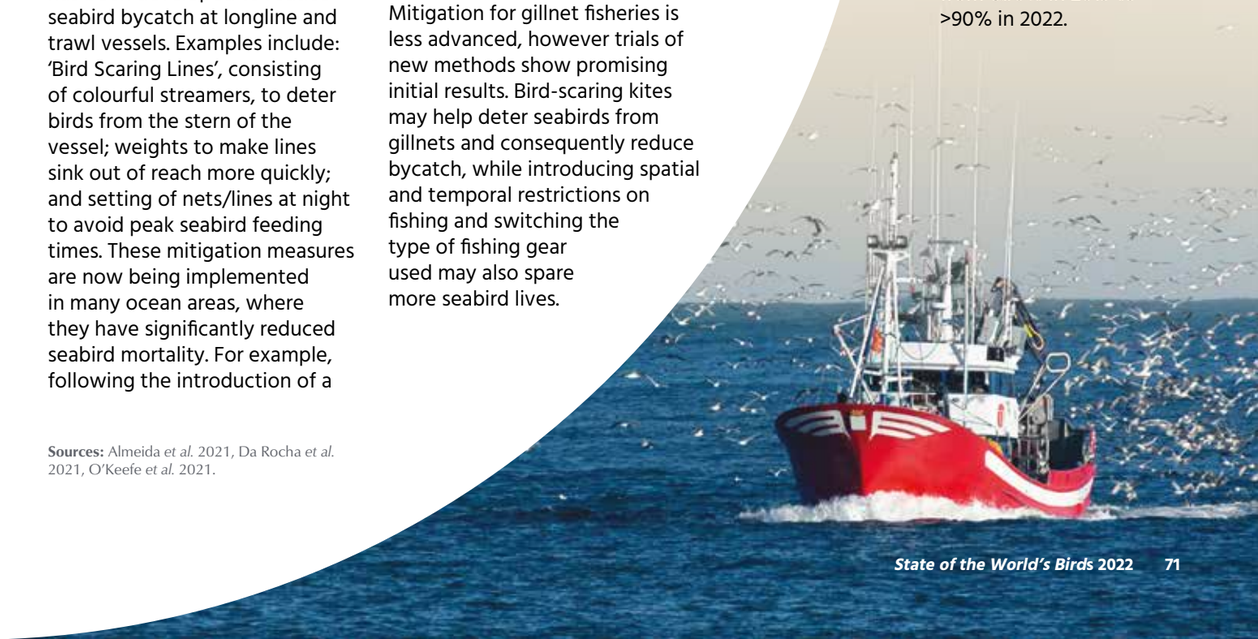
Mitigation measures successfully reduce seabird bycatch

A range of mitigation measures has been developed to reduce seabird bycatch at longline and trawl vessels. Examples include: 'Bird Scaring Lines', consisting of colourful streamers, to deter birds from the stern of the vessel; weights to make lines sink out of reach more quickly; and setting of nets/lines at night to avoid peak seabird feeding times. These mitigation measures are now being implemented in many ocean areas, where they have significantly reduced seabird mortality. For example, following the introduction of a regulation in 2015 that required the use of Bird Scaring Lines in Namibian hake demersal longline fisheries, bycatch rates have fallen by 98.4%, equating to c.22,000 seabirds saved per year. Mitigation for gillnet fisheries is less advanced, however trials of new methods show promising initial results. Bird-scaring kites may help deter seabirds from gillnets and consequently reduce bycatch, while introducing spatial and temporal restrictions on fishing and switching the type of fishing gear used may also spare more seabird lives.

Sources: Almeida *et al.* 2021, Da Rocha *et al.* 2021, O'Keefe *et al.* 2021.

Electronic monitoring may improve compliance with mitigation measures in the future

While several effective seabird bycatch mitigation measures have been identified, ensuring compliance with regulations requiring their implementation remains a significant challenge. Many vessels currently lack on-board observers to monitor mitigation, so self-reporting is often the only measure of compliance. However, trials are underway in Argentina to address this problem. All four vessels in the Argentine hoki fleet have been fitted with on-board cameras that regularly transmit images to BirdLife's Albatross Task Force, enabling analysis of compliance with Bird Scaring Line use under regulatory requirements. Installation of the cameras has already driven compliance up from c.30% in 2019 to >90% in 2022.



Targeting species recovery actions

Although protecting, conserving and effectively managing key sites, restoring degraded habitats and mitigating threats will provide substantial benefits to most threatened species, a significant proportion require targeted recovery actions in order to avoid extinction and reverse negative trends. Such recovery actions include captive breeding in zoos, reintroduction into the wild, moving individuals between locations, disease-management, provision of breeding sites, supplementary feeding and other species-specific interventions. By their very nature, they are often both intensive and expensive – but when properly resourced and correctly implemented, they can be remarkably effective at saving species from extinction.

Most threatened species require targeted recovery actions

One recent study estimated that at least half of threatened species, including 52% of threatened birds, need targeted recovery actions to ensure their survival. These include species for which targeted conservation actions have been specifically identified as critical for their recovery (23% of threatened birds) and species that have very small populations or ranges and so are at high risk of extinction (for example, from random effects) before they could recover naturally (38%). For example, the survival of the Critically Endangered Black Stilt *Himantopus novaezelandiae* in New Zealand relies on captive-rearing and release, plus control of hybrids with Black-winged Stilt *H. leucocephalus,* while the continued recovery of Bermuda Petrel *Pterodroma cahow* requires the creation of artificial burrows and elimination of nest-site competition from White-tailed Tropicbird *Phaethon lepturus* by installing baffles over burrow entrances.

Targeted recovery brings species back from the brink

Implementation of targeted recovery actions by dedicated conservationists has brought many species back from the brink of extinction and allowed them to recover to such an extent that they can be 'downlisted' to categories of lower extinction risk on the IUCN Red List. Over 70 such cases have been documented since 1988. Since 2018, some particularly high-profile downlistings resulting from targeted conservation efforts have included Northern Bald Ibis *Geronticus eremita* (Morocco), Guam Rail *Hypotaenidia owstoni,* Seychelles Paradise-flycatcher *Terpsiphone corvina,* Hawaiian Goose *Branta sandvicensis,* Pink Pigeon *Nesoenas mayeri* and Echo Parakeet *Alexandrinus eques* (both from Mauritius).

52%

of threatened bird species need targeted recovery actions to ensure their survival

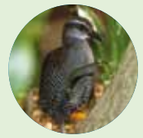
Targeted recovery actions	 Northern Bald Ibis *Geronticus eremita* 2018: CR ▸ EN	 Seychelles Paradise-flycatcher *Terpsiphone corvina* 2020: CR ▸ VU	 Hawaiian Goose *Branta sandvicensis* 2021: VU ▸ NT	 Pink Pigeon *Nesoenas mayeri* 2018: EN ▸ VU	 Guam Rail *Hypotaenidia owstoni* 2019: EW ▸ CR	 Echo Parakeet *Alexandrinus eques* 2019: EN ▸ VU
Supplementary food/water	✓	✓		✓		✓
Disease control				✓		✓
Predator control		✓	✓	✓	✓	
Captive breeding	✓		✓	✓	✓	✓
Reintroduction			✓	✓	✓	✓
Translocation		✓			✓	✓
Nest/colony protection	✓			✓		
Clutch & brood manipulations				✓		✓
Failing nest rescue				✓		
Nest site provision						✓

Photo © Fireglo/Shutterstock | Photo © Bildagentur Zoonar GmbH/Shutterstock | Photo © Jörg Hempel | Photo © Daniel Danckwerts/Shutterstock | Photo © Dick Daniels | Photo © Peter Steward

Source: Bolam *et al.* 2022. Photo © Rachel Hughes, Durrell Wildlife Conservation Trust

Mainstreaming biodiversity across society

Photo © Cam James

Nature provides a range of benefits to people at global, regional and local scales, but these services often go unrecognised and undervalued. Biodiversity and ecosystem services are therefore often not factored into development plans, resulting in the loss and degradation of natural resources. To conserve biodiversity, we must scale up investment in conservation and mainstream biodiversity values across society, ensuring that nature is widely integrated into national and sectoral policies and planning processes. Data on birds and key sites for their conservation are increasingly being used to screen for biodiversity risks when planning projects and developments, and to align environmental agendas across national and regional boundaries to conserve shared assets.

Scaling up wetland conservation in the East Asian-Australasian Flyway by mainstreaming the flyway approach across regional and national agendas

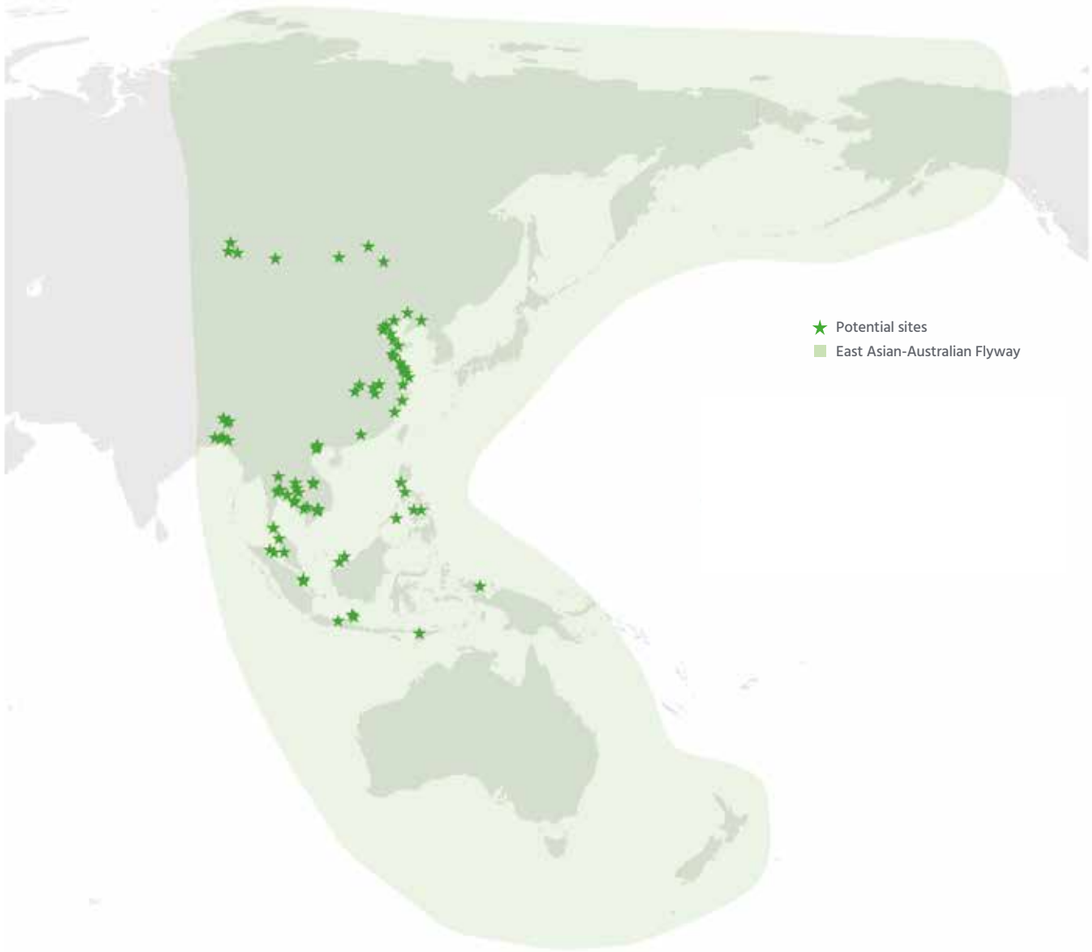
The East Asian-Australasian Flyway (EAAF) is a major migratory corridor used by more than 500 bird species across 22 countries. The flyway's wetlands provide habitat for an estimated 50 million migratory birds, and deliver essential ecosystem services such as flood regulation, food (through fisheries), water resources and livelihoods to millions of people in the Asia-Pacific region. However, many of these wetlands are under substantial pressure from agriculture, unsustainable development and climate change. Migratory species connect diverse wetland ecosystems across national borders, so conservation of these wetlands requires coordinated action. In 2021, BirdLife International partnered with the Asian Development Bank (ADB) and the EAAF Partnership to develop a long-term 'Regional Flyway Initiative' to protect, manage and restore priority wetlands across ten Asian countries, with an initial financing commitment of $3 billion from the ADB. Using a blended approach that brings together public and private finance, the initiative will build upon ongoing activities in the region through partnerships with key stakeholders such as national governments, civil society, development agencies and the private sector. This partnership will work together to conserve biodiversity; maximise economic and social benefits; invest in nature-positive, socially-inclusive development; and tackle climate change. This innovative, large-scale approach, in which the benefits of nature are internationally recognised and integrated into decision-making across society, is key to conserving widely dispersed but interconnected sites.

The flyway is used by over

500

bird species across 22 countries

Potential sites for protection and restoration under the East Asian-Australasian Regional Flyway Initiative



Mainstreaming IBA conservation into the finance sector

A number of development banks, including the World Bank, the International Finance Corporation, the European Investment Bank and the European Bank for Reconstruction and Development, have incorporated Important Bird and Biodiversity Areas (IBAs) into their environmental safeguard policies, performance standards and guidance. This means that the location of IBAs and the species for which they are identified are considered when deciding whether development projects should proceed, and with what design requirements, to minimise environmental risks. For example, the International Finance Corporation's Performance Standard 6 (PS6) requires projects in 'Critical Habitat' to achieve a net gain in biodiversity. Critical Habitat is identified according to five criteria similar to those used for identifying IBAs, so most IBAs will qualify. PS6 has become recognised as international best practice for biodiversity management, and is increasingly used throughout the finance and private sector. The Integrated Biodiversity Assessment Tool (IBAT), developed and maintained by BirdLife and three other conservation organisations, allows users to screen potential project sites in relation to PS6. To date, PS6 reports have been produced for over 10,000 sites.

Sources: EAAFP 2022, IFC 2019.

Influencing policy and legislation

Effective policy and legislation are key to tackling the biodiversity and climate crises. The main legal instruments for addressing international environmental challenges are Multilateral Environmental Agreements (MEAs). Examples include the Convention on Biological Diversity (CBD), the United Nations Framework Convention on Climate Change (UNFCCC), the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) and the Ramsar Convention on Wetlands. These MEAs form the framework within which each Party sets its own laws and conservation priorities to ensure the agreement is implemented at the national level. Informing the content and driving implementation of these global agreements can therefore have more far-reaching effects than focusing on a single country, site or species. Through our local to global approach, BirdLife influences global, regional and national policy and legislation, and advocates for effective implementation. Our campaigns have successfully brought about wide-ranging changes to international agreements, benefitting nature and people.

Securing the right to a healthy environment

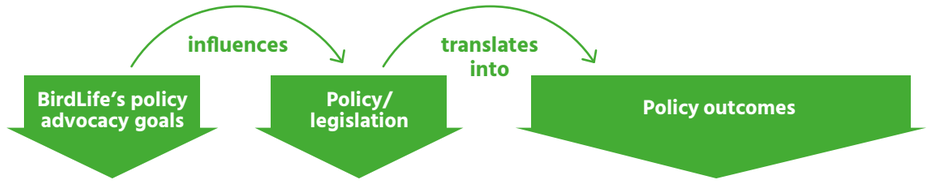
On Earth Day 2020, BirdLife International launched its 'One Planet One Right' campaign, mobilising over 120,000 members of the public and joining with more than 1,350 civil society organisations to call for the universal human right to a clean, healthy and sustainable environment. This right already exists in over 150 countries, where its recognition has led to strengthened policies and laws to take better care of nature and biodiversity. On 8 October 2021, the UN Human Rights Council adopted Resolution 48/13 recognising this right, and on 28 July 2022 it was endorsed by the UN General Assembly. It is the basis for a nature-positive world for all and empowers society to hold accountable those who damage our environment. Key to this success was the mobilisation of civil society, who worked collaboratively to build understanding among decision-makers and gain public support. BirdLife is now working with the UN Special Rapporteur on human rights and the environment and wider civil society to secure the right's integration into multilateral conventions and national legislation. This includes recognition and implementation of the right through the CBD's Post-2020 Global Biodiversity Framework.

Policy in action: from local to global and back again

The BirdLife Partnership is fundamental to achieving local to global policy influence and change. Local leadership, science and monitoring is critical to informing our national, regional and global policy positions, while the translation of international agreements and decisions highlights knowledge gaps and ensures unified action across boundaries. For example, BirdLife's work through the Convention on Migratory Species (CMS) Task Force on Illegal Killing, Taking and Trade of Migratory Birds in the Mediterranean (MIKT) is informed by local monitoring by Partners combined with global science. This translates into policy advocacy and advice on the MIKT scoreboard – a mechanism developed to assess country progress towards combating illegal exploitation of birds.

Profiling the successful work carried out by BirdLife Partners is a powerful tool for influencing policy. For example, demonstrating how the Partnership is collectively working to deliver nature-based solutions to tackle climate change has contributed to strengthening the recognition of nature as a key component to climate mitigation and adaptation in the UN Framework Convention on Climate Change (UNFCCC), a key step to tackling the nature and climate crises in an integrated way.

Examples of how BirdLife's science and policy advocacy have influenced national and international policy and legislation



Sites	Incorporation of KBAs (including IBAs) as an essential component of policy and spatial planning	Convention on Biological Diversity (CBD)	KBAs established as essential criteria in identifying areas of particular importance for biodiversity across the delivery of the Post-2020 Global Biodiversity Framework, and used for tracking progress
Species	Strengthening of policies to mitigate threats, and to halt and reverse population declines	Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES)	West African vultures protected under CITES Appendix II and associated recommendations, regulating international trade and facilitating implementation through national legislation, monitoring and reporting
Climate	Delivery of nature-based solutions to climate change	Framework Convention on Climate Change (UNFCCC)	Nature recognised as a key component to climate mitigation and adaptation through the COP26 Glasgow Climate Pact, which encapsulates global governments' commitments to tackling climate change
Flyways	International policies and plans that address threats to migratory species across flyways	Convention on the Conservation of Migratory Species of Wild Animals (CMS)	Formation and growth of a functioning multi-stakeholder platform, the Energy Task Force, which delivers a nature-safe transition to renewable energy through ensuring negative impacts of energy developments on migratory species are minimised
Marine	Designation of Marine Protected Areas (MPAs) and mitigation of threats such as bycatch	The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)	Designation of a major seabird feeding site (NACES) as an MPA in October 2022, following extensive advocacy efforts, making it the first MPA on the High Seas to be identified from tracking data
Forests	Strengthening of policies to address deforestation and improving forest governance	Philippines' Sustainable Forest Management Act	Biodiversity concerns mainstreamed in the revised Act as a result of BirdLife's policy advocacy support to its Partner in the country
Agriculture	Policies promoting sustainable food systems	Paraguay National Law No. 3.001/06 (Valuation and Remuneration of Environmental Services)	Integration into national law of the ICP index to measure and certify the contribution from rural producers to the conservation of natural grasslands, facilitating payment for environmental services

Capacity building, education and raising awareness

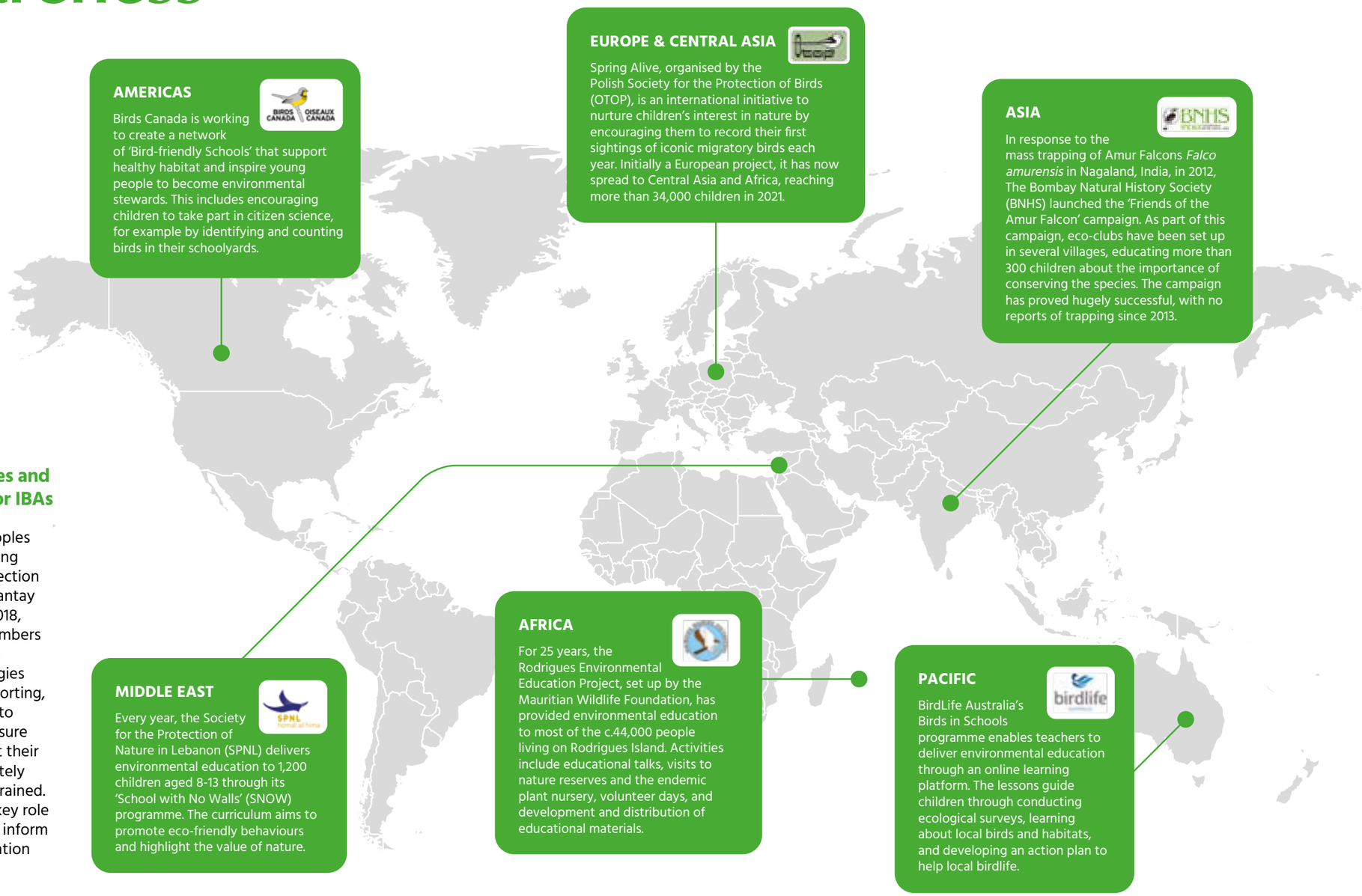
Educating people about the natural world and building their capacity to conserve it are key components of successful conservation. Communities and individuals who feel connected to nature and understand its importance for their own livelihood and wellbeing are more likely to take action to protect it. Around the world, BirdLife Partners are changing attitudes and renewing people's relationship with nature by delivering environmental education to adults and children. The Partnership is also empowering local communities to take the necessary actions to conserve their local wildlife.

The Haribon Foundation is empowering Indigenous Peoples and local communities in the Philippines to protect and monitor IBAs

The Philippines is a global biodiversity hotspot, home to nearly 600 bird species of which over 40% are endemic. To date, 117 Important Bird and Biodiversity Areas (IBAs) have been identified throughout the archipelago. However, many of these IBAs are under threat from deforestation, driven by unregulated logging, mining and land conversion for agriculture. There are policies and legislation in place to reduce these threats, but monitoring and reporting of IBA condition and trends is challenging due to limited capacity. The Haribon Foundation (BirdLife Partner in the Philippines) is addressing this problem by engaging with Indigenous Peoples and local communities, including community-based forest protection volunteer groups known as 'Bantay Gubat' (forest guardians). In 2018, prospective Bantay Gubat members were trained in environmental concepts, conservation strategies and forest monitoring and reporting, giving them the skills needed to collect data on the state, pressure and conservation responses at their local IBAs. To date, approximately 140 Bantay Gubat have been trained. These local volunteers play a key role in gathering data that directly inform policy, advocacy and conservation decision-making.

BirdLife Partners around the world are inspiring young people to conserve nature

It is crucial that the next generation is one that values, respects and prioritises nature. Around the world, BirdLife Partners are laying the foundations for future conservation by enthusing young people about birds and other biodiversity. Many have their own environmental education programmes through which they deliver educational talks, organise birdwatching trips and events that celebrate the natural world, and engage children in practical conservation activities. These actions increase appreciation, awareness and knowledge of local species and ecosystems, nurture a connection to nature, and build skills such as scientific monitoring and ecological literacy.



AMERICAS

Birds Canada is working to create a network of 'Bird-friendly Schools' that support healthy habitat and inspire young people to become environmental stewards. This includes encouraging children to take part in citizen science, for example by identifying and counting birds in their schoolyards.

EUROPE & CENTRAL ASIA

Spring Alive, organised by the Polish Society for the Protection of Birds (OTOP), is an international initiative to nurture children's interest in nature by encouraging them to record their first sightings of iconic migratory birds each year. Initially a European project, it has now spread to Central Asia and Africa, reaching more than 34,000 children in 2021.

ASIA

In response to the mass trapping of Amur Falcons *Falco amurensis* in Nagaland, India, in 2012, The Bombay Natural History Society (BNHS) launched the 'Friends of the Amur Falcon' campaign. As part of this campaign, eco-clubs have been set up in several villages, educating more than 300 children about the importance of conserving the species. The campaign has proved hugely successful, with no reports of trapping since 2013.

MIDDLE EAST

Every year, the Society for the Protection of Nature in Lebanon (SPNL) delivers environmental education to 1,200 children aged 8-13 through its 'School with No Walls' (SNOW) programme. The curriculum aims to promote eco-friendly behaviours and highlight the value of nature.

AFRICA

For 25 years, the Rodrigues Environmental Education Project, set up by the Mauritian Wildlife Foundation, has provided environmental education to most of the c.44,000 people living on Rodrigues Island. Activities include educational talks, visits to nature reserves and the endemic plant nursery, volunteer days, and development and distribution of educational materials.

PACIFIC

BirdLife Australia's Birds in Schools programme enables teachers to deliver environmental education through an online learning platform. The lessons guide children through conducting ecological surveys, learning about local birds and habitats, and developing an action plan to help local birdlife.

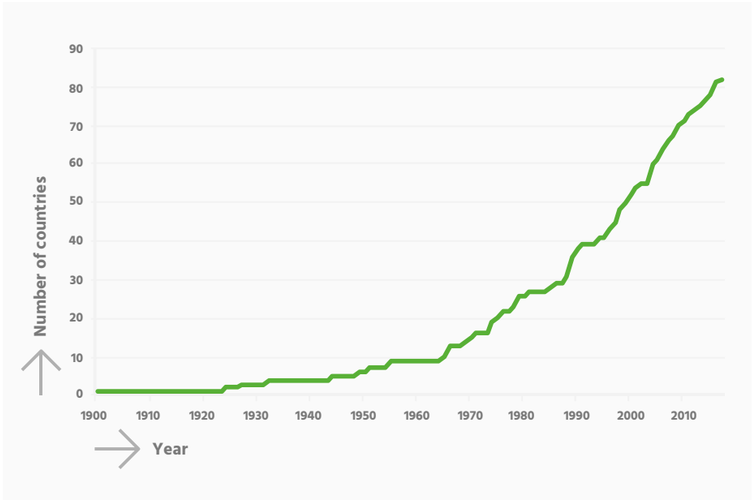
The importance of monitoring

Data on long-term trends in species abundance and distribution are crucial for underpinning efforts to track and understand the global biodiversity crisis, to target scarce conservation resources to priority species and sites, and to quantify the impact of those investments. However, biodiversity monitoring is currently poorly coordinated, often haphazard in its occurrence, 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.

Birds are better monitored than any other taxa, but more is needed

A recent global study, led by BirdLife, compiled a database of nearly 1,200 monitoring schemes and estimated the total number at 3,300–15,000. Birds are by far the most widely monitored taxonomic group, accounting for around half of all schemes detected. This bias has declined over time: since 2000, there has been a sharp increase in the number of new schemes for other taxa being initiated in lower- and middle-income countries and in megadiverse countries. Overall, however, species population monitoring remains strongly biased toward a few vertebrate taxa in wealthier countries. Even birds are still monitored by structured schemes in less than half of the world's countries. These shortcomings could be addressed by creating an open global meta-database of biodiversity monitoring schemes and enhancing capacity for species monitoring in countries with high biodiversity.

Growth in number of countries with bird population monitoring schemes 1900-2018



Data from Moussy *et al.* 2021.

Photo © Barend van Gemerden

Novel technologies and citizen science provide new opportunities for monitoring

Technological advances are providing novel ways of monitoring bird distributions, populations and threats. Satellite tracking technology has progressed rapidly in recent years, providing an increasingly detailed insight into the movements of birds. Tracking data have recently been used to identify many important areas for conservation, ranging from seabird feeding sites in the North Atlantic to networks of sites used by African-Eurasian migratory landbirds. In 2014, Birds Canada (BirdLife Partner) launched the Motus Wildlife Tracking System program – a collaborative research network that uses automated radio telemetry to simultaneously track thousands of birds, bats and insects. Since its inception, Motus has expanded into a network of over 1,500 receiver stations across four continents, tracking more than 34,000 individuals across 290 species (mostly birds). Citizen science is increasingly being used to monitor the distribution of bird species. For example, the BirdLasser app, developed by BirdLife South Africa, allows users to log and share sightings of birds, with data contributing to the South African Bird Atlas Project, while the eBird platform now holds more than a billion records. Modern technology and citizen science are also improving our understanding of the threats to Important Bird and Biodiversity Areas (IBAs). One recent study used social media data to identify IBAs under potential pressure from high visitation rates, while BirdLife's Natura Alert mobile and web platform allows users to participate in IBA monitoring by reporting threats to birds and their habitats.

Sources: Davies *et al.* 2021, Guilherme *et al.* in prep., Hausmann *et al.* 2019, Moussy *et al.* 2021.

Conservation action works

Evidence shows that with sufficient resources and political will, species can be saved from extinction and their populations can recover. Targeted actions including effective conservation of key sites, elimination or management of threats such as invasive alien species and unsustainable hunting, translocation, and captive breeding and release have brought species back from the brink of extinction and more than halved the overall extinction rate. A range of examples illustrate that we have the knowledge and tools required to save species and their habitats, and convincingly demonstrate that conservation works.

Conservation action has already saved many species from extinction

A recent analysis estimated that 21-32 bird species would have gone extinct since 1993 (when the Convention on Biological Diversity came into force) without the conservation actions they received during this period. For example, Fatu Hiva Monarch *Pomarea whitneyi* from French Polynesia would very likely have been driven extinct by invasive alien rats had these not been controlled under a conservation programme, while Puerto Rican Amazon *Amazona vittata* only survives in a population of birds reintroduced into the wild after a hurricane in 2017 wiped out the only other population of wild origin. Over the same period, ten species are confirmed or suspected to have gone extinct, including the Aguijan Reed-warbler *Acrocephalus nijoi* which has been lost since the last record in 1995 in the Northern Marianas Islands, and the Alagoas Foliage-gleaner *Philydor novaesi* from Brazil which was lost in 2011. The extinction rate would therefore have been at least 2-3 times higher without conservation action. Furthermore, the rate at which species have moved from lower categories of risk towards extinction, and eventually become extinct, would have been at least 40% higher during 1988-2016 according to another study.

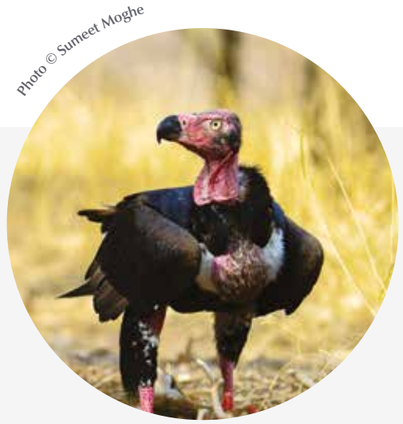
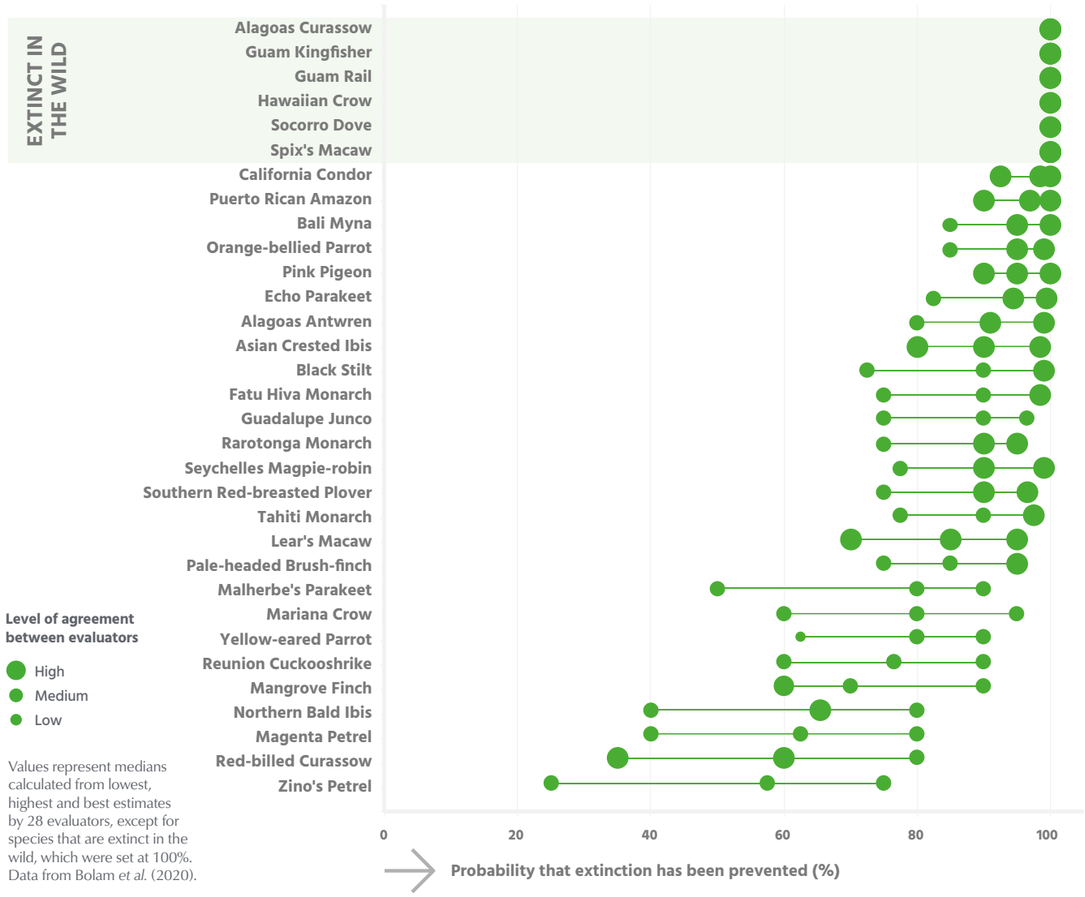


Photo © Sumeet Moghe

Probability that extinction of bird species would have occurred in the absence of conservation action during 1993–2020



Values represent medians calculated from lowest, highest and best estimates by 28 evaluators, except for species that are extinct in the wild, which were set at 100%. Data from Bolam *et al.* (2020).

10 key conservation successes by the BirdLife International Partnership

BirdLife International comprises 119 national nature conservation organisations in 115 countries. In recent decades, BirdLife Partners have achieved a wide range of conservation successes, including the following highlights:

1 Successful adoption of **bycatch mitigation** regulations across target fisheries led by BirdLife's Albatross Task Force has significantly reduced seabird bycatch, including 98% reduction in the Namibian demersal longline fleet.

2 At least 726 globally threatened bird species have directly benefitted from actions of the BirdLife Partnership since 2013, including four **Asian vultures** whose catastrophic declines have been halted and are starting to reverse.

3 BirdLife Partners have carried out numerous successful **invasive alien species** eradications, including removal of mammal populations from at least 36 Pacific Islands, benefiting native bird communities, particularly seabirds.

4 Key sites for migratory waterbirds around the Yellow Sea coast were inscribed as **UNESCO World Heritage Sites** in 2019 following coordinated advocacy by BirdLife and others.

5 Advocacy by BirdLife Partners has contributed to the **protection** of over 450 Important Bird and Biodiversity Areas (IBAs) since 2013.

Photo © Marie-Helene Burle

6 Campaigning by BirdLife and others in 2015 successfully saved the EU **Birds and Habitats Directives** – key environmental legislation – from being revised and weakened.

7 Since 2016, the **Trillion Trees initiative** – a joint venture of BirdLife, the Wildlife Conservation Society and the World Wide Fund for Nature – has helped support the protection and restoration of 83.2 million hectares of forest.

8 A **major seabird hotspot** in the North Atlantic that is larger than the land area of France was designated as a Marine Protected Area in 2021 following analysis of seabird tracking data and campaigning by BirdLife.

9 The **Integrated Biodiversity Assessment Tool** (IBAT) is now widely used by the private sector to integrate biodiversity values into planning and reporting, with over 12,000 users who ran over 10,600 reports in 2021 to screen locations worldwide for potential biodiversity risks using KBA and other data.

10 More than 500,000 hectares of the Southern Cone grasslands in South America are now under bird-friendly management following work by the **Grasslands Alliance** – a coalition between BirdLife Partners in Uruguay, Argentina, Brazil and Paraguay.

Sources: Bolam *et al.* 2020, Monroe *et al.* 2019.

It's time: ten years to act

State of the World's Birds **synthesises the wealth of information available on birds to summarise what they tell 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.**

This review shows that the world's birds are in a perilous state: over 180 species have gone extinct in recent centuries, and one in eight are considered threatened with extinction now. Many formerly common species now have depleted and declining populations, with billions of individuals lost within our lifetimes. A range of threats are driving this loss of our avian heritage, but unsustainable agriculture, invasive alien species, logging, unsustainable exploitation and climate change are the most significant pressures.

Despite this catalogue of challenges, in the vast majority of cases we know what solutions are needed. The network of critical sites for bird conservation is well documented, and evidence shows that their protection and effective management benefits the species that depend upon them. Mitigating key threats can produce spectacular results, from seabird populations recovering after the eradication of invasive predators, to cessation of trapping allowing threatened parrot populations to increase. Such efforts need to be underpinned by greater recognition of the value of nature and the services it provides and the integration of these values into decision-making across society. Illustrating how this can be achieved, several development banks have introduced policies to safeguard Important Bird and Biodiversity Areas.

Birds therefore provide reasons for hope: extinctions can be prevented and populations recovered. However, the coming decade is critical. Without urgent and scaled-up action, many more species will slip closer to extinction, and some may be lost forever. Governments are currently negotiating a new 'Global Biodiversity Framework', a plan for all of society – governments, business, finance sector and civil society – for adoption at the Convention on Biological Diversity (CBD) Conference of the Parties in December 2022. The final wording of the goals and targets adopted must be specific and measurable, with sufficiently ambitious commitments that deliver a mission of being 'nature-positive' by 2030, halting and reversing biodiversity loss, and setting us on a path for recovery towards the 2050 CBD Vision of a world living in harmony with nature. Our future depends on it.

Key actions urgently needing implementation under the 2030 targets include the following:

- Ensure that expansion of networks of protected areas and other effective area-based conservation measures (OECMs) are targeted to Key Biodiversity Areas (KBAs), and that these are effectively managed.
- Implement urgent species-specific recovery actions, coordinated through action plans where appropriate, for those threatened species requiring such interventions.
- Retain existing intact ecosystems and restore degraded habitats, particularly within and between KBAs, to enhance their connectivity.
- Implement effective biosecurity to restrict the further spread of invasive alien species, and eradicate or control these at priority locations, particularly on islands.
- Work to eliminate unsustainable hunting and illegal killing, capture and trade of birds.
- Mitigate climate change by keeping fossil fuels in the ground and investing in nature-based solutions, and ensure that renewable energy development avoids negative impacts on birds.
- Mainstream biodiversity across sectors, especially agriculture, forestry, fisheries and the extractive industries, to transition them to sustainable management practices that minimise negative impacts on birds.
- Heighten public awareness and engagement, ensuring that every child's education is firmly rooted in environmental sustainability.
- Scale up investment in nature through innovative finance mechanisms, redirection of harmful subsidies, and greater recognition of the value of the goods and services biodiversity contributes to economic prosperity and poverty eradication.
- Recognise the human right to a clean, healthy and sustainable environment, and embed this in all policies and programmes to achieve the Global Biodiversity Framework.
- Ensure full and effective participation of Indigenous Peoples and local communities in conservation, including managing important sites for biodiversity, both inside and outside of protected areas.
- Strengthen the capacity of civil society organisations to undertake these actions and to advocate for their uptake by all of society.

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Dalmatian Pelican *Pelecanus crispus*. The Balkan population of this species has declined by 40% since 2021 following an outbreak of avian influenza. Photo © Florian Warnecke
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